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Degree of Eminence and View of Landscape of Peri-urban Agriculture: A Case Study of Delhi

GEETA BISARIA, GYAN PRAKASH SINGH, AMBUKANI P. AND SHALOO
Division of Agricultural Economics, Indian Agricultural Research Institute, New Delhi

Abstract

Delhi, NCT and NCR comprises area of 1483 and 33578 sq. Km respectively. 13.85 and 37 million people are living in Delhi NCT and NCR respectively. Thus it is the largest metropolis by area and the second-largest metropolis by population in India and eighth largest in the world. The population of Delhi grew at the rate of 3.85 percent which is higher than the national growth rate of population i.e. 1.95 percent during the last decade. The density of population was 10803 persons/Sq. Km in 2006 and estimated to reach at 12441 persons/Sq. Km in 2011. The per capita income of Delhi was Rs. 66,728 (US $1,450) at current prices of 2006-07 and ranked third after Chandigarh and Goa. It had 15-40% of net cultivated area of its geographical area, 100 percent irrigated area coupled with 161 percent of cropping intensity in 2007-08. Farmers allocated 58% of their cropped area towards vegetables. About 78 and one percent of marginal and small farmers and large farmers owned 35, and 10 percent of land respectively. Vegetables proved to be a regular source of income to marginal and small farmers in Delhi. Regarding all the three sectors of the Delhi's economy, tertiary sector was the major source of state net domestic product i.e. 92% followed by industrial i.e. 7 percent and only 1 percent from primary sector in 2007-08. The households of have higher disposable income as compared to rest of the country. State has a per capita income of US $ 1748 against a national average of US $ 540 (Department of Census Operations, Delhi; Central Statistical Organization) in 2007-08. Delhi's gross state domestic product (GSDP) grew at an impressive compound annual growth rate of 12.72 percent between 2000-01 and 2007-08 and reached to US $ 312 billion. This leads to fast urbanization, trade and commerce, rise in income and employment opportunities.

Key words: Geographical area, domestic product, urbanization, employment

Introduction

Population of Delhi has increased from 1.38 crores of in 2001 to about 1.60 crores in 2006 which has been expected to touch the extent of 1.84 and 2.80 crores in 2011 and 2026 respectively. Out of its geographical area of 1,14,488 ha or 1483 sq. Km. it had 38657 ha of gross cropped area plus 4000 ha of Yamuna river bed in 2006-07. It produced about 735 million tons of vegetables, 1.38 m. t. of fruits which is far behind the requirement of fast growing population. Though it also had a large number of livestock i.e., 91589 cows, 2,30,552 buffaloes and 16779 goats (National Agriculture Conference on Rabi, 2007) including male and dry animals too, but produced only 1.18 lakh tons of milk is in 2006-07 which accounted for only 11.70 percent of milk requirement of the city.

The metropolis, Delhi had Net State Domestic Product (NSDP) and a per capita income, respectively of Rs. 83,085 crores Rs. 53,976 for the year 2004–05 at current prices (Hand Book of Statistics on Indian Economy-2008-09). The tertiary sector contributes 78.4% towards GSDP of Delhi followed by secondary and primary sectors with 20.2% and 1.4% contribution respectively.

To manage supply of fresh food articles such as, fruits and vegetables, milk and its products, eggs, meat, fish etc. to the growing population in such a big cities has become a key issue since production of these commodities decreases due to continuous deceleration in agricultural area. Thus the gulf between demand and supply of these products has to be bridged from the suburban areas of the metro-cities. Important issues of peri-urban have attracted the attention of social scientists and researchers. Peri-urban dairy farming in mountains is distinguishable from the areas far flung from market place. Dairy is essentially a market oriented there. Ready market availability made small holders to produce more milk primarily for sale and earn cash income. This trend, however, leads to the reduction in milk to be retained at home for consumption by the household members. An increase in milk production will not only contribute more to cash income, but also ensure more milk available for family consumption (Babita Bohra et al 2004). Therefore, eminence of peri-urban agriculture

and landscape of Delhi has become a subject of study and with this backdrop efforts have been made for present study in this direction.

Data and methodology

For this purpose secondary data on population, demographic pattern, status of migration, land use pattern, cropping pattern, irrigated area, land holdings, composition of rural-urban area etc. were collected from published documents of Economic Survey of Delhi, NCT; Census and Agricultural Census etc from the offices of state Government and various ministries of India. Simple statistical tools, such as ratio and proportions, percentages, mean, growth rates and C.V. etc have been used to study the degree of eminence of agriculture in Delhi. Availability and requirement of agricultural commodities in Delhi during 2006-07 were estimated to comprehend the gap between demand and supply.

Population of Delhi and its Demographic Pattern

Population of Delhi has increased from 41 thousand in 1901 to about 1.4 million in 2001. Rate of growth of Delhi's population was almost double of national rate of growth of population (percent) during the above mentioned period. The highest growth rate i.e. 6.42% was noted between 1941 and 1951. The reason behind it was the mass migration of population from West Pakistan to India at the time of partition of the country in 1947. The deceleration in population growth had been witnessed during 1991-2001. During 2001approximately 12.82 million (93%) out of 1.4 million people live in urban area of Delhi whereas rest of 0.96 million (7%) in rural area and density of population was 10803 person/sq km. in 2006-07 (Table 1). The literacy rate was found more for male i.e., 88% than female i.e. 75% but life expectancy was found more for female i.e. 73 years than male i.e. 70 years. On other hand female-male ratio was 821/1000.

Table 1: Demographic pattern of Delhi, 2001

Total population (lakh)	139
Rural population (lakh)	10
Urban population (lakh)	128
Percent rural population	7
Population density (per sq. km)	9340
Literacy (percent)	81.7
Male	87.7
Female	74.7
Sex Ratio (female/1000 male)	821
Life expectancy (year)	71.2
Male	69.6
Female	72.8
Birth rate (per 1000)	15.0
Death rate (per 1000)	4.10

Source: Registrar General & Census Commissioner, New Delhi, India.

Migration of People

Delhi, the fifth fast growing city on the global map is not an exception. The growth rate of population in Delhi was quite higher due to migration of population from neighboring states like Uttar Pradesh, Haryana and other developing states. Table- 2 reveals that major migratory to Delhi were from Uttar Pradesh i.e. about 50 per cent during 1981-91 which decreased to 44 per cent during the next decade (1991-2001). It is noted that migration rate from all states except Bihar (11 to 14 percent) and West Bengal (2.79 to 3.18 percent) had decreased between the periods of these two decades. The reason for this decrease in migration rate may be initiation of more development activities in those respective states. As a result of this high rate of migration, Delhi has registered as one of the fastest growing cities in Asia.

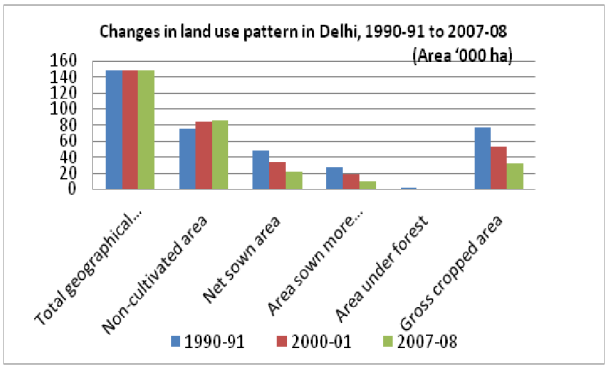
Table 2: Migration from various states to Delhi

State	Rate of migration (%) 1981-91	1991-2001
Uttar Pradesh	49.61	43.56
Haryana	11.82	10.26
Bihar	10.99	13.87
Rajashtan	6.17	5.16
Punjab	5.43	4.72
West Bengal	2.79	3.18
Madhya Pradesh	2.71	1.85
Other states	10.48	17.39

Source: Report of the Technical group on population projections constituted by the National Commission on Population, May, 2006

Land Use Pattern

Delhi, the metropolitan and cosmopolitan city has 1483 square kilometer which is about 0.05 percent of the country's geographical area. Changes in land use pattern depict the agricultural situation. Three points of period i.e. 1990-91, 2000-01 and 2007-08 were selected to observe the changes in land use pattern in Delhi which has been shown in figure 1.



Rise in non-cultivated area had been registered i.e.from 50.37 percent in 1990-91 to 57.42 percent in 2000-01 and 57.76 percent in 2007-08 which is very insignificant. On the other hand sharp decline had been observed from 48,400 ha (32.81 percent of geographical area of Delhi) in 1990-91 to 34,000 ha (23.05 percent) in 2000-01 and 23,000 ha (15.40 percent) in 2007-08. Likewise gross cropped area also registered a drop of 76,200 ha (51.66 percent of geographical area of Delhi) in 1990-91 to 52,800 ha (35.39 percent) in 2000-01 to 32,440 ha (about 22 percent) in 2007-08. It is a clear indication of decline in agricultural area in Delhi.

Changes in Cropping Pattern

Table 3: Changes in cropping pattern in Delhi, India, 1991-92 to 2007-08

Crop	Area (ha)		Share in grossed cropped area (%)	
	1990-91	2007-08	1990-91	2007-08
Wheat	30979	17482	27.9	20.7
Barley	649	75	0.6	0.1
Bajra	4755	1586	4.3	1.9
Maize	48	69	0.0	0.1
Jowar	14941	8837	13.5	10.5
Paddy	3282	7419	3.0	8.8
Gram	350	47	0.3	0.1
Brinjal	820	1600	0.7	1.9
Cauliflower	3644	5900	3.3	7.0
Okra	6275	2000	5.7	2.4
Peas	2834	500	2.6	0.6
Tomato	2834	1700	2.6	2.0
Onion	2024	1300	1.8	1.5
Potato	1883	1400	1.7	1.7
Others	34696	28900	31.3	34.3
Total fruits	69	55	0.1	0.1
Total flowers	801	5500	0.7	6.5
Gross cropped area	110884	84370	100	100

Source: Author's calculations with data from Delhi Statistical Hand Book (2008),

Decline in area under agriculture in Delhi has a crucial effect on cropping pattern. It is usually considered as an index of agricultural production. Table 3 shows that area under cereals has decreased about 50 per cent in 1990-91 to 42 per cent in 2007-08, whereas area under vegetable has increased from 50 to 58 per cent. This implies awareness of farmers of Delhi by taking advantages of producing cash crops (fruits and vegetables) which were the source of regular income to them. It is difficult for marginal and small farmers to put their scarce and limited sources for a whole season (if they take cereal crops) and wait for returns for a longer duration of 4-5 months. Area under fruits remains same i.e. about 0.1 per cent since the climate of Delhi is not suitable for fruits cultivation. It is interesting to note that during this period, area under flower cultivation had augmented from 800 ha to 5500 ha. It indicates that use of flowers in the city has increased in leaps and bounds during this period.

Irrigated Area

Water is a back bone of agriculture. Though the cropping pattern in Delhi had registered decline, but agricultural area is irrigated through canals, wells, and tube-wells and treated water from sewage. Water from sewage treatment plants is provided free to the farmers.

Compound growth rates associated with negative sign and high R^2 values is a clear indication of fast decline in net sown and irrigated area in Delhi which ultimately affect the production of agricultural commodities. Low CV indicate very less variations. Net area sown, net and gross irrigated area had been observed below their mean values after 2004-05 which again supported the fact that agricultural development, as per requirement, is not possible in Delhi (Table-4).

The perusal of this table shows that net irrigated area has increased from 85 per cent in 2001-02 to 100 per cent in 2007-08. Therefore, in Delhi there is no parched land which could be brought under irrigation. Similarly, area irrigated more than once had increased from about 31 per cent in 2001-02 to 44 per cent in 2007-08. Although, net irrigated area has decreased, but cropping intensity had increased from 142 per cent to 161 per cent between 2001-2 and 2007-08 which would not be helpful in increasing the

Table 4: Compound growth rates, mean, standard deviation and coefficient variation of irrigated area in Delhi during 2001-02 to 2007-08

	CGR	R^2	t-value	Mean	S.D	C.V.
Net sown area	-93	93	131.86*	27239.57	3940.995	14.47
Gross cropped area	-92	93	120.14*	38392.29	6209.746	16.17
Cropping intensity (%)	0			147.1429	7.967195	5.41
Net area irrigated	-96.3	44	73.23*	24347	2251.588	9.25
Area irrigated more than once	-101	2	17.19*	8501.857	2426.028	28.53
Gross irrigated area	-98.5	1	43.33*	33229.29	3751.181	11.29

agricultural production.

Land Holding

Land is the most crucial input for agricultural production and after visualizing the status of population and agricultural area in Delhi, let us study the degree of eminence of farmers of all categories in Delhi. While studying the land holding, number and operational holdings in Delhi in 2000-01 (Table 5) it is noted that Delhi NCT has total 28315 numbers of agricultural holdings with operational area of 43126 hectares. The share of marginal and small farmers in all holdings was about 78 per cent while they operate around 35 per cent or area. Large farmers who are one per cent in number operate about 10 per cent of land. Similarly, medium farmers who were approximately 21% in number owned 55% of land. The comparative statistics on number of holdings and area operated throughout the country and in the state of Delhi has registered decelerations which reveal the trend of urbanization of Delhi and conversion of agricultural land in to non-agricultural uses.

Table 5: Category-wise number and operational holding size in Delhi, 2000-01

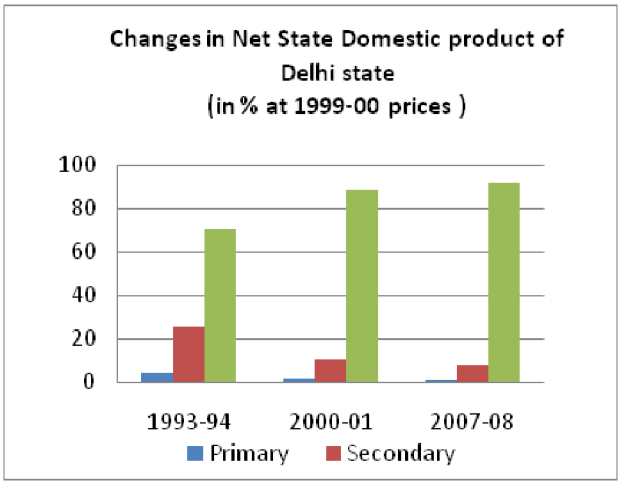
Size group	No. of operational holdings	Area operated (ha)
Marginal (<1 ha)	15922 (56.24)	6706 (15.55)
Small (1-2 ha)	6027 (21.28)	8339 (19.34)
Semi-medium (2-4 ha)	3866 (13.65)	11050 (25.62)
Medium (4-10 ha)	2226 (7.86)	12848 (29.79)
Large (> 10 ha)	274 (0.97)	4183 (9.70)
Total	28315 (100)	43126 (100)

Note: Figures in parentheses are percentage to the total area/ numbers.

State Domestic Product

Net state domestic product is a mirror reflecting the dominancy, share and contribution of the sector in an economy. Share of primary sector (agriculture, livestock, forestry and fishery) in Net State Domestic Product of Delhi had declined from 4 percent in 1993-94 to 1.44 per cent in 2000-01. On the other hand 88.22 per cent and 10.34 per cent share was contributed respectively by tertiary and secondary sector during this period. Three points of time i.e. 1993-94, 2000-01 and 2007-08 were selected to comprehend the change in the Net State Domestic Product of Delhi (Fig.2).

A secular decline in the share of agriculture and industry (secondary sector) and rise in the share of service sector (tertiary) had been noticed during the period initiating from 1993-94 to 2007-08. The declining share of industrial sector had been also noted and it may be due to the shift of Delhi industrial units outside the residential areas, keeping in view the environmental pollution. Smaller share of agriculture in NSDP may be due to demand for agricultural products increases less rapidly with economic development and rise in real income. Income elasticity of agricultural products in Delhi is inelastic which affects the labour cost and cost of the production of agricultural products which is high. Due to high labour cost, medium and large farmers did not cultivate labour intensive vegetables. Small and marginal farmers produce more vegetables than medium and large farmers as they utilized there family labour judiciously.



Occupational Structure

Secondary data at two points of time i.e. 1999-00 and 2004-05, on occupational structure in Delhi was collected. The perusal of the data reveals that the share of secondary sector had been increased from 29 per cent to 31 per cent between 1999-2000 and 2004. Similarly, share in primary sector increased slightly from 1.54 per cent to 1.71 per cent during the period mentioned above. It is interesting to note that tertiary employment registered a decline from 70 per cent in1999-00 to around 68 per cent in 2004-05 (table-6). Further rise in primary and small decline in tertiary sector was observed. This proportionate acceleration in agriculture and deceleration in tertiary sector is contrary to normal occupation structure which takes place with economic development. However, number of persons employed had been increased in both the sectors.

Distribution of persons engaged in various agricultural establishments in Delhi in 2005 indicated that in Delhi, 98 per cent persons in rural areas were employed in non-agricultural activities whereas remaining 2 per cent in agricultural activities such as cultivation of crops, rearing animals and fishing. No

rural worker had been found working in fishing occupation because fishing is new in Delhi and was considered somewhat an inferior occupation. In urban area almost all workers were found engaged in non-farm activities. Thus non-farm activities have been observed as dominating the economy of Delhi.

Table 6: Changes in occupational structure of Delhi

(Number in lakh)

Sector	1999-2000	2004-05
Primary	0.60 (1.54)	0.83 (1.71)
Secondary	11.15 (28.63)	14.91 (30.70)
Tertiary	27.19 (69.83)	32.83 (67.59)
Total	38.94 (100.00)	48.57 (100.00)

Note: Figures in parentheses are percentage to the total.

Availability and Requirement of Agricultural Commodities in Delhi

As per estimated requirement and availability of agricultural crops and milk in Delhi in year 2001 has it had been observed from the (Table-7) that 34,000 hectare of cultivated land produced only 1.2 lakh tones of foodgrains against its requirement of 20.12 lakh tones in 2000-01 which constitutes only 6 per cent of total requirement of foodgrains. Net sown area under pulses was found negligible in Delhi against requirement of 3.5 lakh tones. Similarly, vegetable production was found about 65 thousand tones against requirement of 12.54 lakh tones which constituted only 5 per cent of its requirement. Fruits production was not even one per cent of total requirement. Similarly trend was observed for milk. Milk production was 1.18 lakh tones against its requirement of 10.06 lakh tones constituting only about 12 per cent of requirement.

Table 7: Requirement and availability of agricultural, horticultural and milk products in Delhi, 2001

Commodity	Requirement (lakh tonne)	Availability (lakh tonne)	% of availability over requirement
Cereals	20.12	1.2	6.06
Pulses	3.50	0.0003	Neg.
Vegetables	12.54	0.65	5.2
Fruits	1.52	0.009	0.59
Milk	10.06	1.18	11.70

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Crop – livestock interaction to food security and sustainable development of agriculture for small and marginal farmers in north west India

Y.P.SINGH[1], R.K.NARESH, P.K.SINGH[2], H.L.SINGH[3], R.C.RATHI[4] AND SATYA VEER SINGH[1]
Deptt. of Agro. SVPU of Agri. Tech Meerut (U. P.), India.

Abstract

A major milestone in man's progress from primitive existence to civilized life was settled agriculture and domestication of livestock for drought power, milk and meat. Strangely, even now advanced industrial countries depend on livestock for milk and meat. Developing countries like India need animal power for agricultural operations and pulling carts and use of dung as fertilizer. Milk, eggs and meat continue to form a major source of food. Besides, skin and slaughter by products are used domestically and exported for earning foreign exchange. India lives in her villages, and livestock are part of the rural scene. Farmers not only produce food grains but also manage livestock. Thus farmers' income, agriculture and rural economy are heavily dependent on livestock. In fact, livestock is a major instrument of production of small farmers. Unfortunately, while food grain production is heavily supported through subsidies, livestock is largely neglected. Over the years, milk and the poultry sectors have been modernized and are adding substantial income to the rural economy. For the 70 m marginal and small farmers, livestock and adjunct equipments, such as agricultural implements and carts, are the main instruments of production. Though improved implements and carts have been developed during the last two decades, they are not being utilized due to lack of extension work to popularize them. Improved implements and carts as well as their better utilization would increase farmers' income, which, in turn, will increase agricultural production. Poverty level would then come down, rural development will get a boost, and finally, work and meat animals would suffer less. 80 million Drought Animals (DAs), mostly bullocks, make available 40 m horse power in as many points of application for ploughing and carting. DAs provide energy for ploughing 100 m hectares, forming 2/3 of the cultivated area. DAs haul 25 billion tonne km of freight in 14 m bullock carts (BCs). DAP saves 6 m tonnes of petroleum, valued at Rs. 12,000 crores ($2.4b) per year. Small and marginal farm lands are further getting fragmented, and dependence on DAP would continue. Mechanization of agricultural operations by tractors and transport by trucks should be encouraged, wherever technically feasible, economically viable and ecologically desirable. Replacement of DAP by petroleum based mechanical power would need an investment of Rs. One lakh crores ($20b), which is beyond the reach of marginal and small farmers. The livestock revolution is stretching the capacity of existing production, but it is also exacerbating environmental problems. Therefore, while it is necessary to satisfy consumer demand, improve nutrition and direct income growth opportunities to those who need them most, it is also necessary to alleviate environmental stress. Conventional agriculture is known to cause soil and pasture degradation because it involves intensive tillage, in particular if practised in areas of marginal productivity. Technologies and management schemes that can enhance productivity need to be developed. At the same time, ways need to be found to preserve the natural resource base. Within this framework, crop-livestock integrated farming system represents a key solution for enhancing livestock production and safeguarding the environment through prudent and efficient resource use. Integrating crop and livestock production has a number of advantages, including complementarities in terms of resource use and income and risk reduction

Key words: Food security, sustainable development

Introduction

Between 1960 and 1990 the world's human population increased by 75% from 3.1 billion to 5.4 billion but developing country populations increased by 97% from 2.097 billion to 4.138 billion (FAO, 1992).

[1]College of Vet. & Ani. Sci., SVPU of Agri. Tech Meerut
[2]Directorate of Extension, SVPU of Agri. Tech Meerut
[3]Deptt. of Ag. Eco., SVPU of Agri. Tech Meerut
[4] KVK,Saharranpur, SVPU of Agri. Tech Meerut

Food grain production per caput during the same period increased from 310 to 375 kg overall but from 190 to 260 kg in developing countries. In the late 1970s, 45 developing countries were unable to assure adequate food energy needs of 2200 calories per person per day for their populations and 25 of these countries were still in the same position in the late 1980s (Pinstrup-Andersen, 1994). There are now 800 million people suffering from malnutrition and hunger, not only due to insufficient production and inadequate distribution but also because the poor lack the income to acquire food of adequate quantity and quality to satisfy their needs (FAO, 1993a). -The world population is projected to increase from 5.4 billion in 1990 to about 7.2 billion in 2010. This increase will occur mainly in the developing countries and in urban areas and will have major effects on patterns of food production, marketing and consumption. Strategies are needed to ensure food security for the growing population, to increase income, to support economic development, and to protect the environment. Livestock production is a major component of the agricultural economy of developing countries and goes well beyond direct food production. Sales of livestock and their products provide direct cash income to farmers. Livestock are the living bank for many farmers and have a critical role in the agricultural intensification process through provision of draught power and manure for fertilizer and fuel. They are also closely linked to the social and cultural lives of millions of resource-poor farmers for whom animal ownership ensures varying degrees of sustainable farming and economic stability. Official statistics often underestimate the overall contribution of livestock and especially their multipurpose contributions to food and agricultural production in developing countries.

The meaning of food security has evolved since the first World Food Conference of 1974. It is now accepted that it relates to access by all people at all times to enough food for an active healthy life (Reuntlinger, 1985; World Bank, 1986; FAO, 1989) but the concept is used differently at different levels. At regional and national level it is equated with national or regional balances, i.e. between availability and need based on assumed per caput need. At household level, food security is equated with sufficiency of household entitlements - that bundle of food production resources, income available for purchases, and gift or assistance sufficient to meet the aggregate needs of all household members. Achieving food security in this case is largely determined by an assumption of minimum nutritional need. Security at the level of the individual is rarely, if ever, considered (Chen and Kates, 1994). Irrespective of the reference level, food balance is now considered an inadequate criterion for food security because availability may not guarantee access due to poor distribution or lack of purchasing power. There are many examples of coexistence of aggregate food self-sufficiency and widespread malnutrition end hunger. Food security is therefore defined by a combination of criteria that are not mutually exclusive (Chen and Kates, 1994), as:

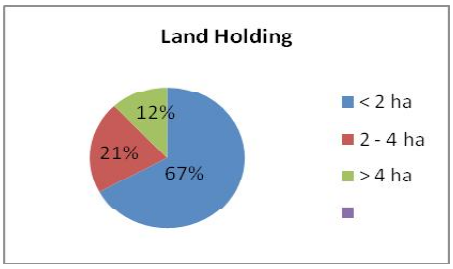
- balance between availability and need;
- absence of famine or temporary food insecurity;
- seasonal or chronic undernutrition;
- micronutrient deficiency, especially iron, iodine and Vitamin A; and
- nutrient-depleting illness such as malaria, diarrhoea and internal parasites.

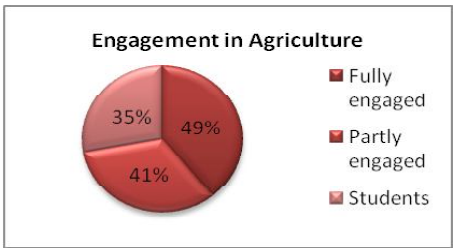
In theoretical and empirical literature food security is defined with reference to food grains. This is especially misleading for societies where roots and tubers are major sources of food and income and for mainly pastoral or livestock-based societies where livestock products are important sources of food and income (Anon, 1989). For example, foods other than cereals supply 40 per cent of total food energy for half of the sub-Saharan African population with the highest risk of food insecurity (FAO, 1993b). If food security is defined as "...access to enough food for an active healthy life" livestock can make a major contribution. An adequate quantity of balanced and nutritious food is a primary indicator of quality of life, human welfare and development. Animals are an important source of food, particularly of high quality protein, minerals, vitamins and micronutrients. The value of dietary animal protein is in excess of its proportion in diets because it contains essential amino acids that are deficient in cereals. Eating even a small amount of animal products corrects amino acid deficiencies in cereal-based human diets, permitting more of the total protein to be utilized because animal proteins are more digestible and metabolized more efficiently than plant proteins (Winrock, 1992, De Boer *et al*, 1994)."Quality foods ... derived from animal sources have major importance for optimizing human performance in chronically mild to moderately malnourished populations" (Diaz-Briquets *et al,* 1992). This is especially important for young children.

Materials and Methods

Biophysical, demographic, and socioeconomic profile

Initially, a baseline survey of randomly selected farmers from different villages was conducted to understand their social, economic, and educational status in addition to input use (seed, irrigation, tractor, labor, fertilizer, and pesticide use) and outputs (grain and straw yield) in conventional farmers' practices





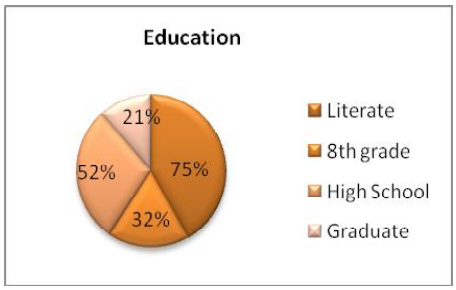


Fig. 1: Socio economics and demographics of project sites(a) land holding, (b) education and (c) engagement in agriculture of Uttar Pradesh, India

(CTTPR-CTBSW), that is, conventional-tilled, puddled transplanted rice (CT-TPR) and conventional till broad casting wheat(CTBSW). The study was conducted for three years from June 2008 to May 2010 in 50 farmers' fields at Sardar Vallabhbhai Patel University of Agriculture &Technology meerut sites in the North Western India. The area has a subtropical climate highly influenced by south western monsoon. Average annual rainfall was around 805 mm, more than 85% of which is received in June to September. Out of 50 farmers 67% had landholdings of <2 ha, 21% had 2 to 4 ha, and 12% had more than 4 ha (Fig. 1a). About 75% of the farmers were literate, out of which 32% were middle-school pass, 52% were high-school pass, and 21% were college pass (Fig. 1b). The literacy rate was higher for large farmers than for small farmers. The average family size was 5.4 family members for evaluation and promotion of integrated crop and resource management in the rice-wheat system in north western India per household. The large farmers usually lived in joint families, where as medium and small farmers had a separate nucleus family. Out of 270 family members of the 50 households surveyed, 49% were fully engaged in agriculture and 41% partly engaged, whereas 35% were students who also helped with agricultural activities during vacation and/or leisure periods (fig 1c). 38% of the farmers were members of different cooperatives existing in the area. Rice and wheat with livestock were the major source of income for 42% of the farmers, followed by sugarcane (44%), vegetables (12%), and oilseeds(9%).

Site characteristics

Fifty farmers were selected to conduct on-farm demonstrations of crop – livestock interaction in five districts (Meerut, Ghaziabad, Bulandsahar, Muzaffarnagar and Saharanpur) of western Uttar Pradesh (UP), India (28°402 073 Nto 29°282 113 N,77°282 143 E to 77°442 183 E) (Fig.1). The climate of the area is semi arid, with an average annual rainfall of 805 mm (75–80% of which is received during July to September), minimum temperature of 40C in January, maximum temperature of 41–45^{0}C in June, and relative humidity of 67–83% during the year. The soils are generally sandy loam to loam in texture and low to medium in organic matter content. Groundwater pumping is the predominant method of irrigation. Western UP has a diversified cropping system, with RW as the dominant cropping system. Wheat is grown by broadcasting after five to six dry-tillage operations and rice seedlings (3–4 weeks old) are transplanted in puddled fields after three to four dry-tillage operations.

Results and Discussion

Animal Husbandry is making a significant contribution to the national economy and socio-economic development in the country. In rural India where over 15-20% families are landless and about 80% of the land holders belong to the category of small and marginal farmers, livestock is the main source of livelihood. In the absence of fertile lands and assured irrigation which are controlled by a small population of rich farmers and lack of employment in the industrial and service sectors, most of the rural families belonging to socio-economically weaker sections of the society maintain different species of livestock to supplement their income. While the land owners prefer cattle and buffaloes, the landless prefer to own dairy animals i.e. buffalos, cows and sheep, goat and poultry. With the policy of the State Animal Husbandry Department to extend free breeding, and vaccination and permit free grazing on community lands, the farmers were encouraged to expand their herd size without any major financial burden. This has probably been the reason for the presence of the world.s largest livestock population in India. India ranks first in cattle and buffalo population, second in goat, third in sheep and seventh in Poultry. Although the population of livestock during last 10 years has

been stable around 485 million, the buffalo population has increased by 8.91%, while the cattle population has reduced by 6.89%. There has been a significant increase in the population of goats during the last five decades, which is attributed to the decrease in the size of land holdings and persistent drought caused by erratic monsoon, forcing many small farmers to shift from large animals to small ruminants.

An integrated farming system consists of a range of resource-saving practices that aim to achieve acceptable profits and high and sustained production levels, while minimizing the negative effects of intensive farming and preserving the environment. Based on the principle of enhancing natural biological processes above and below the ground, the integrated system represents a winning combination that (a) reduces erosion; (b) increases crop yields, soil biological activity and nutrient recycling; (c) intensifies land use, improving profits; and (d) can therefore help reduce poverty and malnutrition and strengthen environmental sustainability.

Diversified versus Integrated Systems

Diversified systems consist of components such as crops and livestock that coexist independently from each other. In this case, integrating crops and livestock serves primarily to minimize risk and not to recycle resources. In an integrated system, crops and livestock interact to create a synergy, with recycling allowing the maximum use of available resources. Crop residues can be used for animal feed, while livestock and livestock by-product production and processing can enhance agricultural productivity by intensifying nutrients that improve soil fertility, reducing the use of chemical fertilizers. A high integration of crops and livestock is often considered as a step forward, but small farmers need to have sufficient access to knowledge, assets and inputs to manage this system in a way that is economically and environmentally sustainable over the long term.

In an integrated system, livestock and crops are produced within a coordinated frame work. The waste products of one component serve as a resource for the other. For example, manure is used to enhance crop production; crop residues and by-products feed the animals, supplementing often inadequate feed supplies, thus contributing to improved animal nutrition and productivity (Fig.2). The result of this cyclical combination is the mixed farming system, which exists in many forms and represents the largest category of livestock systems in the world in terms of animal numbers, productivity and the number of people it services. Animals play key and multiple roles in the functioning of the farm, and not only because they provide livestock products (meat, milk, eggs, wool, hides) or can be converted into prompt cash in times of need. Animals transform plant energy into useful work: animal power is used for ploughing, transport and in activities such as milling, logging, road construction, marketing, and water lifting for irrigation. Animals also provide manure and other types of animal waste. Excreta has two crucial roles in the overall sustainability of the system.

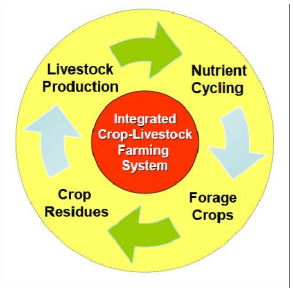


Fig. 2: Integrated crop-livestock farming system – Key aspects

(a) Improving nutrient cycling: Excreta contains several nutrients (including nitrogen, phosphorus and potassium) and organic matter, which are important for maintaining soil structure and fertility. Through its use, production is increased while the risk of soil degradation is reduced.

(b) Providing energy: Excreta is the basis for the production of biogas and energy for household use (e.g. cooking, lighting) or for rural industries (e.g. powering mills and water pumps). Fuel in the form of biogas or dung cakes can replace charcoal and wood. Crop residues represent the other pillar on which the equilibrium of this system rests. They are fibrous by-products that result from the cultivation of cereals, pulses, oil plants, roots and tubers. They are a valuable, low-cost feed resource for animal production, and are consequently the major source of nutrients for livestock in developing countries.

Transfer of nutrients and energy via crops and livestock. Crop-livestock interactions provide a key to ecological sustainability by intensifying nutrient and energy cycles. Crop residues are an important source of forage in smallholder farming systems. In the early dry season in West Africa, cattle spend up to 80% of grazing time on harvested fields, mainly those belonging to farmers rather than cattle-keepers (Bayer 1986). In terms of digestibility as well as crude protein and phosphorus content, the quality of crop residues is far superior to that of natural range at the same time of year. On Kenyan small holdings, an estimated 40% of annual forage energy is derived from crop residues (Stotz 1983). Weeds from cultivated fields, lower mature leaves stripped from standing crops, plants thinned from cereal stands, and vegetation on fallow fields offer additional fodder

resources related to food cropping. Crop residues are often traded and sometimes their monetary value approaches that of grain. Manuring recycles nutrients more quickly than natural decay of vegetation. It transfers nutrients from range to cropland and concentrates them on selected areas, thus slowing down soil exhaustion and allowing more efficient cultivation over longer periods. Where herding and cropping are practised by specialists, such as in parts of West Africa, pastoralists provide manure for farmers' fields in return for crop residues, feed supplements, watering rights, land-use (including cropping) rights and/or cash (e.g. FAO, 1983; Powell Waters-Bayer, 1985; van Raay, 1975; Toulmin, 1983).

Also where farmers keep some animals and pastoralists cultivate some land, the former rarely have enough animals to manure all their fields and the latter rarely cultivate enough land to provide sufficient crop residues for their animals. Therefore, farmers still depend on pastoralists for manure and pastoralists on farmers for crop residues. In smallholder farming areas, forage is derived primarily from land which is unsuitable for cropping ("wasteland" such as areas with rocky outcrops, wayside edges, and waterlogged land) and land which is temporarily not being cropped (harvested or fallow fields). These pieces of land are often interspersed between cultivated plots and are grazed by herded or tethered livestock, or the vegetation is cut for fodder. This permits a higher intensity of land use than if one area is used solely for cropping and another (e.g. ranch, grazing reserve) solely for livestock. Where livestock-keeping and cropping are spatially integrated, as in many tropical farming systems, a higher human population density can be supported than if they were spatially segregated.

Apart from the complementary use of land for cropping and grazing and the mutual benefits gained through manuring and crop residue grazing, the spatial integration of specialist pastoral and cropping groups permits easier market exchange of livestock and crop products between the two groups. Pastoralists also benefit from the infrastructure, e.g. roads, schools, dispensaries, designed primarily for settled farming communities. The resulting improvement in the pastoralists' quality of life contributes to the social and areas lead to sedentarisation of the pastoralists, the reduction in herd mobility and, thus, in the flexibility of forage resource use may reduce animal production and ecological sustainability.

Where animals are used for traction, as in Asia and North Africa, some of the energy gained from grazing range and temporarily noncultivated land is transferred to cropping. Farmers can cultivate larger areas with draught animals than by hoe. Since ploughs and harnesses can normally be manufactured locally, animal traction requires lower levels of external inputs than the use of tractors, which depends heavily on imports of fossil fuel and spare parts. An additional benefit of draught animals is that they provide manure. However, the ecological repercussions of keeping draught animals are site-specific: in some cases, they may cause overgrazing and environmental degradation on the pasture surrounding the village.

Livestock as suppliers of inputs and services for crop production

Draught power

Bovines, equines, Camelidae and elephants are used in draught operations as diverse as pulling arable implements and carts, lifting water and skidding logs. The number of animals used for draught is estimated at 400 million. About 52 per cent of the cultivated area in developing countries (excluding China) is farmed using draught animals against 26 per cent with hand-tools (Fig. 3). During the past ten years there has been a 23 per cent increase in the numbers of cattle and buffalo used for draught as well as meat and milk production. At the same time the number of equines used primarily for draught and transport has not significantly changed.

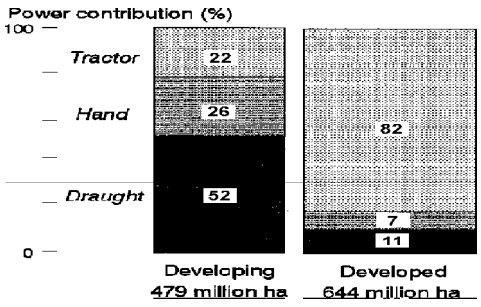


Fig. 3: Livestock use in draught animal power, in developing and developed countries in 1992

It is expected that draught animal use will decline slightly by the year 2000 in all regions except Africa. In Latin America and the Near East, tractor use will increase slightly while use of human power will increase slightly in Asia (Alexandratos, 1988). In areas such as semiarid and subhumid West Africa, where crop-livestock mixed farming is evolving and expanding, increased use of animal traction will help intensification and contribute to higher output and income (McIntire *et al*, 1992) and therefore to greater food security. In the 1960s and 1970s, rapid urban and coastal economic growth encouraged migration from the Sahel and increased the opportunity cost of using cattle for traction. In recent years, however, this cost has been decreasing due to coastal economic stagnation and it is likely that the situation is now more conducive to development of mixed farming and increased use of traction in the inland

countries (Delgado,1989).

At farm level, draught animal ownership patterns have implications for food production and security. There are positive correlations between draught animals and cereal crop production (Gryseels, 1988; Omiti, 1995). In many developing countries ownership is skewed. Many small and marginal farmers own none or an inadequate number of traction animals (BBS, 1986; Gryseels, 1988; Asamenew, 1991). Crop production of these farmers suffers due to late planting, poor quality tillage, use of low value crops needing less tillage and an inability to cultivate all available land. These problems may be aggravated after natural calamities such as flood or drought due to death or poor health of animals and increased draught animal prices (Jabber, 1990). Draught power economics are improved if one animal is used instead of two and if a cow is used instead of a male. This strategy reduces the cost of maintaining the larger herd necessary to satisfy replacements and milk production. Draught cows need, however, to be given additional feed if milk production and reproduction are not to be affected.

Manure

Nutrient recycling is an essential part of any strategy for sustainable agriculture. Integration of livestock and crops allows for efficient recycling through use of crop residues and by-products as animal feeds and for animal manure as crop fertilizer. Cattle dung contains about 8 kg of nitrogen, 4 kg of phosphate and 16 kg of potash per tonne of dry matter (Ange, 1994). In addition, manure returns organic matter to the soil, helping to maintain its structure as well as its water retention and drainage capacities Throughout the developing world, manure is the primary source of plant nutrients for traditional rainfed crops. Chemical fertilizers are expensive and applied mainly to high yielding varieties especially in irrigated conditions. A massive currency devaluation in the West and Central African Francophone countries in 1993 increased prices of fertilizers so much that farmers responded by applying more manure, by making compost in a systematic manner and by developing a market for manure (Sanders *et al*, 1995).

In areas where crop-livestock mixed farming is emerging manure is an important link. Manure is of paramount importance in these areas because most soils are fragile and of low inherent fertility. Only a small fraction of crop land receives adequate manure, however, and availability in a given year depends on the livestock population arid its species composition, location at manuring time, feed supply from range and crop land and efficiency of manure collection. Since crop and livestock production are not yet integrated on a wide scale, there is considerable loss of nutrients in the process of transfer from range-based livestock to crop fields. Nutrient flow may be further affected by drought-induced changes in livestock populations, species composition and animal mobility. For these reasons, it has been estimated that, in present production systems, animal manure is not adequate to sustain the current level of crop production in the semiarid areas because it requires a very high pasture area per unit of crop area (Fernandez-Rivera *et al*, 1994; McIntire and Powell, 1994: Williams *et al*, 1994). This is probably an interim problem because population pressure and market conditions will drive intensification in the future and crops and livestock will be more integrated. Loss of manure will then be minimized as it becomes critical for sustaining soil productivity. It has also been suggested that efficiency of manure use can be increased by joint application of manure and fertilizer and manipulation of the relative amounts and times of application of manure (Brouwer and Powell, 1994). Improved feeding, such as using urea-treated straw, improves manure quality which in turn gives higher crop yields. It is recognized, however, that achieving higher productivity in agriculture will require increased use of chemical fertilizers.

Dung for fuel and biogas

In many countries dung is valued as fuel for cooking and heating and for reducing expenditure for fuel wood or fossil fuels. It represents the major fuel for household use by millions of farmers in Asia and Africa and in parts of the Near East and Latin America. In India, 300 million tonnes of dung are used for fuel every year. The collection and drying of dung for cooking generates income for women. It is also used as plaster and as a building material. In an historical context, use of dung as fuel is a recent phenomenon prompted mainly by scarcity of fuel wood and represents a loss to plant nutrition. An individual household in a given situation tries, however, to maximise its use by allocations between manure and fuel and by taking into account the trade-off between the two. Unless chemical fertilizer can adequately compensate the use of dung for other purposes, this competition may negatively affect food production and food security in some situations. Biogas production may be a viable alternative to reduce competition between fuel and manure use. Biogas from manure is an excellent substitute for fossil fuel or fire wood. The best sources for these purposes are (in descending order) pigs, cattle, horse, camel, poultry (Kumar and Bisas, 1982). About 1 m3 of gas is produced from 25 kg of fresh cattle dung. Simple low-cost plastic biodigesters have recently been developed by a number of FAO/TCP projects, for example in Cambodia, Tanzania and Vietnam. Biogas production

on the farm reduces the workload of women by eliminating wood collection or the purchase of fuel. It is woman-friendly because of convenience, increased hygiene and the supply of services such as lighting, warm water and heating. Biogas can also be used to drive machinery such as water pumps. -Effluent from biodigesters can be recycled as fertilizer, with even better results than the original manure (Talukder *et al.* 1988), as a fish feed, or to grow azolla and duckweed. Biodigestion has positive public health aspects, particularly where toilets are coupled with the biodigester, and the anaerobic conditions kill pathogenic organisms as well as digesting toxins such as botulinum.

Availability of Feed and Fodder

Availability of feed and fodder is a major constraint in promotion of dairy husbandry in the country. It has been estimated that only 880 million tons of dry fodder was available including greens, which can meet only 35-40% of the demand. This clearly indicates that as most of the livestock are unfed, they are not able to perform optimally. Out of the available dry matter, most of it is available in the form of agricultural by-products and dried grass collected from community wastelands and forests which are of inferior quality. Similarly, the concentrates required for feeding the livestock are also in acute shortage. As a result, even the high yielding animals, which are presumably well-fed are suffering from nutritional imbalance. With regard to cultivation of forage crops, hardly 3-4% of the area is being utilised in selected pockets where dairy husbandry is prospering as an important source of income (Table 1). Further expansion of the area is possible only when the quality of livestock owned by farmers improves significant.

Table 1 :Land profile of the country

Geographical area	32.8 Crore ha
Gross Cropped area	17.5 ha
Forest	22.6%
Grassland and Pastures	3.5%
Barren Land	6.5% (Organic content less than 0-15%)
Saline-alkaline soil	9.96% P^H over 8.5
Cultivable fallow Land	4.92%

Source: Agricultural Research Data Book, 2006. ICAR, Krishi Bhawan, New Delhi-110001.

Scope for Development of Livestock Husbandry

It is because of the large number of unproductive animals that there has been severe storage of feed and fodder resources. With regard to the demand for milk, it has been estimated that by 2020, the country will need about 271 million tons of milk per annum Table 2). Milk being an important source of protein in India, particularly in rural areas, the demand for milk is likely to increase with the increase in rural prosperity.

Table 2: Project household demand for food in India at 7 per cent income growth.

Commodity	Annual household demand (million tonnes)				
	1991	1995	2000	2010	2020
Food grains	168.3	185.1	208.6	266.4	343.0
Milk	48.8	62.0	83.8	153.1	271.0
Edible oil	4.3	5.1	6.3	9.4	13.0
Vegetables	56.0	65.7	80.0	117.2	168.0
Fruits	12.5	16.1	22.2	42.9	81.0
Meat, Fish&eggs	3.4	4.4	6.2	12.7	27.0
Sugar	9.6	10.9	12.8	17.3	22.0

The demand for meat is likely to increase significantly because of increase in local consumption and severe shortage of meat in the Far East and South East Asian countries, opening an excellent opportunity for export. With the growing demand for various products, Animal Husbandry can provide good opportunity, particularly for the small and marginal farmers and the landless to improve their economy. Livestock development is a labour intensive activity which demands very close attention throughout the year. This will be a boon for the small farmers and landless who are mostly unemployed or under-employed. Thus, the rural families can certainly take active part in animal husbandry provided it is economically viable and the necessary infrastructure is available to support this programme. To transform the current status from negative contribution to profitability, particularly to benefit the weaker sections of the society, there is a need for a drastic change in the livestock husbandry policy and greater involvement of the private sector and local communities. The Animal Husbandry sector should be treated at par with the industry for availing finance and tax benefits and the government should encourage Public Private Partnership to attract larger investments, modern technologies and effective networking for forward and backward integration.

Livestock's share in Green House Gases

The important green house gases (GHGs) associated with livestock are methane (CH_4), nitrous oxide (N_2O) and carbon dioxide (CO_2). Methane gas is 21 times and N_2O is 310 times aggressive than CO_2 in contributing to climate change. The green house gases trap reflected solar radiation in the atmosphere and make the planet warm. Presently the GHG concentration in the atmosphere is 460 ppm CO_2-eq. This is estimated to increase to 550 ppm by 2020 under 'business as usual' situation. The global increase in carbon di oxide concentration are primarily due to fossil fuel use and land use change, while those of methane and nitrous oxide are mainly due to

agriculture (IPCC, 2007). A rise in CO_2-eq level of 100 ppm would result in an increase of temperature of 1^0C. There will be 5% reduction in rice yield for every 1^0C rise in temperature above 32^0C as it causes spikelet sterility. The potential effects of climate change on agriculture are yet uncertain and could be positive in some respects and negative in others. At the regional level, changes in precipitation and temperature patterns could jeopardize current agricultural practices.Warming will have many severe impacts. Rising sea levels will result in displacement of millions of people. The impacts of climate change are not evenly distributed. The poorest countries and people will suffer earliest and most. The frequency of extreme weather phenomena like floods, droughts, severe storms may perhaps increase, sea levels could raise threatening vulnerable coastlines around the world, and tropical diseases and pests that affect plants and animals could increase their range (Stern, 2006). The rapid increase in atmospheric concentrations of the three main human made greenhouse gasses – carbon dioxide, fluorocarbons and nitrous oxide and hydro-fluorocarbons (HFCs) and sulfur hexafluoride (SF6) are of great concern now. Energy information administration the Official energy Statistics from US Government showed that percentages methane was only 10% of total green house gases in US. As the sources of methane reportedly comes from landfills, coal mines, oil and natural gas operations, and agriculture, share of livestock in methane emission may be less than three per cent.

Fertilizer value of Farm Yard Manure

From the 284 million adult cow and buffalo units of India the annual FYM availability is 1376 million tonnes. Well rotten farm yard manure contains 0.4 to 1.5 % N, 0.3 to 0.9% P_2O_5 and 0.3 to 1.9% K2O. The maximum percentage of NPK available from farm yard manure is 1.5:0.9:1.9. So the total amount of nitrogen ,phosphorus, potash available from 1376 MT of dung from livestock is equal to 205.85 lakh tonnes, 109.79 lakh tonnes and 260.75 lakh tonnes respectively. The area under different crops in India and their annual NPK requirement is given in Table 3. The total annual requirement of NPK in India is 70.38 LMT nitrogen, 40.31 LMT phosphorus and 38.61 LMT potash. The comparative NPK requirement and its availability in FYM is given in Table 3 and it is clearly shown that the entire NPK requirement of the country can be met with the one third of FYM collected (CARTMAN-2010).

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Performance of Primary Milk Producers Cooperative Societies in Udham Singh Nagar Distt. of Uttarakhand

SHWETA ARORA, RUCHI RANI GANGWAR, VIJAY. K.PAL AND AJAY. K. SINGH[1]
Department of Agricultural Economics, College of Agriculture, G.B. Pant University of Agriculture and Technology, Pantnagar- 263145 (U.S.Nagar, Uttarakhand)

Abstract

Agriculture is very important sector of Indian economy providing employment, livelihood, food, nutritional and ecological securities to the country. Despite significant achievement on agricultural front, problem of poverty and unemployment has still been haunting rural economy. Crop production is prone to both drought and floods, leading to uncertainty in income of farmers specially marginal and small farmers. Thus dairying has emerged as major subsidiary occupation in agriculture for rural masses. India has emerged as a largest producer of milk in the world. Uttarakhand is characterized by the small milk producers having one to two milch animals using poor production technology. Thus their marketed surplus is very small, which makes them unable to sell their surplus economically in the nearby urban places. Though launched on Anand pattern, dairy cooperatives in Uttarakhand were proved not so successful. Less collection of milk in societies shows either lack of interest of producers in the milk unions or that the milk unions are out of the reach of the milk producers. This necessitates the analysis of performance of these societies .The investigation was conducted with the objectives to study functions of Primary Milk Producers Societies and to analyze economic viability of Primary Milk Producers Societies. The important findings of the study showed that Primary Milk Producers Societies failed in discharging there services of training to its staff members, regular visits by doctors to ensure A.I. and veterinary services to the animals, supply of quality seed, feed and mineral mixture. Various financial test ratio used to judge the viability of Primary Milk Producers Societies showed that there is a need to increase asset strength of small and medium societies in order to improve their stability and economic viability.

Key Words: Primary Milk Producers Cooperative Societies, Economic Viability, Dugdh Utpadak Sahkari Sangh (DUSS), Financial Test Ratios.

Introduction

Dairying has emerged as major subsidiary occupation in agriculture for rural masses. This has been so because of the fact that majority of farmers are small, marginal and have surplus family labour along with limited land holding. Therefore dairy enterprise suits well to the situation as it is labour intensive in nature that provides better opportunity for gainful employment of surplus family labour. Livestock sub-sector alone contributes to 25 percent of the total value of agricultural GDP of the country. GDP growth rate in agriculture has been around two per cent during the past two decades but livestock sector is consistently growing at the rate of 4-5 per cent (Indian Dairyman). This has paved the way for India to become the largest producer of milk in the world ,with an annual production of 108.5 million tonnes by 2008-09 (Economic Survey 2009-10). In addition India is a net exporter of milk and milk products and Indian livestock sector contributes about 0.6 percent in country's export. Hence dairying has important role in economic growth of the country. Contrary to this the per capita availability of milk has increased from 112 grams per day in 1968-69 to 258 grams per day in 2008-09, but is still low compared to the world average of 265 grams per day. Therefore there is a need to improve further upon its performance.

Uttarakhand is characterized by the small milk producers having one to two milch animals using poor production technology. Thus their marketed surplus is very small, which makes them unable to sell their surplus economically in the nearby urban places. As a result, milk producers are exploited by monopoly powers of milk vendor and middlemen operating in the area. This led to the cooperative movement in dairy production and primary milk producers cooperative societies were organized to cope up with

[1]Senior Research Fellow

the problems faced by small and individual milk producers in the state. Though launched on Anand pattern, dairy cooperatives in Uttarakhand were proved not so successful. Less collection of milk in societies shows either lack of interest of producers in the milk unions or that the milk unions are out of the reach of the milk producers. This necessitates the analysis of performance of these societies. Keeping in mind the above facts, the present study is an effort in this direction and has been undertaken with following specific objectives.

1. To study the functions of Primary milk producers cooperative societies.
2. To analyse the economic viabilities of Primary milk producers cooperative societies.

Methodology

The present study was conducted in Udham Singh Nagar Distt. of Uttarakhand. As amoung 13 districts of this state Udham Singh Nagar ranks first in the procurement of milk under organized sector through cooperative milk marketing. In the first step of selection of Primary Milk Producers Societies (PMPS), all the registered societies under Dugth Utpadak Sahkari Sangh (DUSS), Rudrapur were stratified into functional societies and closed down societies. Out of total societies registered at DUSS, Rudrapur 424 were functional societies and 79 were closed societies. The functional societies were further classified into three sizes/categories according to the daily milk procurement Viz small, medium and large societies. The societies procuring 0-100lts. milk per day were considered as small societies, societies procuring 100-200lts. milk per day were considered as medium sized societies and those societies procuring more than 200 lts. milk per day were considered as large societies. Then from each of these category ten societies were randomly selected for the detailed study. Thus a total of 30 societies were taken for the study purpose.

Ø In order to achieve the first objective of the study i.e. the functions of PMPS. The relative percentage of various activities in the total income of the society was also calculated.

Ø To analyse economic viability of PMPS under second objective following financial test ratio's were calculated:

$$\text{i. Operating Ratio} = \frac{\text{Total operating expenses}}{\text{Gross income}}$$

Where total operating expenses included milk purchase, salary expenditure, animal feed purchase, seed purchase, mineral mixture purchase, vaccine purchase, semen purchase, retail expenditure etc. While Gross income was calculated by summing up the total receipts separately viz. milk sale, commission from milk sale, local milk sale, animal feed sale, sale of vaccine, semen, mineral mixture, seed, ghee etc. This ratio is the measure of economic efficiency of the societies and it should be less than one to prove economic viabilities of these societies.

$$\text{ii. Gross Ratio} = \frac{\text{Total Expenses}}{\text{Gross Income}}$$

Where total expenses included fixed and operating expenses. Items included under fixed expenses were depreciation on dead stock, depreciation on building, audit fee. And operating expenses and gross income were considered same as for computing operating ratio. The profitability of the societies is measured by using gross ratio. The society will be considered as economic feasible society if its gross ratio is less than one.

$$\text{iii. Rate of Return on total expenses} = \frac{\text{Net Profit}}{\text{Total expenses}}$$

Net profit is the difference between gross returns and operating expenses and total expenses includes fixed and operating expenses as considered in case of computing gross income. For proving societies to be economically viable, rate of return over total expenses should be less than one.

$$\text{iv. Net Capital Ratio} = \frac{\text{Total assets}}{\text{Total liabilities}}$$

Items included under total assets of the societies were Ghee stock, mineral stock, animal feed stock, vaccine stock, semen stock, dead stock, bank saving account, share in Sangh, building value. Total liabilities on the other hand included producers overdues, sangh animal feed, sangh ghee, sangh mineral, payments due, share capital, sangh Milk Testing Unit (M.T.E). This ratio indicates liquidity position of the societies, it should be greater than one.

Results and Discussion

Milk Collection

The milk collection at the PMPS is done twice a day. The Union collects the milk from the PMPS and send it to the chilling plant. For this purpose all the PMPS are grouped into different routes. Members of the society take their produce to milk collection depot, where the secretary of the society test it for fat and SNF percentage through lactometer or through Milko tester. The total milk delivered by the member of the society is then recorded in the passbook issued to each member along with fat and SNF percentage and the remaining amount of milk is pooled in a lot known as can. This can is transported to the roadside point from where the vehicle of the union carry it to the Union. The collected sample milk is also sold. The milk received at the union is again tested for fat

and SNF percentage then the milk is taken to the chilling plant .The milk received from each society is entered in the name of the respective society at sangh level. The average daily milk procurement of DUSS, Rudrapur was 63636 Kgs with a total liquid milk sale of 28462 litres till December, 2008.

Supply of technical inputs to the society.

Distribution of seed for fodder:

Primary Milk Producers societies provides facility of supply of seeds for fodder to its members. The seed is purchased from the sangh by the PMPS and sold to the members of the societies. But during the study, it was found that the members are not satisfied with the quality of the seed, neither the supply for the fodder seed was at appropriate time. Table 1 depicts that average fodder seed sold by the selected societies was Rs. 1133.5 per annum and its share in overall income of the society is 0.253% respectively. Regarding distribution of mineral mixture the members are also not satisfied with its quality. The average mineral mixture sold by the societies to its members was only Rs. 1357.9 per annum, contributing only 0.161% of the total income of the societies as indicated in table 1.

Animal Health Cover:

It was found that doctor visit the societies when there was request for the treatment of some milch animals. For which the owner of the animal has to pay rupees 50 as registration fee. Members also pointed out that even after informing about their sick animals doctors do not attend them immediately, sometimes there was lapse of two to three days. During the investigation it was also found that camps were held at every two to three months and members get their animals treated satisfactorily. Table 1 indicates that the average number of veterinary first aid provided to selected societies were only 66 per annum and its share in total income was 0.006 percent.

Artificial Insemination (A.I.):

In order to provide the breeding services, frozen semen and liquid nitrogen is provided at PMPS level by DUSS. It was noted that there was shortage of trained A.I. workers at the society level. Only two A.I. centers had trained A.I. workers which were located at the societies in the interior areas. The members of the societies however were found reluctant to go to these A.I. centers located in the interior areas. Some of the members go to the government veterinary hospitals/A.I. centers to get their animal served. Table 1 shows that the average number of A.I. cases handled by the selected societies are 35 and its share in total income of the society is 0.019 percent only.

Annual meeting for bonus distribution:

At the end of each financial year a general meeting is held is presence of all the members of the society. Out of the total profit generated at society level, 25 percent goes to the reserve fund, 1 percent or a minimum of Rs. 500 goes to education, 5 percent is devoted to the charity fund. Workers of the societies also get bonus, as 4 percent of the profit generated by the society or its monthly income whichever is low. Two percent of the profit that is generated by the society goes to the advertisement fund. Out of the total profit that is to be distributed, 75 percent goes as bonus to the members of the societies.

Thus we can interpret that sale of milk is the most important activity performed by PMPS and it contributes highest percentage share in total income (84.30%) followed by sale of animal feed (7.12%) and sale of milk products (2.27%) respectively. While in case of milk products 80 percent margin received from sale of milk products i.e. Ghee goes to the secretary and rest 20 percent goes to the society.

Table 1: Level of various activities performed by small, medium and large societies and their respective contribution in the income of the society.

Activities	Share of the societies (Rupees/annum)				Relative Percentage of various activities in total income of the selected societies (Rupees/annum)			
	Small	Medium	Large	Overall	Small	Medium	Large	Overall
Sale of Seed	884.0	937.5	1579	1133.5	0.159	0.21	0.39	0.253
Sale of mineral mixture	3022.6	236.0	1027.6	1357.9	0.097	0.037	0.35	0.161
A.I. Cases	20.00	40.00	45.00	35.00	0.0005	0.009	0.056	0.019
Veterinary First Aid	30.00	80.00	88.00	66.00	0.002	0.008	0.008	0.006
Sale of milk products	11913	11811	22767	11954	2.30	2.7	1.81	2.27
Sale of milk	328446	462813	1088014	626424	78.00	87	88.00	84.30
Vaccination	17.00	40.00	48.00	35.00	.026	0.031	0.19	0.082
Sale of semen	-	10.00	639.00	216.00	-	0.02	0.05	0.02
Sale of animal feed	39502	21785	96213	5250	8.36	5.00	8.00	7.12
Loan for milch animals	6000	9000	12000	9000	-	-	-	-

Thus it increases the profit of the secretary rather than society as a whole.

Economic viability of Primary Milk Producers Societies was assessed examining various financial test ratios:

For PMPS to be economic viable Operating ratio, Gross ratio, Rate of return over total expenses and Net capital ratio was computed for each society employing formula discussed earlier and is indicated in Table 2. Among small PMPS (procuring less than 100 lts. milk per day) showed operating ratio's calculated during last three years ranges between 0.80 to 1.0. This depicts that societies were working not too efficiently while medium PMPS (procuring 100-200 lts. milk per day) showed operating ratios as 0.76 to 0.97 depicts that some societies were more efficient as compare to smaller societies and large societies gave a range of operating ratio as 0.81 to 0.97. Maximum operating ratio was found in small size societies and minimum operating ratio in medium sized societies i.e. 0.76 which indicates that total operating expenses incurred to earn one rupee income

Table 2(a) : Financial test ratios of the small societies for the year 2001-2002, 2002-2003, 2003-2004.

Ratios	Yr.	Name of the societies*									
		1	2	3	4	5	6	7	8	9	10
Operating Ratio	01	0.995	0.981	0.891	0.912	0.834	0.94	0.88	0.854	0.915	1.0
	02	0.960	0.915	0.973	0.878	0.836	0.864	0.984	0.952	0.802	0.91
	03	0.992	0.906	0.965	0.885	0.844	0.881	0.98	0.971	0.808	0.963
Gross Ratio	01	0.996	0.984	0.893	0.914	0.837	0.941	0.884	0.859	0.919	1.0
	02	0.967	0.916	0.978	0.882	0.840	0.865	0.989	0.957	0.805	0.92
	03	0.996	0.912	0.967	0.892	0.847	0.883	0.989	0.97	0.811	0.967
Rate of Returnx	01	0.0049	0.018	0.122	0.096	0.197	0.063	0.135	0.169	0.091	0.002
	02	0.041	0.093	0.026	0.137	0.194	0.156	0.115	0.05	0.245	0.008
	03	0.007	0.102	0.036	0.128	0.183	0.134	0.015	0.028	0.236	0.038
Net Capital Ratio	01	1.07	0.93	1.23	0.95	1.16	0.90	1.04	1.12	0.96	0.92
	02	0.95	1.08	0.99	1.096	1.28	0.98	1.03	0.99	1.007	1.02
	03	0.95	1.04	0.99	1.04	1.05	1.05	1.03	0.95	1.09	0.97
Net Worth	01	515	3011	18894	302	15110	9179	5962	6219	2406	31730
	02	580	8236	-119	1505	7257	1864	4493	301	208	50582
	03	-710	4262	-47	556.8	3361.2	3161.3	981.1	-3136	3515	-11509

* 1-10 indicates chronological arrangement of selected societies under study.

Table 2(b): Financial test ratios of the medium societies for the year 2001-2002, 2002-2003, 2003-2004.

Ratios	Yr.	Name of the societies*									
		11	12	13	14	15	16	17	18	19	20
Operating Ratio	01	0.965	0.76	0.95	0.942	0.975	0.77	0.953	0.857	0.967	0.894
	02	0.994	0.86	0.938	0.828	0.863	0.84	0.822	0.919	0.875	0.955
	03	0.98	0.947	0.792	0.828	0.88	0.90	0.954	0.90	0.97	0.951
Gross Ratio	01	0.968	0.77	0.956	0.947	0.982	0.78	0.955	0.86	0.972	0.899
	02	0.998	0.864	0.942	0.833	0.872	0.844	0.823	0.923	0.878	0.958
	03	0.99	0.95	0.796	0.833	0.922	0.905	0.957	0.908	0.98	0.955
Rate of Return	01	0.036	0.301	0.048	0.060	0.025	0.286	0.049	0.165	0.031	0.117
over Total	02	0.005	0.16	0.064	0.206	0.156	0.189	0.215	0.086	0.142	0.046
expenses	03	0.010	0.05	0.26	0.206	0.122	0.109	0.048	0.103	0.023	0.051
Net Capital Ratio	01	1.061	1.12	1.01	0.731	0.775	0.93	0.676	1.14	1.09	1.37
	02	0.88	1.42	1.28	1.33	1.03	1.01	1.05	1.00	1.2	1.08
	03	0.926	1.04	1.35	1.13	0.97	1.04	1.013	1.01	0.97	1.01
Net Worth	01	1807	3494	561	8428	37891	-1994	18141	6240	355	5805
	02	3541	14762	17414	6253	912	276	2730	300	13355	13434
	03	2314	2370	13894	4104	-1096	1059	980	997	1533.95	742

* 11-20 indicates chronological arrangement of selected societies under study

Table 2(c): Financial test ratios of the large societies for the year 2001-2002, 2002-2003, 2003-2004.

Ratios	Yr.	Name of the societies*									
		21	22	23	24	25	26	27	28	29	30
Operating Ratio	01	0.975	0.953	0.89	0.959	0.965	0.82	0.904	0.907	0.892	0.908
	02	0.86	0.810	0.92	0.903	0.889	0.918	0.805	0.897	0.867	0.90
	03	0.94	0.922	0.92	0.942	0.916	0.936	0.971	0.935	0.744	0.938
Gross Ratio	01	0.97	0.955	0.90	0.962	0.967	0.83	0.906	0.91	0.894	0.91
	02	0.872	0.812	0.93	0.907	0.892	0.921	0.806	0.899	0.877	0.902
	03	0.949	0.925	0.93	0.946	0.919	0.938	0.972	0.937	0.75	0.939
Rate of Return	01	0.025	0.048	0.113	0.042	0.036	0.206	0.105	0.102	0.119	0.1005
over Total	02	0.150	0.23	0.076	0.106	0.124	0.088	0.242	0.114	0.151	0.109
expenses	03	0.202	0.083	0.07	0.06	0.090	0.067	0.029	0.068	0.33	0.065
Net Capital Ratio	01	1.89	1.68	2.05	2.06	1.16	1.74	1.002	1.32	2.08	1.69
	02	1.88	0.99	2.05	2.03	2.7	2.01	1.08	1.206	2.06	1.49
	03	1.86	1.68	1.83	1.91	2.8	2.73	2.52	1.45	2.008	1.46
Net Worth	01	869	113260	112147	30735	96641	579619	423	40667	127400	64990
	02	82850	-183	101291	217553	108503	670386	15724	27840	142900	53027
	03	106140	411271	113012	123853	138062	171195	156949	49950	81527	49982

* 21-30 indicates chronological arrangement of selected societies under study

on medium societies was less than small and large societies. Maximum operating ratio were found in small societies due to lack of availability and efficient utilization of resources and proper management amoung small societies. Thus we can conclude that the medium sized societies were working more efficiently as compare to large and small societies. Gross ratio worked out during the last three years for the small sized societies ranges between 0.80 to 1.0 and for medium sized societies it ranged between 0.82 to 0.99 and lastly for large societies ratio had decreased ranging between 0.75 to 0.97. Minimum gross ratio was found in large societies and were found to be more profitable one as compared to small and medium societies. Maximum gross ratio appeared in small societies i.e. 1.0 such a picture depicts that some small societies were not much efficient and not even profitable. The rate of return over total expenses indicated the efficiency of a firm/society. This ratio was found maximum in medium sized societies i.e. 0.286 and minimum in small sized societies i.e. 0.007 during the last three years. This result also showed that medium sized societies were more efficiently working than small and the large societies. Lastly net capital ratio was calculated to asses the performance of the selected societies. This ratio indicates the liquidity position of the societies and thus determine their stability. This ratio was found to be highest in large sized societies i.e. 2.7 indicating high assest strength as compared to small and medium societies and minimum ratio found in medium societies i.e. 0.775 indicating though they were having high efficiency ratios but if their assest strength (lacking supply of efficient machinery and equipments by the Union) is not improved over time they can be insolvent.

Thus from the following ratio, we can conclude that medium sized societies were more efficient as compare to small and large societies, but large societies were more profitable as they were having high gross ratio and had more asset strength.

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Impact of front line demonstrations on pearl millet in Churu district Rajasthan

O. P. SHARMA, P S TANWAR[1] AND R. P. SINGH[2]
Subject Matter Specialist (Agronomy) Krishi Vigyan Kendra (Gandhi Vidya Mandir) Sardarshahr distt. Churu (Rajasthan)

Abstract

Front line demonstrations on pearl millet were conducted by KVK at farmers' fields in various parts of the district during kharif 2007 to kharif 2010. The present study was carried out to assess the impact of demonstrations in terms of yield of pearl millet as well as adoption of demonstrated technologies. The average yield of pearl millet in demonstration was 23.89 percent higher than local check fields (av. 7.45 q/ha). The study revealed that adoption level of demonstrated technologies was higher in case of demonstration beneficiaries as compared to non beneficiaries. Hence, conducting front line demonstration with appropriate low cost inputs seems quite fruitful in terms of yield improvement; benefit cost ratio as well as adoption level of technological interventions carried out during the course of demonstration. The demonstrations had significant association (pL 0.01) on adoption of various technologies.

Key words: front line demonstration, demonstration beneficiaries,

Introduction

Dry land farming is the main occupation of farmers in district Churu. The district falls under agro climatic zone Ic (*Hyper and partially irrigated plain zone*) in north Western Rajasthan. About 96 percent area is rainfed with mean annual rainfall of 330 mm. Traditional crops like pearl millet, mothbean, Moongbean, clusterbean, etc. are grown in kharif season only. Pearlmillet (*Pennesetum typhoides* L) popularly known as 'Bajra' is main cereal crop grown in all parts of the district. Despite wide area covered under the crop, it has been observed that the crop productivity is very low (i.e. 364 kg/ha). Being a staple food grain as well as fodder crop, constant demand of pearlmillet is there. It established the pearlmillet area in around 37.6% of total sown area (11.10 lac ha,). It is of great importance to improve the productivity of pearlmillet and revival of the dry farming in the district. Earlier, it has been experienced by Sharma (2003) that FLD on mothbean under similar conditions has boosted the yield at farmers' field and demonstrated technologies are in adoption constantly. Prior to initiate the FLD programme in the area, the causes of low productivity were discussed with farmers and analyzed. It has been observed that along with low rainfall coupled with frequent drought conditions, other reasons of low productivity were use of local seed, poor soil fertility, improper intercultural operations, no plant protection measures, etc.

Materials and methods

Front line demonstrations in pearlmillet were conducted from kharif 2007 to kharif 2010 on 102 farmers' fields (66 ha) in different villages viz Bukansar, Bholusar, Gajusar, Dhani pachera etc. of the district Churu as rainfed (Table 2). The demonstrations were aimed to demonstrate the production potential of various high yielding varieties of pearlmillet recommended for the area. Certified seed of HYV of pearlmillet were provided as critical input while non monetary inputs like timely sowing, timely weeding nutrient management etc. practices were taken care through farmers training, field visits, field days etc. and followed in the demonstration programme. Yield data of pearlmillet were recorded from demonstration and non demonstration (non beneficiaries) farmers and compared with respect to percent increase in yield as well as monetary returns. To assess the impact of demonstrated technologies, a comparative study was carried out with 80 beneficiaries who have been involved in demonstration programme. Similarly, 80 farmers from the same area as non beneficiaries were randomly selected to find out the adoption level with respect to demonstrated technologies. As shown in Table 1, demonstrated technological interventions included a

[1] Programme Coordinator, KVK GVM Sardarshahr Distt. Churu Rajasthan

[2] Associate Director Extension, KVK Hastinapur SVPAUA& T Meerut

Table 1.Technological interventions carried out in demonstrations fields

Sl. No.	Practice	Details
1	Quality seed	Provided improved seed of pearlmillet
2	Seed rate	Used appropriate seed rate to maintain optimum plant population
3	Sowing time	Sowing done timely
4	FYM application	Added organic matter through FYM/ domestic waste
5	Weeding	Performed timely weeding
6	Nutrient management	Efforts were made to maintain soil fertility through domestic wastes

few critical inputs such as quality seed of improved varieties recommended for the area which have been provided by KVK and followed practices like timely sowing, appropriate seed rate, timely weeding, soil nutrient management etc.

Results and Discussion:

The data in table 2 revealed that higher pearlmillet yield was obtained in demonstration fields as compared to local check fields. The increment in yield ranged from 16.67 to 28.57 percent in different years. Higher benefit cost ratio was also observed in demonstration plots ranging from 1.74 to 3.39 with average of 2.32 as compared to local check average of 1.79. This indicates that pearlmillet cultivation with demonstrated technologies is economically viable.

Table 2. Yield of pearl millet under frontline demonstrations and local checks.

Year	Area (ha)	No. of demon.	Variety	Av. Yield (kg/ha)				% increase Demon. over local check	B:C ratio Demon.	B:C ratio Local check	Remarks
				Max.	Min.	Av.					
2007 mid season	30	30	ICTP 8203	12.6	8.2	9.61	7.9	21.65	2.36:1	2.18:1	Long dry spell in
2008	16	32	Raj 171	13.8	8.6	10.8	8.4	28.57	3.39:1	2.29:1	Normal rainfall
2009	10	20	HHB67 improved	8.8	3.6	6.3	5.4	16.67	1.74:1	1.08:1	Deficient rainfall
2010	10	20	HHB67 improved	12.6	9.2	10.21	8.12	25.74	1.79:1	1.60:1	Above normal rainfall
Total	66	102									
Average				11.95	7.4	9.23	7.45	23.89	2.32:1	1.79:1	

The data (Table 3) on comparative study with a view to assess the level of adoption of demonstrated technologies were analyzed. The study revealed that level of adoption was higher among beneficiary farmers who were provided seed material and training on improved package of pearlmillet cultivation. The data revealed that adoption HYV, recommended seed rate, timely sowing, timely weeding and urea top dressing was significantly higher i.e. 88.75, 70, 80, 78.75 and 68.75 percent of beneficiaries, respectively. The percentage adoption of these interventions by non beneficiaries was only 21.25, 40, 56.25, 22.50 and 6.25, respectively. As indicated in the Table 3 that adoption of these interventions is closely associated with the FLD beneficiaries and reflects the impact of front line demonstrations at farmers' fields. Similar results on FLD pearlmillet in Haryana state have been reported by Kumar *et al* (2010). They reported that the newly developed hybrids have added the advantage of 8.0 to 31.1 percent higher yield as compared to existing cultivars. Sachan *et a*l (2009) also realized the impact of frontline demonstration on mustard in terms of economic viability as well as adoption of the demonstrated technologies.

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Table 3 Adoption of improved practices of pearlmillet cultivation by beneficiaries of FLDs and non beneficiaries

Sl. No.	Practices	Beneficiaries (n=80)	Non Beneficiaries (n=80)	Chi square
1.	Use of HYV			
	Yes	71(88.75)	17 (21.25)	92.04**
	No	9(11.25)	63(78.75)	
2.	Use of recommended Seed rate			
	Yes	56 (70)	32(40)	18.18**
	No	24 (30)	48(60)	
3.	Timely sowing			
	Yes	64(80)	45(56.25)	12.99**
	Np	16(20)	35(43.75)	
4.	FYM application			
	Not applying	9(11.25)	54(67.50)	
	Doing less than 5 t/ha	33(41.25)	21(26.25)	70.34**
	Between 5-10 t/ha	29(36.25)	5(6.25)	
	More than 10 t/ha	9(11.25)	0	
5.	Timely weeding			
	Doing timely at 30-45 DAS	63(78.75)	18(22.50)	65.02**
	Doing later	13(16.25)	40(50.00)	
	Not doing	4(5.00)	22(27.50)	
6.	Fertilizer application			
	N application through urea top dressing	55(68.75)	5(6.25)	108.33**
	N &P application at sowing	10(12.50)	0	
	Not doing at all	15(18.75)	75(73.75)	

(Figures in parentheses indicate percentage of variables)
** significant at 1% level

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Effect of carbon and nitrogen sources on growth of *Rhizobium leguminosarum* in a inoculam fermentor production of inoculants

A. K. KATIYAR[1] AND S.P. GANGWAR
Associate Director Soil Science, S.V.B.P. Univ., Krishi Vigyan Kendra – Pilibhit (U.P.)2620012

Abstract

A study was conducted legume inoculants production project at G B Pant Univ. Pantnagar during 2002 –03. Different levels of inoculum and sources of carbon and nitrogen for fermentor grown R. leguminosarum *bv. phaseoli strain FB-77 were examined to select the best combination of inoculum load, source of carbon and nitrogen for large scale production of inoculants. The combination of cane sugar and baker's yeast extract as medium was comparable in terms of viable counts and nodulation to traditionally used combination of mannitol and yeast extract at 5 % inoculum load in 10 liter capacity fermentor. The growth in cane suger in baker's yeast extract did not adversely effect the infectivity of strain FB-77, when tested with frenchbean var. Contender in sterilized sand pots and under field conditions. The field observations showed significant increase in number of nodules (28 nodules plant^{-1}), plant dry weight (44.7 g plant^{-1}), N content (3.3%) and grain yield (13.9 q ha^{-1}) due to inoculation of strain FB – 77 grown in a combination of cane sugar and baker's yeast extract as carbon and nitrogen sources in the growth medium.*

Key Words : Rhizobium, Inoculum, Carbon & Nitrogen sources, Bio-reactor

Introduction

Growth of rhizobia in liquid medium is a standard laboratory practice which needs a change of scale to be used for commercial production. Rhizobia are easy to grow if provided proper temperature, adequate nutrients and oxygen. Rhizobia have a generation time 2-8 hrs., with an aeration requirement of 5-10 liter air/liter medium/hr., to attain optimum growth at 28-30° C (Beck et al 1993). Rhizobial strains vary in their abilities to utilize different carbon and nitrogen sources, therefore it is desirable that strains selected for inoculant production should be evaluated in relation to their efficiency of utilization, availability and cost of carbon and nitrogen sources. Most often choosen formula will depend on locally available materials, but this medium should be able to support growth of high number of rhizobia.

Materials and Methods

An actively growing broth of *R. leguminosarum* bv. phaseoli strain FB – 77 having 5 X 10^8 cells ml^{-1} was inoculated @ 1 percent into pre sterilized YEM broth in a 10 litre capacity fermentor. The experiment then repeated after one week with 5, 10, 15 and 25 % inoculum load. Viable rhizobial counts were taken at every 24 hrs. for 120 hrs. Mannitol in a YEM broth was replaced with molasses, starch, cane sugar and potato extract @ 1 % glucose in the medium for growing strain FB – 77 at inoculum load of 5 %. Similarly, yeast extract 1 gm 1^{-1} as N source was replaced with Baker's yeast and mushroom extract respectively to select most suitable combination of carbon and nitrogen sources. To test the infectivity of strain grown in different C and N sources, populations were harvested after 48 hrs. and mixed in a sterilized carrier (lignite + charcoal) to inoculate seeds of *Phaseolus vulgaris* var. Contender grown in sterilized sand pots irrigated with a sterilized N free nutrient solution. Plant were uprooted for nodulation studies at 40 days stage. The field trial using the inoculant prepared from the broth, obtained from the best combination of C and N sources i.e. sugar and Baker's yeast were conducted at G B P U A & T Hill Campus Ranichauri (Tehri Garhwal) Uttaranchal. The observations on nodulation and plant dry weight were recorded at 50% flowering stage.

Results and Discussion

Irrespective of inoculum levels of rhizobia, the population did not exceed beyond 10^9 cells/ml. till 120 hrs. of growth. Except for 1% inoculum, maximum population (180 X 10^7 to 360 X 10^7 cells ml^{-1}) of Rhizobium reached after 48 hrs. of inoculation at all levels of inoculum load. In view of time and volume

[1]Assistant Professor, G.B.Pant Univ., Research station Sui –Chamapawat (Uttaranchal)262524

required for inoculum preparation, 5% inoculum load was found to be most ideal for population and period of incubation. Gulati (1989) also observed similar trend in viable cell count of rhizobium after 48 to 84 hrs. of inoculation at 50, 20, 10, 5 and 1% inoculum load.

Table 1: Growth of *R. leguminosarum* bv. phaseoli FB 77 at different levels of inoculum (at 28 ± 1°C)

Inoculum load (%)	Viable rhizobial count (x 10^7 cells ml^{-1}) 0 hrs.	24 hrs.	48 hrs.	72 hrs.	96 hrs.	120 hrs.
1	0.1	3	59.5	110	1651	150
5	0.5	42	360	200	125	52
10	0.9	98	340	155	55	50
15	1.5	160	180	160	60	45
25	2.4	200	250	193	62	40

Initial population = 10^8 cells ml^{-1}

Table 2: Growth of *R. leguminosarum* bv. phaseoli FB 77 in different carbon sources (at 28 ± 1°C) with 5 % level of inoculum

Carbon sources	Population (x 10^7 cells ml^{-1}) 0 hrs.	24 hrs.	48 hrs.	72 hrs.	96 hrs.	120 hrs.
Mannitol	0.5	10.0	200	150	150	80
Molasses	0.5	8.0	38.5	49.5	49.5	55
Starch	0.5	6.0	30.0	60.0	60.0	61
Cane sugar	0.5	9.5	300	105	105	95
Potato extract	0.5	9.5	150	450	450	55

Initial population = 10^8 cells ml^{-1}

Table 3: Growth of *R. leguminosarum bv. phaseoli* FB 77 in different nitrogen sources at (at 28 ±1°C) with 5 % level of inoculum.

Nitrogen Sources	Population (x 10^7 cells ml^{-1}) 0 hrs.	24 hrs.	48 hrs.	72 hrs.	96 hrs.
Yeast Extract	0.8	14.0	250	100	82
Baker's Yeast Extract	0.8	12.5	240	96	80
Mushroom Extract	0.8	10.0	90	98	70

Initial population = 10^8 cells ml^{-1}

The viable cell count in different carbon sources, when compared with mannitol as standard, (Table 2) indicated that cane sugar was best substitute mannitol as a carbon source for getting higher rhizobial population (300X10^7 cell ml^{-1}) within a short periods i.e. 48 hrs.. Maximum population (450 X 10^7 cell ml^{-1}) was obtained when mannitol was substituted with potato extract at 5% inoculum load after 72 hrs. of inoculation possibly because autoclaving of potato pieces might have converted some of the starch to readily available as carbon source. Growth in molasses and starch was slow and final cell count was low as compared to other C sources. It was compared in term of rhizobial count with Baker's yeast extract and yeast extract as N source in YEM broth. It was possible to attain a maximum population (240 X 10^7 to 250 X 10^7 cells ml^{-1}) within 48 hrs. in case of yeast extract and Baker's yeast extract indicating the possibility of substituting yeast extract with Baker's yeast as N source (Table 3). However, mushroom extract did not support growth as much as yeast extract and Baker's yeast extract.

Table 4: Growth of *R. leguminosarum* bv. phaseoli FB 77 in different combinations of carbon and nitrogen sources with 5 % inoculum load

C/ N sources	Population (x 10^7 cells ml^{-1}) at 48 hrs. Mannitol	Molasses	Starch	Cane sugar	Potato Extract
Yeast Extract	248	100	120	240	160
Baker's Yeast Extract	235	110	126	290	175
Mushroom Extract	80	70	62	130	85

Table 5: Effect of infectivity of *R. leguminosarum* bv. phaseoli FB 77 grown in different sources of C and N in the medium.

C / N sources	Number of nodules $plant^{-1}$ Mannitol	Molasses	Starch	Cane sugar	Potato Extract
Yeast Extract	10	8	9	11	8
Baker's Yeast Extract	9	7	6	9	9
Mushroom Extract	6	6	7	8	5
Uninoculated	0	0	0	0	0

The data on Table 4 clearly indicated that combination of cane sugar and Baker's yeast extract was as good as mannitol and yeast extract as source of carbon and nitrogen. The population of *R. leguminosarum* bv. phaseoli at 5% inoculum level was highest at 48 hrs. in combination of cane sugar and Baker's yeast (290 X 10^7 cell ml^{-1}) followed by yeast extract and cane sugar broth population (240 X 10^7 cell ml^{-1}) . Mushroom extract was not suitable substitute of yeast extract when used in combination with different carbon sources. None of the combinations had any adverse effects on infectivity of the strain FB – 77 (Table 5). Although the number of nodules were not significantly different for various combinations of carbon and nitrogen sources, but

Table 6: Response of R. leguminosarum bv. phaseoli FB 77 on french bean var.

Treatments	No. of nodules/ plants	Nodules dry wt (mg/pl)	Plant dry wt (g/pl)	N content in Plant (%)	Grain yield (q/ha)	Increase yield (%)
Unioculated	21.50	50.30	37.70	3.10	10.60	-
Inoculated	27.90	59.20	44.70	3.30	13.90	31.00
N @ 80 kg/ha	17.40	31.20	40.30	3.20	13.80	30.00
CD at 5 %	4.60	10.92	-	0.09	2.74	-
SEm ±	1.88	4.46	-	0.04	1.12	-

mushroom extract with all the carbon sources (5-8 nodules plant^{-1}) and Baker's yeast with mannitol cane sugar, potato extract showed maximum number of nodules (9 nodule plant^{-1}) as compared to molasses and starch. Maximum number of nodules were recorded (11 nodule plant^{-1}) with the inoculant prepared from combination of cane sugar and yeast extract as carbon and nitrogen source.

The results of experimental trials at Ranichauri on french bean var. Contender showed significant increase in nodulation and dry matter production at 50 percent flowering stage due to inoculant prepared from a broth in which cane sugar and Baker's yeast had been used as C and N sources respectively. The nitrogen content of plant also recorded significant increase at 50 % flowering stage. Inoculation increased the grain yield of french bean by 31% over the control which was at par with nitrogen application @ 80 kg ha^{-1} (Table 6). These findings corroborate with findings of Peres et al (1994). Thus results of present study have shown that cane sugar and Baker's yeast can effectively be used sources of carbon and nitrogen for growing rhizobia on large scale for commercial production of fermentor based inoculants.

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Study of bullock drawn intercultural and post harvest equipments

S.P. KURHEKAR AND S.R. PATIL
College of Agricultural Engineering and Technology, Dapoli (Maharastra)

Abstract

Performance of intercultural and post harvest equipments (Ferti hoe and stubble collector) design by and fabricated by M.A.U. Parbhani was tested for its performance. Depth, draft and field efficiency for ferti hoe was 8 cm, 35 to 40 kg, 84.12 % respectively and for stubble collector depth was 5.63 cm and stubble collection efficiency was 81.12%. Field efficiency of stubble collector and ferti hoe was 86.61% and 84.21% respectively.

Keywords: equipments, fertihoe, efficiency

Introduction

Fertihoe serves useful for functions like hoeing with fertilizer application. It helps to apply the fertilizer near the crop due to which the wastage of fertilizer can be avoided. It requires less labour as compared to traditional method, one labour can do both the jobs at a time. Indian agriculture basically depends upon bullock power as more than 82 percent of all farmers hold below 2 ha. farms. Keeping tractor and any other big machinery is beyond the economic capability of these farmers. They prefer to use a pair of bullock with small matching implements.

Stubble collector is an implement used to collect the stubble after harvesting and ploughing. To reduce the drudgery in the operation with saving in the time and to do work efficiency a bullock drawn stubble collector is developed. This implement helps in saving time, work and money at large amount.

Methodology

Field Performance of implements:

Fertihoe and stubble collector was tested for its performance evaluation in the field of College of Agricultural. Engineering and farm field Parbhani. Field test was also conducted at Dry land Research Center and Cotton Research Center MAU, Parbhani respectively. RNAM test code was followed and plot size selected was 20m x20 m.

1) Moisture content of soil : The soil sample were taken from 3 places randomly in the field an moisture content was determine by oven dry method.
2) Draft requirement: For draft requirement dynamometer was used. The implement was operated and draft was measured for pulling indicated by the dynamometer.
3) Field efficiency : Field efficiency was calculated by using formula

$$\text{Field efficiency} = \frac{\text{Actual area covered in 1 hr}}{\text{Theoretical area covered in 1 hr}} \times 100$$

4) Weeding efficiency: Collect the weeds from selected plot after and before the operation. It is calculated as

$$\text{Weeding efficiency} = \frac{\text{No. of weeds before operation} - \text{No. of weeds after operation}}{\text{No. of weeds before operation}} \times 100$$

5) Stubble density: Mark a 1m x 1m size plot in selected plot measure the number of stubble before the operation and after operation then calculates stubble density by formula.

Stubble density = No. of stubble x weight of stubble

A) Specification of fabricated M.A.U. fertihoe

1) Make : M.A.U. Parbhani
2) Type : Bullock drawn, adjustable
3) Power source : Pair of bullock
4) Main frame : A.M.S pipe 75cm
5) Tines : M.S. flat 25x 5 at angle 21°
6) Blades : 15,22.5 and 30 cm
7) Fertilizer metering : Manual
8) Beam : 50 mm diameter pipe, 10 feet

B) Specification of fabricated M.A.U. stubble collector

1) Make : M.A.U. Parbhani
2) Type : Bullock drawn, adjustable
3) Power source : Pair of bullock
4) Width of implement : 1.6 m
5) Collecting rate : 26 bars at 5 cm spacing
6) Depth control : A flat 5 cm away from tip of rod and hitch
7) Man power requirement : 1 person

Results and Discussion

The bullock drawn stubble collector and fertihoe was tested in field and following results were obtained.

Fertihoe:

1) Depth : Depth of operation of implement was 8 cm for fertihoe
2) Draft : The ferti hoe needed a draft in the range of 35 to 40 kg
3) Field efficiency: Field efficiency for fertihoe was 84.12%
4) Weeding efficiency : Weeding efficiency was obtained 86.42 %

Table 1. Field performance of the Ferti hoe.

S.No. Particulars	I	II	III	Average
1. Plot size (20mx20m)	400 m^2	400 m^2	400 m^2	400 m^2
2. Width of operation(cm)	40	40	40	40
3. Depth of operation (cm)	8	8.3	7.5	7.93
4. No.of weeds before operation (1x1m)	46	59	32	46
5. No.of weeds after operation (1x1m)	6	8	6	7.3
6. Soil inversion %	86.95	91.07	81.25	86.42
7. Distance of fertilizer placement from plant	3	3.9	4.3	3.73
8. Draft (kg)	36	38	37	37
9. Time required to cover the area (min)	37	33	39	37
10. Speed of bullock(km/h)	1.9	2.1	1.7	1.9
11. Actual field capacity (ha/hr)	0.064	0.072	0.061	0.064
12. Theoretical field capacity (ha/h)	0.076	0.084	0.068	0.076
13. Field efficiency (%)	84.21	85.71	89.70	84.21

Table 2. Field performance of the stubble collector.

S.No. Particulars	I	II	III	Average
1. Plot size (20mx20m)	400	400	400	400
2. Width of operation(cm)	160	160	160	160
3. Depth of operation (cm)	6	5.8	5.4	5.73
4. No. of stubble before operation in 1 m^2.	22	17	15	18
5. No. of stubble after operation in 1 m^2.	4	2	4	3.3
6. Soil moisture content	7.53	7.40	7.62	7.51
7. Stubble collection efficiency	81.81	88.23	73.33	81.12
8. Bullock speed (km/h)	2.2	2.4	2.5	2.36
9. Time required to cover the plot (min)	8	7	7	7.33
10. Actual field capacity (ha/hr)	0.30	0.342	0.342	0.327
11. Theoretical field capacity (ha/hr)	0.352	0.384	0.40	0.378
12. Field efficiency (%)	85.22	89.28	85.71	86.61

Stubble collector:

1) Depth: Depth of operation of the implement was 5.63 cm for stubble collector.
2) Draft: Draft requirement for the developed implement was well within the capacity of bullock pair.
3) Stubble collector efficiency: The stubble collection efficiency was 81.12 percent.
4) Field efficiency: field efficiency for stubble collector was 86.61%t.

Summary and Conclusion

Considering the problem of availability of labour and need of timely operation the deptt. FMP has designed and tested fertihoe and stubble collector. Test were conducted as per RNAM test code and following conclusions were drawn

Stubble collector:

1) Stubble collection efficiency was 81.12 percent with reduction in labour requirement
2) Draft requirement for the developed equipment was within the capacity of bullock pair
3) Depth of operation of the implement was 5.63 cm for stubble collector.
4) Field efficiency for stubble collector was 86.61%

Fertihoe:

1) The efficiency was more due to placement of the fertilizer cost to plant
2) Depth of operation of the implement was 8 cm for fertihoe.
3) Field efficiency for fertihoe was 84.21 percent
4) Draft requirement was within the capacity of bullock pair

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Genetics of various yield components in Chickpea (*Cicer arietinum* L.)

S.K. KAUSHIK[1], K.V. SINGH[2], A.K. DIXIT[3] AND A.K. SAXENA[4]
Krishi Vigyan Kendra, Ujjain (M.P.)

Abstracts

This study comprised of 12 kabuli chickpea genotypes was conducted to determine components of variability (genotypic, phenotypic and environmental), heritability (h^2_{bs}) and genetic advance for yield and yield components during rabi *2007-08. Results revealed highly significant differences for days to 50 % flowering, days to maturity, plant height (cm), number of pods per plant, seed index and seed yield. Broad sense heritability ranged from 72.23% (seed yield) to 99.97% (seed index). Genetic advance as percent of mean was ranged from 9.71% (days to maturity) to 49.83% (seed yield). Owing to additive gene effects, crop improvement can be attained by simple selection of all the traits except days to maturity.*

Key Words: Chickpea, *Cicer arietinum*, genetic variability, heritability, genetic advance, seed yield

Introduction

Chickpea (*Cicer arietinum* L.) commonly known as gram is the second most important pulse crop in the world after drybean. As well as being an important source of human food and animal feed, it also helps to improve soil fertility, particularly in drylands. The introduction of chickpea in a cereal based rotation, which is used particularly in developing countries, can break the disease and pest cycle, and increase the productivity of entire rotation (Jodha and Subba Rao, 1987). It is the premier *rabi* pulse crop with respect to consumption and cultivated area in our nation. India is the largest chickpea producer as well as consumer in the world. India grows chickpea on about 6.67 million hectares area producing 5.3 million tones with productivity of 794.60 kg per hectare (IIPR, 2008). There are two major types of chickpea *i.e. Kabuli* and *Desi (brown)*. Chickpea plant is very sensitive to excess moisture, high humidity and cloudy weather which adversely affect its yield through limited flowering and seed set (Key, 1979). Chickpea is the cheapest and readily available source of protein (19.5%), fats (11.4%), carbohydrates (57%-60%), ash (4.8%) and moisture (4.9% – 15.59%) [Huisman and Vander Poel, 1994].

The presence of genetic variability is pre-requisite for any breeding programme aimed at improvement of crop yields. Despite its nutritional values and economic importance, chickpea production is relatively low in the country. This is primarily due to narrow genetic make-up and diminished genetic diversity among cultivars available. The variability available in chickpea can be tapped for evolving high yielding types. Thus, the present study was undertaken with a view to ascertain phenotypic and genotypic variation present in seed yield and its contributing traits to determine the heritable components of the actual variability and to study the performance of genotypes which will enable the breeders to know which trait respond to selection and how much improvement can be expected by basing selection on a particular trait and thus help him to plan his breeding programme accordingly.

Materials and Methods

The experimental material comprised of 12 genotypes of kabuli types received under All India Coordinated Research Project on Chickpea from Indian Institute of Pulses Research, Kanpur. All the genotypes were grown in R.B.D with four replications at Instructional Farm of Krishi Vigyan Kendra (JNKVV)- Ujjain during *rabi* 2007-08. Each genotype was raised in four rows of 4 meters long with 30 cm apart. Observations were recorded on ten randomly selected competitive plants of each genotype per replication for plant height (cm), number of pods per plant and seed index (g) while days to 50 per cent flowering, days to maturity and seed yield were recorded on plot basis. The data were subjected to statistical analysis as per Panse and Sukhatme (1967), Coefficient of variation were computed as per Chandel (1993), genotypic and phenotypic coefficient of variation were calculated as per method suggested by Johnson *et al. (1955)*. The relative amount of heritable portion of variation was determined by

[1] Scientist(Plant Breeding & Genetics),
[2] Scientist(Horticulture)
[3] Senior Scientist(Soil Science)
[4] Scientist (Extension Education)

heritability estimates in broad sense as suggested by Johnson *et al.* (1955) and Hanson *et al.* (1956) and converted in percentage as per Lush (1940). The genetic advance for each character was calculated by using the formula outlined by Johnson *et al.* (1955).

Results and Discussion

The analysis of variance showed highly significant differences among the genotypes for all the traits studied which indicated considerable genetic variability among the genotypes lead to ample scope for improvement (Table 1). Similar results were reported by Qureshi *et al.* (2004), Yadav and Prakash (2005), and Sharma *et al.* (2005). The minimum and maximum values for each trait indicated wide range of differences between genotypes for various characters indicated that chickpea yield can further be improved by utilizing the large variations of these traits. Similar results were reported by Singh (2005). The value of mean, standard error, critical differences, coefficient of variations, heritability in broad sense and expected genetic advance are presented in table 2. Since the variances are influenced by magnitude of the units of measurement of different characters, a measure of variation which is independent of the unit of the measurement is more useful for comparison between different populations. This measure is provided by coefficient of variation (CV).

According to table 2, the highest coefficient of variation was recorded for number of pods per plant (30.79 %) followed by seed index (27.23%), seed yield (17.90%), days to 50 per cent flowering (14.46%) and plant height (10.79%). The greatest genotypic coefficient of variation was reported by number of pods per plant (32.13%), followed by seed index (28.44%), seed yield (15.55%) and days to 50 per cent flowering (15.01%). These findings were in agreement of earlier work done by Kushwaha *et al.* (2005) and Sharma *et al.* (2005). Low values of genotypic coefficient of variation observed for days to maturity (4.19%) are in agreement with the findings of Yucel *et al.* (2005). The GCV/PCV ratio was nearing unity in all the traits except seed yield indicating little influence of environment on the expression of these traits. The values of phenotypic coefficient of variation and genotypic coefficient of variation were high and almost equal for number of pods per plant, seed index, days to 50 per cent flowering, plant height and days to maturity indicated environment does not have influence on the expression of these traits. Similar results were reported by Sharma *et al.* (2005). The value of phenotypic coefficient of variation was higher than genotypic coefficient of variation for seed yield indicating the influence of environmental effect. Similar findings were reported by Kushwaha *et al.* (2005).

Genotypic coefficient of variation does not give the idea of total heritable variation. The relative amount of heritable portion of variation can be

Table 1: Analysis of variance for seed yield and its attributing characters in chickpea (*Cicer arietinum* L.).

Source of variation	D.F.	Days to 50% flowering	Days to maturity	Plant height (cm)	No. of pods/ plant	Seed Index (g)	Seed Yield (Kg/ha)
Replications	3	0.03	0.08	0.098	0.014	0.01	83586.63
Treatments	11	190.94**	69.18**	100.25**	177.61**	370.39**	274172.01**
Error	33	0.76	0.63	0.12	0.10	0.04	31142.27

*: significant at 0.05 probability **: significant at 0.01 probability

Table 2: Estimates of Genetic parameters for seed yield and its attributing characters in chickpea (*Cicer arietinum* L.).

SN	Character	Range Min.	Range Max.	Mean	Standard error	CD (5%)	CV (%)	GCV (%)	PCV (%)	$h^2_{(bs)}$	GA
1	Days to 50% flowering	44	67	53.0	0.71	1.47	14.46	15.01	15.10	98.82	16.30
2	Days to maturity	109	121	114.0	0.65	1.34	4.06	4.19	4.24	97.32	9.71
3	Plant height (cm)	39.5	58.6	51.35	0.29	0.60	10.79	11.25	11.27	99.63	11.88
4	No. of pods/ plant	14.7	35.0	23.94	0.26	0.54	30.79	32.13	32.16	99.83	15.83
5	Seed Index (g)	25	58	39.1	0.17	0.34	27.23	28.44	28.45	99.97	22.88
6	Seed Yield (Kg/ha)	1407	2285	1831	144	299	17.90	15.55	18.29	72.23	49.83

assessed through heritability estimates. Heritability indicates the effectiveness with which selection for genotype can be based on the basis of its phenotypic performance.

Table 2 showed high heritability for all the traits studied indicating that these traits are determined by major proportion of genetic effects. Hence, genetic improvement of these traits by adopting mass selection is attainable. Earlier findings of Hasan *et al.* (2008) for seed index, days to 50 per cent flowering and plant height; and Yucel *et al. (2005)* for seed weight; Kushwaha *et al.* (2005) for seed yield; Thakur *et al.* (2005) for days to 50 per cent flowering and Sharma *et al*. (2005) for seed index, days to 50 per cent flowering & plant height support the present study. It is suggested that high heritability coupled with high genetic advance will be more useful than the heritability alone in predicting the performance of the progenies of the selected lines (Johnson *et al.*, 1955). In the present study high heritability coupled with high genetic advance was reported by all the traits studied except one *i.e.* days to maturity indicating these traits under the control of additive gene action and potential possibilities of improvement of these characters can be achieved by selection. These results were in the accordance with the findings of Kushwaha *et al.* (2005), Sharma *et al.* (2005) and Hasan *et al.* (2008). Days to maturity revealed high heritability and low genetic advance indicating the importance of heterosis breeding for the trait.

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Economic analysis of paddy cultivation in Paliganj Block of District Patna, Bihar

A.K. ROY[1], G.P. SINGH AND A.K. SINGH[2]
Department of Agril. Economics, N.D. University of Agriculture & Tech., Kumarganj, Faizabad.

Abstract

Hundred farmers were selected from Paliganj Block of district Patna Bihar. Data were collected through personal interview technique on pretested schedule. The overall farm size was 1.07 ha and cropping intensity was 207 per cent. Paddy in Kharif season and wheat in Rabi season were found major crops occupying 92.88 and 47.19 per cent of net sown area. Overall costs of production per quintal was found to Rs. 739.43. Gross income and net return per hectare were Rs. 38654.00 and Rs. 12754.53. The benefit cost ratio came to 1:1.50.

Key words: Personal, schedule, production, benefit cost ratio

Introduction

Rice is the staple food for more than 60 per cent of the world's population and for three fourth of the Indian population. About 90 per cent of the total rice grown in the world is produced and consumed in Asian region. The slogan "Rice is Life" is most appropriate for India as this crop plays a vital role in our national food security and is means to livelihood for millions of rural households by providing direct employment in rural areas. Rice provides 32-59 per cent of the dietary energy and 25-44 per cent of dietary protein. It supplies 20 per cent calories at world level and 31 per cent calories at India level. Rice provides a significant amount of foreign exchange every year. Export of milled rice at world. Asia and India level was 50536.67, 22034.35 & 4736.87 thousand tones respectively (2008). In terms of both area and production paddy ranks first in the world. It occupies 156.68 million hectares area with production of 650.91 million tones and productivity of 41.5 quintals/ha during 2006 (FAO). In India paddy also ranks first by means of both area and production. It occupies about 43.77 million hectares area with production of 96.69 million tones and productivity of 22.10 quintals/ha. (2007-2008). In Bihar paddy is the leading cereal crop. It covers an area of 3.6 million hectares with production of 6.7 million tones and productivity of 18.61 quintals/ha during 2007. In Patna district, paddy occupies 83.40 thousand hectare land with production of 132.93 thousand tones and productivity of 15.94 quintals per hectare during 2005-06. Paliganj block of Patna district is the maximum paddy growing block which covers 10.04 thousand hectares area with production of 16.01 thousand tones.

Data shows that productivity of paddy crop is very low in district Patna against the potential yield. However, paddy production in district has large scope for increasing the income and employment of the farmers. But no economic study had so far been conducted to know the existing economics of paddy cultivation in Patna district. Considering this fact the study on "Economic analysis of paddy cultivation in Paliganj Block of District-Patna, Bihar was undertaken with following objectives:

(i) To study the cropping pattern & cropping intensity at the sample farms.
(ii) To workout the costs of cultivation and input-output relationship.

Methodology

Stratified purposive cum random sampling technique was used to select the respondents. Hundred farmers were selected from four villages following the proportionate sampling method. Data were collected by survey method through personal interview on well structured and protested schedule. The data pertained to Agriculture year 2009-10. Tabular analysis was used for presentation of the result.

Results and Discussion

Cropping Pattern & Cropping Intensity

Cropping pattern show the area devoted to the various crops during the given period of time, conventionally a single year. It indicates the yearly sequence and spatial arrangement of crops followed in a particular area. The cropping pattern followed by the sample farms are presented in Table 1.

It is evident from the table that during Kharif season maximum area i.e. 99.49 per cent were

[1] Student M.Sc. Ag. Agril. Eco.,
[2] Ex. Ph.D. student, I.A.S.C., B.H.U., Varanasi.

Table 1 : Cropping pattern on different size group of farmers.

S.N. Gross cropped area	Size group of farmers									
	Marginal		Small		Medium		Large		Overall	
	area	%	area	%	area	%	area	%	area	%
A. Kharif season	0.533	100.00	1.228	100.00	2.323	97.97	4.917	100.00	1.064	99.49
(Major crop-paddy)	0.488	91.71	1.119	92.36	2.141	90.29	4.917	100.00	1.011	92.88
B. Rabi season	0.514	96.43	1.168	91.25	2.35	99.15	4.70	95.72	0.993	92.80
(Major crop-wheat)	0.251	47.00	0.681	53.12	1.378	58.14	2.39	48.47	0.505	47.19
C. Zaid season	0.189	35.57	0.309	24.19	0.228	9.63	0.210	4.28	0.197	18.41
(Major crop-Moong)	0.098	18.49	0.174	13.59	0.192	8.10	0.210	4.28	0.118	11.11
D. Total cropped area	1.236	-	2.931	-	4.904	-	9.835	-	2.215	-
E. Net cultivated area	0.533	-	1.228	-	2.371	-	4.917	-	1.07	-
F. Cropping Intensity	-	231.89	-	238.68	-	206.83	-	200.02	-	207.00

Table 2 : Costs of cultivation of paddy (Rs./ha)

S.N. Items	Size group of farmers				Overall average
	Marginal	Small	Medium	Large	
1. Costs of Inputs	3356.45(13.62)	3610.58(13.98)	3908.99(15.04)	4052.75(14.48)	3732.05(14.38)
2. Operational costs	11093.47(45.03)	11871.71(45.99)	11981.65(46.11)	12732.78(45.49)	11816.25(45.53)
3. Interest on working capital	368.78(1.50)	389.62(1.52)	397.82(1.53)	415.72(1.49)	389.91(1.51)
4. Interest on fixed capital	3579.66(14.53)	3597.43(13.93)	3337.66(12.84)	4243.95(15.16)	3653.01(14.08)
5. Rental value of land	4000.00(16.23	4000.00(15.49)	4000.00(15.39)	4000.00)14.29)	4000.00(15.41)
6. Others (x)	2239.83(9.09)	2346.93(9.09)	2362.61(9.09)	2544.52(9.09)	2358.97(9.09)
Total	24638.19(100)	25816.27(100)	25988.73(100)	27989.72(100)	25950.19(100)

Table 3 : Measures of income per hectare and input-output relationship.

S.N. Items	Size groups of farms				
	Marginal	Small	Medium	Large	Overall
1. Gross Income	41192.81	37977.54	37450.53	36809.60	38654.00
2. Net return	16554.62	12161.27	11462.01	8819.94	12754.53
3. Input:Output ratio	1:1.67	1:1.47	1:1.44	1:1.31	1:1.50
4. Costs of production(Rs./Qt.)	628.20	791.91	744.23	843.31	739.43
5. Yield qt./ha.	39.22	35.60	34.92	33.19	37.27

covered by different crops out of which 92.88 per cent was allotted to the paddy alone. Thus paddy was found as major Kharif crop. Similarly during Rabi season 92.80 per cent of net shown area was covered by different crops. During this season wheat was found as major crop which covered 47.19 per cent of the total cultivated area. Rest of the area was allotted to pulses, oilseed and vegetable crops. The area covered by different crops during Zaid season was very less i.e. 18.41 per cent. In this season Moong was found as major crop by covering an area of 11.11 per cent. The overall cropping intensity in the study area was found to 207 per cent which ranges from 200 to 238.68 per cent on various categories of the farms. The cropping intensity at marginal and small farms were high in comparison to medium and large size of farms which emphasizes the awareness of the marginal and small farmers about better utilization of scarce land resource.

Costs of cultivation of paddy

The per hectare costs of cultivation of paddy is presented in Table 2. Data presented in this table indicate that the overall costs of cultivation of paddy per hectare was Rs. 25950.19 which was highest on

large formal (Rs. 27989.72) followed by medium (Rs. 25988.73) small (Rs. 25816.27) and marginal (Rs. 24638.19) farms respectively. The costs of cultivation was having direct relation with holding size. As far as the costs on various inputs are concerned the share of operational cost was highest i.e. 45.53 per cent followed by rental value of land (15.41%) costs of inputs (14.38%) interest on fixed capital (14.08%) and other cost (9.09%) which include risk and management cost.

Highest costs of various operations (45.53%) and comparatively low costs of input i.e. (14.38%) shows that there are the possibilities to improve the level of profit by increasing the cost on balanced and scientific inputs.

Measures of Income per hectare of paddy cultivation

It is revealed from Table 3 that overall gross income was recorded Rs. 38654.00 per hectare. It was analysed to Rs. 41192.81, Rs. 41192.81, Rs. 37450.53 and Rs. 36809.60 on marginal, small, medium and large farms respectively. Gross income per hectare shows adverse relation with the size of holding. Overall net return per hectare came to Rs. 12754.53, which was highest on marginal farms (Rs. 16554.62) followed by small farms (Rs.12161.27) medium farms (Rs.11462.01) and large farm (Rs. 8819.94). Input: out ratio was found to 1:1.50 on overall basis. It was highest on marginal and lowest on large sample farm i.e. 1:1.67 and 1:1.31. The cost of production per quintal was lowest at marginal farm i.e. Rs. 628.20 which increases with increasing the holding size and came to Rs. 791.91, Rs. 744.23 and Rs. 843.31 at small, medium and large farms respectively. The overall per hectare yield was found to 37.27 quintal which also shows opposite relationship with holding size. It was maximum of 39.22 quintal at marginal farms and minimum of 33.19 quintal at large farms.

It is concluded from the result that paddy cultivation was more economic on smaller holding than larger one.

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Training needs of farmers for Agricultural diversification in Jaipur district of Rajasthan

P. S. TANWAR AND YOGENDRA KUMAR[1]
Programme coordinator , Krishi Vigyan Kendra- Sardarshahar (Churu)

Abstract

Study was conducted on 120 randomly selected farmers spread in four blocks of Jaipur district namely Govindgarh, ,Amber, Jhotwara and Bassi .The farmers were identified by random sampling technique . Primary data were collected with the help of pre-tested schedule by personal interview method. It was found that among different enterprises farmers need more trainings on vegetable cultivation, dairy management and fruit cultivation. It seems due to proximity of the capital of the state . Farmers required medium number of trainings on crop production , flower cultivation , goatry management and water management and need least number of training on pig management. Regarding different management practices farmers required most urgent and more number of trainings on health care management and feeding management practices. Medium number of training required on milking management, breeding management and on general management and required least training on housing management practices. Among different aspect of dairy farming , farmers required most urgent training on first aid of animals , importance and scheduling of vaccination against common contagious diseases , importance of deworming, balance feeding to dairy animals, management of mastitis and formulation of low cost ration and required least number of training on hooves trimmings and care and management of dairy animals.

Key words: Goatry management, vaccination, dairy farming, dairy animals

Introduction

Training plays a vital role in the advancement of human performance in a given situation . Training provide a systematic improvement of knowledge , skills, and attitude and help the trainees to function effectively and efficiently. Any training programme starts with identification of training needs. The training is a essential component for the successful dissemination and adoption of latest agricultural technologies, training need refers to the gap between what is and what should be in term of the trainees knowledge , skill attitude and the behaviors in given situation and time. Before conducting a training programme for farmers it is essential to asses the training need and training may organize accordingly. The training needs vary with a number of factors viz. age , education , caste, gender and agro climatic zone. Hence present study was conducted to identified the training need of farmers in Jaipur district of Rajasthan.

Materials and Methods

Present study was conducted in Jaipur district of Rajasthan state on 120 farmers selected as respondents for the study. The farmers were identified from 4 blocks viz. Govingarh, Amber, Jhotwara and Bassi of the district by using multistage random sampling technique**.** data were collected using well structure interview schedule by personal interview.

The training needs of farmers have been operationalised as an expression of need for training in selected area as felt by farmers . It was measured in terms of the expressed opinion of the farmers by assigning the score 3, 2 and 1 , for most urgent , urgent and least urgent ,respectively. The collected data were analyzed by using appropriate statistical technique.

Results and Discussion

The training need of the farmers for different enterprises depicted in Table 1 . It revealed that farmers require more trainings on vegetable cultivation stand at first rank with TNMS=2.46 . Dairy farming was placed at second rank with training need mean score 2.39 followed by fruit cultivation (TNMS=2.24, rank IIIrd). This may be due to the choice of diversification in agriculture and proximity of capital of the Rajasthan , where demand , consumption and mode of transport to reach the marketing channels are easily available. These findings are similar to Singh and Rahul (2010). Crop production (TNMS=2.16, rank 4th) , water management (TNMS=1.95, rank 5th) , goat farming (TNS=1.89), flower cultivation

[1]Department of Animal Husbandry and Dairying,Kisan (P.G) college, Simbhaoli, CCS University , Meerut

(TNMS=1.85), mushroom cultivation and poultry production (TNMS=1.10)

Table 1: Training needs of farmers for various enterprises

S.No.	Name of enterprises	Training need mean score(TNMS)	Rank
1.	Vegetable production	2.46	I
2.	Crop production	2.16	IV
3.	Dairy management	2.39	II
4.	Poultry management	1.63	VIII
5.	Goatry management	1.89	VI
6.	Piggery management	1.10	X
7.	Mushroom cultivation	1.63	VIII
8.	Aloevera cultivation	1.48	IX
9.	Fruit cultivation	2.24	III
10.	Flower cultivation	1.95	V
11.	Water management	1.85	VII

Table 2: Training needs of farmers about different dairy management practices

S.No.	Dairy management practices	Training need mean score (TNMS)	Rank
1.	Feeding management	2.06	II
2.	Breeding management	1.95	IV
3.	Housing management	1.91	VI
4.	Milking management	1.98	III
5.	Health care practices	2.24	1
6.	General management practices	1.93	V

Training needs of the farmers about different dairy management practices presented in Table 2. It revealed that farmers of the selected area required more trainings on health care practices stand at first rank with TNMS=2.24 , followed by feeding management practices, milking management practices

Table 3: Training needs of farmers about different aspects of dairy management practices

S. No.	Particulars	Training need mean score (TNMS)	Rank On Practices basis	Rank On over all basis
A.	Feeding management practices			
1.	Balance feeding	2.38	I	IV
2.	Formulation of low cost ration	2.13	III	VII
3.	Techniques of improving digestibility of concentrate	2.01	IV	X
4.	Techniques of cultivation of green fodder	1.76	VI	XXI
5.	Techniques of improving digestibility of dry fodder	1.89	V	XIV
6.	Importance of feeding mineral mixture	2.18	II	VI
B.	Breeding management practices			
1.	Production of better quality animals	1.91	II	XII
2.	Various techniques of breed improvement	1.77	III	XX
3.	Selection of better quality of animals	1.93	I	VII
C.	Housing management practices			
1.	Importance of proper housing system	1.68	III	XXII
2.	Protection and management of animals from inclined weather conditions	2.13	I	VII
3.	Construction of low cost housing	1.90	II	XV
D	Milking management practices			
1.	Importance of clean milk production	1.89	II	XV
2.	Method of milking	1.82	IV	XVIII
3.	Precautions before and after milking	1.88	III	XVI
4.	Management mastitis	2.31	I	V
E.	Health management Practices			
1.	Deworming of dairy animals	2.40	III	III
2.	Importance and scheduling of vaccination against common contagious diseases.	2.63	II	II
3.	First aid of animals	2.73	I	I
4.	Hooves trimmings	1.59	V	IV
5.	Management sick animals	1.86	IV	XVII
F.	General management practices			
1.	Care of newly born calf	2.09	I	VIII
2.	Care of pregnant animals	2.09	I	VIII
3.	Care of animals during and after parturition	2.04	II	IX
4.	Care and management of heifer	1.79	III	XIX
5.	Care and management of dry animals	1.61	IV	XXIII

,breeding management practice , general management practices and housing management practices with training need mean score 2.06,1.98, 1.95, 1.93, and 1.91, respectively an in order to rank it was 2n, 3r, 4th, 5th , and 6th, respectively.

Training need of farmers on different aspects of dairy management practices shown in Table 3 . It indicate that among feeding management practices farmers need more training on balance feeding (TNMS=2.38), followed by importance of feeding mineral mixture and common salt (TNMS=2.18), formulation of low cost ration for dairy animals (TNMS=2.13) , techniques of improving digestibility of concentrate (TNMS=2.01), technology of improving palatability of dry fodder (TNMS=1.89) and green fodder cultivation techniques (TNMS=1.75). As regards breeding management practices training need mean score was 1.9, 1.91 and 1.77 for selection of better quality animals, production of better quality animals and various techniques of breed improvement. Regarding different aspects of housing management practices farmers gave first priority for training on techniques of protecting and management of animals from inclient weather condition (TNMS=2.13), followed by construction of low cost scientific house for their animals (TNMS=1.90) and importance of proper housing system (TNMS=1.68). As regarding various aspect of milking management practice farmers of the selected area needs more training on management of mastitis (TNMS=2.31) which is a great problem specially in cross bred animals, followed by importance of clean milk production, precaution before and after milking, the training need mean score was found 1.89, 1.88 and 1.82, respectively. As regards health care practices farmers need more trainings on first aid of animals (TNMS=2.73), it seems to lack of veterinary facilities in the village and high cost of treatment . Table further revealed that farmers require more number of trainings on importance and scheduling of vaccination and deworming practices, assigned training need mean score 2.63 and 2.40 , respectively. Farmers need less training on hooves trimmings because this activities performed by other trained person in the area and require more skill as state by the farmers.

As regards other management practices , care of newly born calf and care of pregnant animals stand at first on the farmers priority (TNMS=2.09), followed by care of animals during and after parturition, care and management of dairy animals, training need mean score was found 2.04, 1.79 and 1.61 ,respectively.

Training need of surveyed farmers on different aspects of dairy farming on overall basis indicated that farmers required most urgent and more training on first aid of animals , importance and scheduling of vaccination and deworming , importance of balance feeding, management of mastitis, importance of feeding mineral mixture and common salt , formulation of low cost ration , protection of animals from inclient weather condition, and techniques of improving digestibility of concentrate in order to hierarchy. Moderately training needs for farmers was on selection of better quality animals, importance of clean milk production improving palatability of dry fodder, precaution before and after milking , management of sick animals and method of milking. Farmers required less training on care and management of heifer, various techniques of breed improvement, green fodder cultivation techniques, importance of proper housing, care and management of dry animals and hooves trimmings. Farmers are primarily concerned with gaining knowledge to enhance production and productivity of dairy animals therefore short duration as well as long duration training programme should be conducted to fulfill the training needs of the farmers of the area.

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Effect of soil (ring method) and leaf (foliar method) applied urea on growth and yield traits in Lemon Grass (*Cymbopogon flexuosus*) variety RRL 16 in different seasons

RASHMI PANWAR, S.K. DWIVEDI AND S. RAO
Dept. of Plant Physiology JNKVV, Jabalpur

Abstract

The experiment was conducted at Dusty Area Research Field under Department of Plant Physiology, Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur (M.P.) during 2008-09. Treatments T2 (1.25 gm urea/plant) and T4 (1.75 gm urea/plant) were found best for herbage yield (kg/plant) and Oil (%) respectively for all the seasons.

Key words: herbage yield, oil

Introduction

The annual world production of lemon grass oil is around 1000 t from an area of 16000 ha. In India, it is cultivated in about 4000 ha and the annual production is around 250 t. Lemongrass is mostly confined to North Indian states such as Jammu and Kashmir, Sikkim, Assam, Bengal and Madhya Pradesh (Handa and Kaul, 2001). It is a native aromatic tall sedge belongs to family Poaceae. The characteristic smell of oil makes its use in scenting of soaps, detergents and insect repellent preparations. According to CIMAP, plantation by slips in field is better. The variety RRL16 is evolved from Regional Research Laboratory (RRL), Jammu, India. Average yield of herb is 15 to 20 t /ha/annum giving 10 to 110 kg oil. Oil content varies from 0.6 to 0.8% and citral content is 80%. Nitrogen increases vegetative growth. But growth varies with the season. Hence, keeping above points in view the study was carried out with lemon grass variety RRL16 to evaluate the effect of urea application on morphological and yield parameters for different seasons.

Materials and methods

The experiment was conducted at Dusty Area Research Field under Department of Plant Physiology, Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur (M.P.) during 2008-09. The soil was well drained and sandy loam. For investigation 2 years old plants of lemon grass variety RRL 16 were cut back to 10 cm above ground level. Ring was made around the plant. There were six treatments with four replications. The experiment was laid down in RBD. Six treatments included T1 – 1.0 g urea/plant (80 kg N/ha), T2- 1.25 g urea/plant (100 kg N/ha), T3-1.50 g urea (120 kg N/ha), T4-1.75 g urea/plant (140 kg N/ha), T5-2.0 g urea/plant (160 kg N/ha) and T6 - Control. Ring method was choosen for urea application during winter and spring while foliar application of urea was done during summer. Observations were recorded for plant height, plant parimeter, number of tillers/plant, leaf area, herbage yield and oil content. Hydro-distillation method was adopted for oil estimation. Oil is collected in amber colored glass bottles. The data were subjected to statistical analysis.

Result and Discussion

Morphological parameters:

Plant height

Maximum plant heights (91.87 cm., 80.21 cm. and 86.35 cm.) were recorded in the treatment T2 (1.25 g urea/plant) during winter, spring and summer seasons respectively whereas, minimum plant heights (60.63 cm., 52.63 cm. and 50.05 cm.) were recorded during winter, spring and summer seasons respectively in control (Table 1 and Fig. 1). Number of leaves/ plant and shoot height were increased during cool seasons than the summer season (Krishnan, 2000). In dry season, water application improves the growth parameters. Under irrigated conditions, lemon grass removed large quantities of nutrients particularly nitrogen and potassium (Beach, 1977).

Plant Parimeter

In treatment T2 (1.25 g urea/plant) maximum plant parimeters (68.90 cm., 62.38 cm. and 65.14 cm.) were found in winter, spring and summer seasons respectively . Results revealed that highest plant parimeter was recorded in winter followed by summer. Minimum plant parimeter was found in spring. In all the three seasons minimum plant parimeters were recorded in control. Similarly, Singh

Table 1: Effect of Urea application (ring method & foliar method) on the growth traits and oil percentage in lemongrass Variety RRL16 during winter, spring and summer season.

Treatments	Parameters																	
	Plant Height (cm)			Plant Spread (cm)			Number of Tillers			Leaf area (cm^2)			Herbage yield (kg/plant)			Oil (%)		
	winter	spring	summer	winter	spring	summer	winter	spring	summer	winter	spring	summer	winter	spring	summer	winter	spring	summer
T1 (1.0 gm urea/plant)	83.97	74.25	78.95	61.10	55.63	56.74	67.67	61.52	64.25	50.26	45.23	48.86	2.42	2.30	2.36	0.234	0.223	0.23
T2 (1.25 gm urea/plant)	91.87	80.21	86.35	68.90	62.38	65.14	56.00	50.12	55.12	62.63	53.62	54.60	2.50	2.39	2.45	0.242	0.233	0.239
T3 (1.5 gm urea/plant)	80.13	72.32	76.39	57.60	50.12	55.23	54.33	49.65	52.87	63.17	48.12	53.89	2.37	2.25	2.31	0.254	0.246	0.251
T4 (1.75 gm urea/plant)	74.73	66.23	68.23	54.77	48.65	51.35	51.33	43.32	50.16	46.54	37.71	42.86	1.90	1.80	1.85	0.302	0.280	0.298
T5 (2.0 gm urea/plant)	74.37	64.15	66.35	58.03	51.24	57.1	52.67	44.61	48.29	42.96	32.15	37.39	1.75	1.62	1.7	0.284	0.261	0.279
T6 (Control)	60.63	52.63	55.05	50.13	44.63	49.12	39.67	33.95	37.15	34.15	29.63	33.39	1.56	1.48	1.52	0.10	0.09	0.097
CD at 5%	0.76	2.10	0.55	0.88	1.01	0.42	0.89	0.33	0.50	0.71	0.90	0.64	0.64	0.23	0.49	0.33	0.05	0.07
Sem ±	0.25	0.70	0.18	0.29	0.34	0.14	0.30	0.11	0.17	0.24	0.30	0.21	0.21	0.08	0.16	0.11	0.02	0.02

et. al., 2000 recorded that plant parimeter was increased during 2nd , 3rd year but declined onwards in lemon grass variety RRL16. Leaf spread was increased by soil application of nitrogen fertilizer (ring) a month advance in cutting (Merill *et. al.*, 2007).

Number of Tillers

Maximum number of tillers 67.67 (winter), 61.52 (spring) and 64.25 (summer) were recorded in the treatment T1 (1 g urea/plant) while minimum number of tillers 39.67 (winter), 33.95 (spring) and 37.15 (summer) were recorded in the treatment T6 i.e. control (Table 1 and Fig. 1). Foliar application is good in summer in comparison to spring (Catchpoole, 1983). Excess fertilizer doses are undesirable as it promotes vegetative growth haphazardly and oil quality also reduced (Joy *et. al.*, 2006).

Leaf Area

In winter maximum leaf area (63.17 cm^2) was noticed in treatment T3 (1.50 g urea/plant) whereas, in spring and summer seasons maximum leaf areas 53.62 cm^2 and 54.60 cm^2 respectively were observed in treatment T2 (1.25 g urea/plant) (Table 1 and Fig. 1). Temperature affect the leaf area. Foliar application was found effective over soil application. Obviously, leaf applied nutrients were directly absorbed by plants, while soil applied nutrients rendered unavailable due to leaching (Kumar *et. al.*, 1996).

Yield parameters:

Herbage yield

Maximum herbages yields 2.5 kg/plant (winter), followed by 2.45 kg/plant (summer) and 2.39 kg/plant (spring) were recorded in the treatment T2 (1.25 g urea/plant) whereas, minimum herbage yields were found in control. Singh and Rao (2008) reported that application of 200 kg N/ha in the form of urea produced significantly higher patchouli herbage and oil yields compared with controls.

Oil %

Maximum oil 0.302 % - winter followed by 0.298 %- summer and 0.280 %- spring were found in the treatment T4 (1.75 g urea/plant) while minimum oil 0.10 % (winter) followed by 0.097 % (summer) and 0.09 % (spring) were recorded in control. Oil of lemon grass is a viscous liquid, yellow to dark yellow or dark amber in colour. Morphological characters like plant height, number of tillers/plant and number of leaves/ plant is significantly correlated with essential oil yield/ plant. Generally, Cleavenger apparatus is used for distilling small quantities (upto 1.0 kg) of the herb in the laboratory. On an average the herbage of *C. flexuosus* contains 0.2-0.4% oil and the oil yield is 100-125 kg/ha/yr (Joy *et.al.*,2006).

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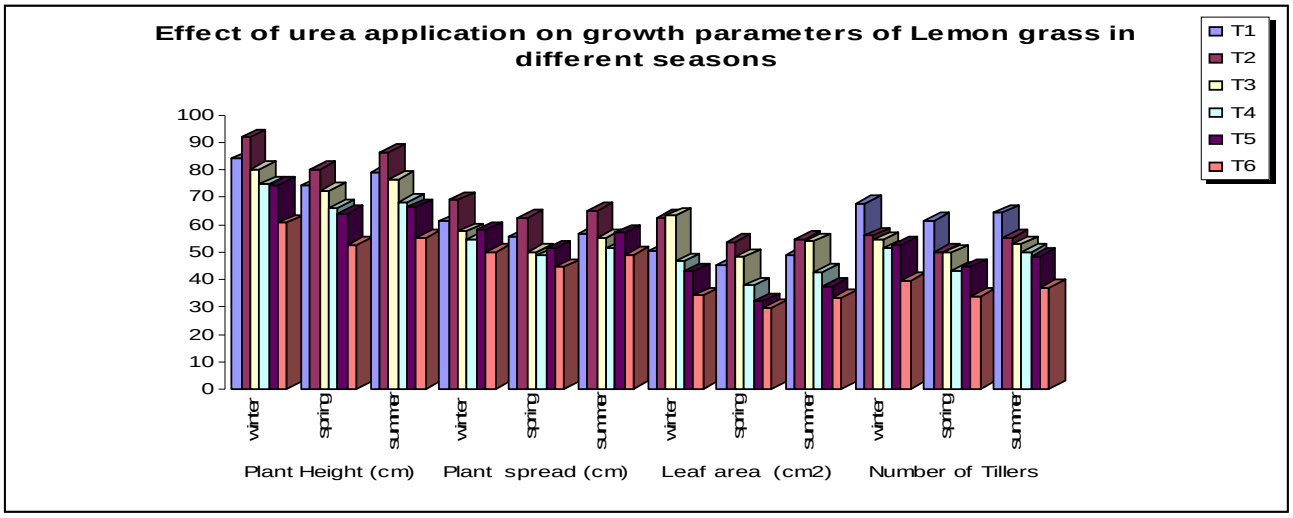

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Effect of sulphur and magnesium application on yield, quality and nutrients uptake by mustard

P.P. SINGH, RASHMI PANWAR[1], B. SACHIDANAND, S.S. BAGHEL AND S.K. SHROTI[2]
Dept. of Soil Science, J.N.K.V.V., Jabalpur (M.P.)

Abstract

A pot experiment was carried out in the green house to study the effect of sulphur and magnesium application on yield, quality and nutrients uptake by mustard. Application of sulphur (20 mg kg^{-1}) reported maximum seed yield (2.50 g/pot), stover yield (3.85g/pot), seed protein (21.79%), stover protein (6.27%), seed N (3.49%), stover N (1.0%), seed P (0.43%), stover P (0.21%), seed K (0.68%), stover K (1.83%), seed S (0.44%), and stover S (0.21%), seed protein (21.80%), in mustard while (20 mg kg^{-1}) magnesium dose maximized seed yield (2.17g/pot), stover yield (3.30g/pot), seed protein (21.80%), stover protein (6.12%), seed N (3.49%), stover N (0.98%), seed P (0.10%), stover P (0.19%), seed Mg (0.35%) and Seed N uptake (75.73% mg/pot), stover N uptake (32.56 mg/pot), seed mustard P uptake (8.81 mg/pot), stover P uptake (6.49 mg/pot), stover K uptake (59.18 mg/pot), seed Mg uptake (7.52 mg/pot), stover Mg uptake (6.01 mg/pot), seed S uptake (8.65 mg/pot) and stover S uptake (6.07 mg/pot), by mustard crop. The interaction effect on yield was synergistic only at lower levels of Mg and thereafter, it was antagonistic. Magnesium application tended to reduce S content but increased the uptake of S by mustard.

Key words: mustard, sulphur, magnesium, interaction, uptake

Introduction

Nutritional needs including secondary and primary nutrients of crop need to be properly satisfied as the soil nutrients are depleted more quickly. High analysis chemical fertilizer do not provide secondary nutrients for the crops. Therefore, essential nutrients should be use in adequate amount in integrated fertilization. Sulphur, is an essential element for plant growth, ranks in importance with N and P in the formation of plant protein. It also plays important role in the synthesis of the sulphur containing amino acids, cysteine and methionine . Quality of sulphohydryl groups (-SH) in plant has relation to increase cold resistance in some cases. Sulphur also plays an important role in chlorophyll. The deficiency of sulphur causes an accumulation of nitrate, amides and carbohydrates, which retard the formation of proteins. The interaction of sulphur with other nutrients improves the quality of crops (Chaube and Dwivedi, 1995). Magnesium is popularly known as secondary nutrient because of its requirement being less than that of primary nutrients. It is a constituent of chlorophyll and therefore, essential for photosynthesis. It increases resistance to harmful environment influence such as drought and diseases. Magnesium is also an activator for many enzymes and takes part in protein synthesis. Other major role of Mg^{2+} Cofactor is in almost all enzymes activating phosphorylation processes. It forms a bridge between the pyrophosphate structure of ATP or ADP and the enzyme molecule. Generally, when plants are Mg deficient the proportion of protein N decreases and that of non- protein increases (Haider and Mengel, 1969). Evidently the nutrition of plants depends on several factors like absorption, mobility within the plant and its distribution to functional sites. Each one of these processes is affected by interactions between nutrients. Such interactions take place in soil and in the plant. Because these interactions modify the nutrition of plants, they must be understand and considered in providing an adequate nutrient supply. Moreover, there are limited reports on interactions and their effect on concentration in plants. Because of this season, the investigation was undertaken to study the S-Mg interaction in relation to their effect on yield, content and uptake of nutrients in mustard.

Material and Methods

Experiment was conducted in earthen pots, under green house at Department of Agricultural Chemistry and Soil Science, R.B.S. College, Bichpuri, Agra during Rabi. A composite soil sample representing 0-23 cm depth was from a cultivated field and subjected to physical and chemical analysis. Mechanical composition of soil was having 62.42 % sand , 18.64% silt, 17.96%

[1]K.V.K. Panna, J.N.K.V.V. Jabalpur
[2]Deptt. of Agronomy, R.B. S. College, Bichpuri, Agra

clay and sandy loam textural class while physico-chemical characteristics were 8.2 pH (1:2.5 ratio), 0.36 dSm^{-1} EC, 4.6 g kg^{-1} organic carbon, 0.04 % total nitrogen , 67.5 mg kg^{-1} available N, 4.5 mg kg^{-1} available P, 8.5 mg kg^{-1} available S and 10.0 mg kg^{-1} available Mg. The experiment with three levels (0,10 and 20 mg kg^{-1} soil) each of S and Mg was conducted in a factorial randomized design with three replications having 9 treatment combinations using mustard as test crop. Twenty seven earthen pots lined with polythene sheet of similar size and shape were selected. After mixing the soil lot thoroughly, 5 kg of soil were filled in each pot. The calculated amount of sulphur and magnesium were given at the time of sowing in solution form to pots as elemental sulphur and magnesium chloride, respectively. The application of S and Mg was super imposed over a basal application of N, P_2O_5 and K_2O in mustard as 10,30 and 20 mg kg^{-1} by urea, DAP and murate of potash, respectively . Total quantity of all fertilizers was supplied at the time of sowing. Appropriate moisture having pulverised soil was filled in pots. Then each pot was seeded with ten healthy seeds of mustard on Nov. 25, 2001. Irrigation was done as when needed . The seed and stover samples were analyzed for nitrogen , phosphorus, potassium, sulphur, calcium and magnesium. Nitrogen was estimated as quoted by Snell and Snell (1955). From the nitrogen content values , the protein percentage in mustard seed and stover was calculated according to formula protein percentage= N% x 6.25. The phosphorus was digested by the method outlined by Johnson and Ulrich (1959). Phosphorus content was determined by in the acid extract by ammonium vanadate molybdate yellow colour method as described by Chapman and Pratt (1961). The aliquots obtained after wet digestion of P estimation were diluted to the desired level and were analyzed for K by a direct reading flame photometer. Sulphur was determined in the plant extract by turbidimetric method (Chesin and Yien, 1951). The amount of calcium and magnesium were estimated by versenate method using formula.

$$\text{Ca+ Mg in me/l} = \frac{\text{Volume. of EDTA used for titration} \times \text{Normality of EDTA}}{\text{Volume of extract taken}} \times 1000$$

The uptake of nitrogen by plants was worked out by multiplying N content values with corresponding yield data. The same procedure was adopted for calculation of phosphorus, potassium, calcium, magnesium and sulphur uptake by seed and stover. The data were subjected to statistical analysis.

Results and Discussion

Yield

The level of both (sulphur and magnesium) tried in the present investigation were 0, 10 and 20 mg kg^{-1} soil. The increasing levels of sulphur have profound effect on the yield of mustard seed and stover. The corresponding increase in mustard seed and stover yield due to 10 and 20 mg S kg^{-1} were 23.7 and 59.7 and 22.0 and 58.7%, respectively. The data on soil chemical analysis show that the soil used in the experiment fell in the low category of available sulphur. A significant increase in seed yield upto 20 mg kg^{-1} applied S was an indication of its being the best dose of sulphur for mustard under such condition. Singh and Singh (1990) and Raj and Kanthaliya (2004) reported significant response of crops to sulphur application. The crop, exhibited significant response to magnesium addition in mustard seed yield were 4.3 and 8.6% for 10 and 20 mg Mg kg^{-1} , respectively. Krishnamurthi and Mathan (1996) also reported similar results. The S x Mg interaction had a significant beneficial effect on the stover yield in mustard. The maximum yield was recorded with 20 mg S + 20 mg Mg kg^{-1} treatment.

Qualitative studies

Application of sulphur increase the oil content of mustard seed, highest oil content being recorded higher doses of S (Table 1). Application of 20 mg S kg^{-1} increase oil content from 36.90 to 39.1 per cent. The results are in agreement with those obtained by Singh *et. al.*, 1986. The protein percentage in mustard seed and stover increased significantly with increasing levels. Verma *et. al.* (1973) also reported similar results. Magnesium application also improved the content of protein in mustard. The interaction (S X Mg) had a significantly beneficial effect on protein content in mustard seed.

Chemical composition of plants

Application of sulphur increased the nitrogen content in mustard seed and stover significantly over control. The increase in N content is attributed to the application of sulphur to plants which resulted in profuse vegetative and root growth by the fact that sulphur deficiency prevents utilization of nitrogen and brings about an accumulation of soluble nitrogen within the plant which checks further absorption of nitrogen leading to decrease in its content in plants. Similar results were reported by Yadav and Sharma (2002). Nitrogen content in mustard seed and stover increased significantly with increasing levels of magnesium. Kumar *et. al.* (1981) also reported an increase in N content with Mg application. The seeds of mustard were found to contain more nitrogen than stover of mustard. The sulphur and magnesium (S x Mg) interaction was non-significant. However, the maximum concentration of N in mustard seed and stover was recorded under S_{20} Mg_{20} treatment (Table 2). The results of plant analysis indicate that the content of phosphorus was higher in plants supplied with S as compared to those unfertilized with respect

Table 1: Effect of S & Mg application on seed and stover yield and protein content of mustard

Mg level (mg kg^{-1})	S level (mg kg^{-1}) 0	10	20	Mean
	Seed yield (g/pot)			
0	1.50	2.05	2.43	1.99
10	1.73	2.20	2.50	2.14
20	1.70	2.23	2.57	2.17
Mean	1.64	2.16	2.50	
	S	Mg	Sx Mg	
SEm ±	0.05	0.05	0.09	
CD at 5%	0.15	0.15	N S	
	Stover yield (g/pot)			
0	2.33	3.15	3.67	3.05
10	2.57	3.35	3.88	3.27
20	2.49	3.40	4.00	3.30
Mean	2.46	3.30	3.85	
	S	Mg	S x Mg	
SEm ±	0.004	0.004	0.006	
CD at 5%	0.011	0.011	0.02	
	Protein content in Seed (%)			
0	21.19	21.43	21.56	21.39
10	21.37	21.69	21.81	21.61
20	21.50	21.90	22.00	21.80
Mean	21.35	21.68	21.79	
	S	Mg	S x Mg	
SEm ±	0.024	0.024	0.022	
CD at 5%	0.073	0.073	N S	
	Protein content in Stover (%)			
0	5.54	5.93	6.12	5.86
10	5.68	6.06	6.25	6.00
20	5.81	6.12	6.43	6.12
Mean	5.68	6.04	6.27	
	S	Mg	S x Mg	
SEm ±	0.02	0.05	0.03	
CD at 5%	0.02	0.05	N S	

Table 2 : Effect of S & Mg application on nutrients content of mustard

Mg level(mg kg^{-1})	S level (mg kg^{-1}) 0	10	20	Mean
	Seed yield (g/pot)			
0	3.39	3.43	3.45	3.42
10	3.42	3.48	3.49	3.46
20	3.44	3.51	3.52	3.49
Mean	3.42	3.47	3.49	
	S	Mg	S x Mg	
SEm ±	0.004	0.004	0.007	
CD at 5%	0.012	0.012	N S	
	Nitrogen Stover (%)			
0	0.89	0.95	0.98	0.94
10	0.91	0.97	1.00	0.96
20	0.93	0.98	1.03	0.98
Mean	0.91	0.97	1.0	
	S	Mg	S x Mg	
SEm ±	0.003	0.003	0.005	
CD at 5%	0.009	0.009	N S	
	P Seed (%)			
0	0.37	0.39	0.42	0.39
10	0.37	0.39	0.43	0.40
20	0.38	0.40	0.43	0.40
Mean	0.37	0.39	0.43	
	S	Mg	Sx Mg	
SEm ±	0.004	0.004	0.006	
CD at 5%	0.011	0.011	N S	
P Strover (%)				
0	0.15	0.17	0.20	0.17
10	0.17	0.18	0.21	0.19
20	0.17	0.19	0.22	0.19
Mean	0.16	0.18	0.21	
	S	Mg	S x Mg	
SEm ±	0.003	0.003	0.005	
CD at 5%	0.009	0.009	N S	
	K Seed (%)			
0	0.64	0.66	0.69	0.66
10	0.64	0.65	0.68	0.65
20	0.62	0.64	0.67	0.64
Mean	0.63	0.65	0.68	
	S	Mg	S x Mg	
SEm ±	0.003	0.003	0.006	
CD at 5%	0.010	0.010	N S	
	K Stover (%)			
0	1.78	1.81	1.84	1.81
10	1.77	1.80	1.83	1.80
20	1.76	1.78	1.83	1.79
Mean	1.77	1.80	1.83	
	S	Mg	S x Mg	
SEm ±	0.002	0.002	0.003	
CD at 5%	0.005	0.005	N S	
	Mg Seed (%)			
0	0.22	0.26	0.26	0.25
10	0.32	0.27	0.28	0.29
20	0.39	0.36	0.30	0.35
Mean	0.31	0.30	0.28	
	S	Mg	S x Mg	
SEm ±	0.003	0.003	0.005	
CD at 5%	0.009	0.009	N S	
	Mg Stover (%)			
0	0.18	0.15	0.12	0.15
10	0.20	0.18	0.14	0.17
20	0.20	0.15	0.13	0.16
Mean	0.20	0.16	0.13	
	S	Mg	S x Mg	
SEm ±	0.009	0.009	0.017	
CD at 5%	0.027	0.027	N S	
	S Seed (%)			
0	0.36	0.41	0.44	0.40
10	0.35	0.41	0.44	0.40
20	0.35	0.40	0.43	0.39
Mean	0.35	0.41	0.44	
	S	Mg	S x Mg	
SEm ±	0.002	0.002	0.007	
CD at 5%	0.005	0.005	N S	
	S Stover (%)			
0	0.15	0.19	0.22	0.19
10	0.14	0.19	0.21	0.18
20	0.13	0.18	0.21	0.17
Mean	0.14	0.19	0.21	
	S	Mg	S x Mg	
SEm ±	0.003	0.003	0.005	
CD at 5%	0.008	0.008	N S	

Table 3 :- Effect of S & Mg application on nutrients uptake by musterd

Mg level(mg kg^{-1})	S level (mg kg^{-1}) 0	10	20	Mean
	N Seed yield (g/pot)			
0	50.86	70.31	83.35	68.37
10	59.28	76.47	87.24	74.33
20	58.49	78.39	90.31	75.73
Mean	56.21	75.06	87.17	
	S	Mg	S x Mg	
SEm ±	1.72	1.72	2.57	
CD at 5%	5.15	5.15	7.71	
	N Stover (mg/pot)			
0	20.50	29.92	35.95	28.79
10	23.39	32.28	38.80	31.49
20	23.16	33.32	41.20	32.56
Mean	22.35	31.84	38.65	
	S	Mg	S x Mg	
SEm +	0.08	0.085	1.50	
CD at 5%	0.25	0.25	0.44	
	P Seed (mg/pot)			
0	5.56	7.99	10.22	7.92
10	6.42	8.60	10.74	8.59
20	6.45	8.93	11.05	8.81
Mean	6.14	8.51	10.67	
	S	Mg	S x Mg	
SEm ±	0.17	0.17	0.29	
CD at 5%	0.50	0.50	N S	
	P Stover (mg/pot)			
0	3.49	5.35	7.33	5.39
10	4.37	6.03	8.14	6.18
20	4.23	5.94	8.80	6.49
Mean	4.03	5.94	8.09	
	S	Mg	S x Mg	
SEm ±	0.099	0.099	0.17	
CD at 5%	0.300	0.300	N S	
	K Seed (mg/pot)			
0	9.61	13.53	16.78	13.31
10	10.10	14.29	17.00	14.13
20	10.55	14.30	17.21	14.02
Mean	10.42	14.04	17.00	
	S	Mg	S x Mg	
SEm ±	0.16	0.16	0.28	
CD at 5%	0.49	0.49	N S	
	K Stover (mg/pot)			
0	41.47	57.01	67.52	55.33
10	45.45	60.30	71.00	58.93
20	43.82	60.51	73.20	59.18
Mean	43.59	59.27	70.57	
	S	Mg	S x Mg	
SEm +	0.07	0.07	0.13	
CD at 5%	0.23	0.23	0.39	
	Mg Seed (mg/pot)			
0	3.23	5.33	6.33	4.96
10	5.54	5.95	7.07	6.19
20	6.63	8.22	7.72	7.52
Mean	5.13	6.50	7.04	
	S	Mg	S x Mg	
SEm +	0.19	0.19	0.34	
CD at 5%	0.58	0.58	N S	
	Mg Stover (mg/pot)			
0	2.79	4.41	4.77	3.99
10	4.36	5.02	5.82	5.07
20	4.98	6.12	6.93	6.01
Mean	4.04	5.18	5.84	
	S	Mg	S x Mg	
SEm +	0.11	0.11	0.19	
CD at 5%	0.32	0.32	N S	
	S Seed (mg/pot)			
0	5.41	8.40	10.70	8.17
10	6.07	6.01	11.08	8.72
20	5.96	8.93	11.05	8.65
Mean	5.81	8.78	10.95	
	S	Mg	S x Mg	
SEm +	0.97	0.97	0.16	
CD at 5%	0.29	0.29	N S	
	S Stover (mg/pot)			
0	3.51	4.75	8.51	5.59
10	3.41	5.52	8.75	5.89
20	3.34	5.58	9.30	6.07
Mean	3.42	5.28	8.85	
	S	Mg	S x Mg	
SEm +	0.11	0.11	0.19	
CD at 5%	0.33	0.33	N S	

of S. Mehta and Singh (1988) also obtained similar results with S application. Phosphorus content in mustard seed and stover was increased significantly with magnesium application. Kumar *et. al.* (1981) also reported an increase in P content with Mg application. The interaction between S and Mg was found to be non- significant. Regarding the effect of S treatment on potassium content of mustard there was a significant increase in the level of K due to soil application of S. Mehta and Singh (1988) also reported an increase in K concentration in mustard seed and stover with increasing S levels. On the other hand, potassium concentration decreased significantly with sulphur application. However, there was a slight reduction in Mg content in mustard stover with 20 Mg S kg^{-1} treatment. The concentration of Mg in mustard seed increased significantly with its application. Gupta and Singh (1985), Patel *et. al.* (1989) and Singh and Singh (1990) also reported similar results. Application of sulphur under present investigation tended to increase the concentration of S in mustard significantly over control. The increase may be due to rapid absorption and translocation of it by the plant with adequate supply of S to the soil. Singh and Singh (1990), Krishnamurthi and Mathan (1996) also reported similar results . The sulphur content of mustard seed and stover on the other hand declined with Mg addition. However this decrease was statistically non- significant. Aulakh *et. al.* (1977) reported similar results. The interaction effect was non- significant.

Uptake studies

The utilization of nitrogen by mustard seed and

stover significantly increased over control with the application of sulphur. This increase in N uptake may be attributed to increased yields due to S application. The maximum values of N uptake by crop was recorded under S_{20} Mg_{20} treatment. The uptake of nitrogen by mustard increased by magnesium application significantly. Ananthanarayana and Venkatarao (1982) also reported similar results. The seed of mustard utilized greater amounts of N than those of stover. The interaction effect of S x Mg was significant. The uptake of N increased with 10 and 20 mg Mg Kg^{-1} application in the presence and absence of applied S. There was a significant increase in P uptake by mustard seed and stover with S application. Biswas *et. al.* (1995) the impact of magnesium on phosphorus uptake was significant and a consistent increase in P utilization was recorded with increasing levels of Mg. Ananthanarayana and Venkatarao (1982) also reported an increase in P uptake with magnesium application. Both S and Mg were found to have a beneficial effect on the utilization of P by mustard seed and stover and maximum amount of P was utilized under 20 mg Mg kg^{-1} and 20 mg S kg^{-1} treatment (Table 3). However, the effect of interaction was non- significant. Potassium uptake by mustard increased with S application. Singh *et. al.* (1987) also reported an increase in K uptake by S application. A significant rise in the uptake of K by mustard crop (Table 3) was also noted due to Mg application. Kumar *et. al.* (1981) also reported similar results. The interaction effect was significant with respect to K uptake by mustard seed only. The significant rise in Mg uptake by mustard with increasing levels of sulphur was brought about not only by greater yield of seed but also due to marked enrichment in the concentration of Mg in mustard. The utilization of magnesium by mustard also increased significantly with its application Patel *et. al.* (1989) and Singh and Singh (1990) also reported an increase in Mg uptake with its application. The interaction was non- significant. The significant increase in the uptake of S by mustard due to increasing level so sulphur application was the combined effect to higher yields along with a marked increase in S content. The mean S uptake by mustard seed and stover increased from 5.81 to 10.95 and 3.42 to 8.85 mg/pot, respectively. Bahl *et. al.* (1986), Yadav and Sharma (2002) also found similar trend regarding the uptake of sulphur with its application. Magnesium addition, on the other hand, decreased the utilization of sulphur by mustard significantly over control. This reduction may be described to lower S content at higher Mg levels. The interaction effect was non- significant.

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Gender Role Analysis In Animal Husbandry

PRAKASH SINGH, SUBODH KUMAR, R.K.DOHAREY, R.P.SINGH , R.R.YADAV AND S.N.UPADHYAY
Deptt. of Extension Education, NDUAT, Kumarganj, Faizabad. 224 229 (U.P.)

Abstract

This study was carried out on 100 respondents (50 males and 50 females) who were engaged in animal husbandry enterprise in Faizabad district of Eastern Uttar Pradesh. It was observed that females were engaged more in daily practices (both actual doing and supervision) while, males were involved more in occasional practices. The males were found dominant regarding decision making in most of the management practices except care and feeding of livestock as well as responsibility for cleaning of animal sheds. In case of males, the variables like, education, caste, family occupation, land holding, family annual income, materials possession, communication media possession, herd size, economic motivation and decision making were positively and significantly correlated, means as the degree of these variables is increased, it would contribute towards their more role performance. While, in case of female, all the variables showed negative correlation ship towards role performance means that value of these variables is increased, the role performance of females in animal husbandry is therefore decreased.

Key words: Occasional practices, daily practices, education, animal husbandry

Introduction

Now a days, livestock rearing has become a subsidiary enterprise for many households, generating additional income along with crop production. Being a pre-dominantly agriculture economy, India has the largest livestock population in the world. Presently, the livestock sector accounts for about 21 percent of the value of out put of the combined crops and livestock sectors, which constitute agriculture. This intern is about 29 percent of the total gross-domestic product of the economy. Women's role in livestock keeping is an old age tradition and plays a major role for rearing animals and much of the work of livestock management is carried out by women. However, the development, extension and training programmes are generally not for involvement of women as well as not for extending the benefits to them, (Singh and Viitanen 1987).

Keeping in view the contribution of women in animal husbandry, the present study was carried out on following objectives:

1. To study the extent of involvement of men and women in animal husbandry.
2. To see the relationship between different variables relating to gender and degree of role performance in animal husbandry.

Methodology

This study was undertaken in Milkipur block of Faizabad district by selecting four villages randomly. A list of livestock owners in each selected village was prepared and a total of 100 respondents were selected through proportionate random sampling technique of which 50 were males and 50 females. The degree of role performance was measured on the basis of scale developed by Kanwar and Kharde (1994) with suitable modifications. The scale includes 12 daily practices and 10 occasional practices. To see the relationship between different variables and degree of role performance, the correlation coefficient (r) was used.

Results and Discussion

The Table 1 reveals the practicewise role performance by the males and females. In case of daily practices (actual doing) more involvement of males was found out in the practices like 'chaffing of fodder', 'tieing and untieing the animals'. 'milking', 'selling of milk' and 'grazing the animals'. But, in other practices females were found dominant. Under occasional practices, 'feeding of calves and care of neonatal calves' were observed dominantly performed by the females, while other practices like 'care of animals at calving, after calving' 'taking sick animals to veterinary dispensary etc. predominantly performed by the males. The overall degree of role performance by males was found to be 44 percent in case of daily practices (actual doing) and 70 percent in case of occasional practices(daily practices). Whereas,

Table 1: Practice wise involvement of gender in animal husbandry practices.

S.No. Practices	Extent of involvement (%)			
	Male		Female	
	Actual doing	Super-vision	Actual doing	Super-vision
A. Daily practices				
1. Cleaning of shed	18	26	82	74
2. Bathing animals	47	49	53	51
3. Arrangement of green fodder	44	48	56	42
4. Bringing fodder from field for chaffing	50	51	50	49
5. Chaffing of fodder	55	54	45	46
6. Feeding of animals	39	45	61	55
7. Offering water to animals	41	45	49	55
8. Tieing & untieing the animals	52	51	48	49
9. Milking	56	49	50	51
10. Selling of milk	56	46	44	54
11. Preparation of milk & milk products	-	01	100	99
12. Grazing the animals	79	60	21	40
Average	44	43	56	57
B-Occasional practices:				
1. Care of animals at calving	56	53	44	47
2. Care of animals after calving	56	54	44	46
3. Taking sick animals to Vet/dispensary	97	76	03	24
4. Protection of animals from bad weather	58	51	50	49
5. Taking in heat animals to breading	99	69	01	31
6. Purchase of animals	99	81	01	19
7. Selling of animals	98	81	02	19
8. Feeding of calves	47	51	53	49
9. Care of neonatal calves	47	52	53	48
10.Littering	50	53	50	47
Average	70	63	30	37

Table 2: Involvement of gender in decision making about A.H. practices.

S.No. Practices	Extent of involvement(%)	
	Male	Female
1. Livestock to be reared	71	29
2. Equipment to be needed/purchased	70	30
3. Size and location of housing	76	24
4. Fodder production	70	30
5. Marketing of animals	50	50
6. Disposal of excess and nonproductive animals	70	30
7. Care and feeding of livestock	45	55
8. Feed arrangement	55	45
9. Preventive measures to protect live stock	59	41
10. Type of disease treatment	60	40
11 Weaning & care of young ones	53	47
12. Responsibility for cleaning of animals shed	27	73
13. Milking of animals	52	48
14. Selling of milk and products	40	60
Average	57	43

regarding females, it was 56 percent for daily practices (actual doing) and 30 percent for occasional practices (actual doing). Almost similar pattern was observed in case of supervision of daily practices as well as occasional practices. The overall involvement of female in daily practices (actual doing) was observed to be 56 per cent ,while in case daily practices(supervision), it was 57 percent Similarly, in occasional practices (actual doing), the involvement of females was 30 percent as against 37 percent in occasional

Table 3: Correlation coefficient (r) between different variables relating to gender and degree of role performance in animal husbandry practices

Variables	Correlation coefficient(r)	
	Male (50)	Female (50)
1- Age	0.0150	0.0140
2- Education	0.2951**	-0.6292**
3- Caste	0.4900**	-0.6439**
4- Family occupation	0.2504*	-0.2116*
5- Land holding	0.5290**	-0.7249**
6-Type of family	0.1158	-0.3045**
7- Size of family	0.1246	-0.1449
8.Social participation	0.1237	-0.2929**
9- Family annual income	0.5475**	-0.6705**
10- Material possession	0.4123**	-0.6720**
11- Communication media possession	0.3128**	-0.5445**
12- Herd size	0.3548**	-0.05109
13- Milk production	0.3718**	-0.0763
14- Socio economic status	0.4375**	-0.7100**
15- Economic motivation	0.1999*	-0.7302**
16- Decision making	0.2795**	-0.6347**

*Significant at 5% = 0.1949 **Significant at 1% = 0.2540

practices (supervision). Hence, it may be said that maximum parentage of female were observed performing daily practices either actual doing or supervision, while in occasional practices, involvement of males was observed to be more.

The Table 2 shows the involvement of males and females in decision making regarding animal husbandry practices to be adopted by them. The males were found dominant in most of the management practices except 'care and feeding of livestock' and responsibility for cleaning of animal sheds. The overall involvement of males and females in decision making was observed to be 57 percent and 43 percent respectively.

The Table 3 indicates the relationship of different variables with role performance of males and females. In case of male respondents, the variables like education, caste, family occupation, land holding family annual income, material possession, communication media possession, hard size, milk production, socio –economic status, economic motivation and decision making were found to be significant and positively correlated with role performance, means that these variables had positive influence over role performance of the males. But, in context to the female respondents, the situation was almost reverse means that these variables viz .education, family occupation, land holding, type of family, social participation, family annual income, material possession, communication media possession, socio-economic status , economic motivation and decision making were found negatively correlated with role performance means that if the degree of these variables decreases the role performance of the females would be decreased.

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Constraints in the efficient functioning of Women Self Help Groups (SHGs) in kumaon region of Uttarakhand

RUCHI RANI GANGWAR, SHWETA ARORA, VIJAY K. PAL AND AJAY K. SINGH
Department of Agricultural Economics, College of Agriculture, G.B. Pant University of Agriculture and Technology, 263145, U.S.Nagar, Uttarakhand.

Abstract

The study aims to examine constraints in efficient functioning of SHGs. The study was conducted in the year 2008-09 in Nainital district of Kumaon region of Uttarakhand. The findings show that the main reason for inefficient functioning was economic problems regardless of type of the model under which the SHG function. However the differences were observed when the various economic problems were taken for consideration. Failure of repayment was cited as the main reason followed by inadequacy of loans and negligence by bank and block officials for SHGs under SGSY. The members of the SHGs under SGSY models did not cite high interest rate as interest rates were reasonable and maintained as per the bank rules. However, the majority of women members under NABARD model III cited higher interest rates as the foremost reason for defunctness of SHGs followed by bad repayment practices adopted by NGO officials. Repayment was not a big problem for SHGs under NABARD model III as NGOs monitor their loan transactions.

Key words: constraints, inefficient, repayment practices, SGSY, NABARD

Introduction

Micro-credit intervention programme has been well-recognized world over as an effective tool for poverty alleviation and improving socio-economic conditions of rural poor. Poverty alleviation is one of the primary objectives of any planning in a national economy. In India too, micro-credit is making a strong headway in its efforts to reduce poverty and empower the rural poor. Therefore, it becomes imperative to formulate situation specific poverty alleviation policies and programmes for generation of a minimum level of income for rural poor, which form the substantial percentage of national population in developing societies. One initiative is credit infusion in the rural sector with increased involvement of banks.

Rural credit in post nationalization India was considered as integral part of socio-economic development efforts for the rural areas. Knowing that the success of any credit programme for the rural areas hinges on its high out reach and people friendly approach, the governmental and other institutional players stepped in to provide favourable environment to the poor to develop their organizations. The decade of 1990's witnessed growth of various people's organizations. In this context the role of Self-help groups (SHG's), especially of women has assumed a critical challenge. Self-help groups approach is the key element of social mobilization. Linked with micro-finance, the SHG approach and movement has now been accepted as an effective intervention strategy for poverty alleviation. Microfinance services are provided by three types of sources i) Formal institutions such as commercial Banks, Regional Rural Banks and Co-operatives, ii) Semi-formal Institutions such as NGOs and iii) Informal sources such as money lenders and shopkeepers.

In the recent years, the activities of microfinance institutions have come under a lot of criticism. High interest rates (24-36%), system of quick repayment, keeping the poorest out of the pail of micro-credit, not allowing funds to go into income bearing activities that have a longer gestation period, harsh methods adopted in case of non repayment of loans, borrowers have to borrow from money-lenders in order to repay NGO advanced loans have been noted as disquieting issues. Interest rates charged by micro credit organizations are higher than the corresponding rates charged by commercial banks or other financial institutions. In India, NABARD provides refinance to commercial banks at 7.5% p.a., banks on lend to NGOs at 10-15 % p.a., groups lend to individual members at 24-36% p.a. [Chavan and Ramakumar, (2002)].

Micro-credit system is based on quick repayment. This excludes the poorest out of the benefits of micro-finance since the ability to pay the first few installments depends on the initial resources

base of the borrower.

Quick repayment also does not allow for funds to go into income-bearing activities that have a longer gestation period. High repayment is directly related to high transaction costs. [Swaminathan, Madhura (2007)]. These are emerging as serious problems.

Against this background, present study was carried out in Uttarakhand to examine the various constraints in the efficient functioning of SHGs in the kumaon region of Uttarakhand.

Materials and Methods

Nainital district was selected for the study as it has one of the largest numbers of Self Help Groups (16.98%) in Kumaon region of the State of Uttarakhand. In the district Self Help Groups generally come under SGSY and NABARD models II and III. The SGSY model has subsidy component and must have at least 70 – 80 % of its members living below poverty line, the NABARD model does not have such limitations. The NABARD model has three variants namely –

a) Model I: SHGs formed and financed by banks.
b) Model II: SHGs formed by NGO and financed through banks.
c) Model III: SHGs financed by banks using NGOs as financial intermediaries.

In the study area only Model II and Model III predominantly existed.

There are 8 blocks in the district which were ranked according to the number of SHGs in descending order. The top two blocks having highest number of SHGs namely Haldwani and Kotabag with 197, 169 groups, respectively were selected. The three SHGs which were defunct till date but had been functional for three years or more were randomly selected. The total number of members in defunct SHGs was 30.

The study was based on primary data. The relevant information was collected on pre-structured interview schedules to find out the reasons for inefficient functioning of Self Help Groups, administrative, financial, managerial and technical aspects of functioning of SHGs were analyzed and ranked according to their order of importance. Analysis was done using simple statistical tools like averages and percentages.

Results and Discussion

In order to look into the problems and challenges faced by SHGs in different aspects of their functioning were examined. In the sample taken for the study, defunct SHGs were found belonging to SGSY and NABARD model III. No defunct SHGs were found under NABARD Model II in the study area. Table 1 shows the reasons faced by members of a defunct SHG under SGSY. The main reasons were reported to be economic problem (81.80%) followed by internal dispute (72.70%), non-availability of quality training (63.30%) and availing subsidies as the only motive (54.50 %).

The moderate reasons were non-cooperation of family members (43.40%), defective approach followed in the formation of women SHGs (36.30%), lack of community support (27.20%) and misconception about SHG among the members (18.10%).

Economic problems were decomposed to understand the reasons for defunctness. Repayment failure by SHG members (77.80%) was the major reason followed by inadequacy of loan (66.70%), neglect by bank/block officials (44.50%), un-timeliness of loan (33.40%) and high interest rate (23.30%). (As shown in the Table 2)

Table 3 shows the reasons as faced by members of two defunct SHGs under NABARD model III. The main reasons identified for the failure of SHGs were economic problems (73.60 %), followed by profit oriented approach by NGOs (63.15 %), lack of NGO follow up (57.80 %) and internal dispute (52.60 %).

Moderate percentage was observed for the reasons like wrong approach followed in the formation of the group (42.10 %), lack of community support

Table 1: Reasons for defunctness as reported by the members of SHG under SGSY (n=11)

S.No.	Reasons for defunctness	Percentage	Rank
1.	Economic Problem	81.8	1
2.	Lack of NGO Follow up	-	
3.	Availing subsidies as the only motive	54.5	4
4.	Non availability of quality Training	63.6	3
5.	Profit oriented approach by NGOs	-	
6.	Internal dispute	72.7	2
7.	Non cooperation of family members	43.4	5
8.	Lack of community support	27.2	7
9.	Following wrong approach in the formation of the group	36.3	6
10.	Misconception about SHG among the members	18.1	8

'n' represents the number of members in the sample.

(36.80 %), non-availability of quality training (31.50 %), non-cooperation of family members (21.05 %) and misconception about SHGs among the members (15.70 %).

Table 2: Economic Reasons for defunctness of SHG Members of SGSY (n=9)

S.No.	Economic Problem	Percentage	Rank
1.	Untimeliness of loan	33.4	4
2.	Inadequacy of loan	66.7	2
3.	Repayment failure by members	77.8	1
4.	Neglect by bank/ block officials	44.5	3
5.	High interest rate	22.3	5
6.	Bad repayment practices adopted by NGO official	-	

'n' represents the number of members in the sample.

The economic problems faced by the women members of defunct SHGs under NABARD model III has been presented in Table 4 Majority of SHG members (85.70 %) reported that high interest rate was the foremost reason for defunctness of SHGs followed by bad repayment practices adopted by NGO officials (64.20 %), inadequacy of loan (50.10 %), un-timeliness of loan (42.80 %), negligence by the bank and block officials (28.50 %) and repayment failure by women members (21.40 %).

Table 3: Reasons for defunctness as reported by the members of SHGs under NABARD model III (n= 19)

Sl. No.	Reasons for defunctness	Percentage	Rank
1.	Economic Problem	73.6	1
2.	Lack of NGO Follow up	57.8	3
3.	Only motive for availing subsidies	-	
4.	Non availability of quality Training	31.5	7
5.	Profit oriented approach by NGOs	63.15	2
6.	Internal dispute	52.6	4
7.	Non cooperation of family members	21.05	8
8.	Lack of community support	36.8	6
9.	Wrong approach follow in the formation of the group	42.1	5
10.	Misconception about SHG among the members	15.7	9

'n' represents the number of members in the sample.

Policy Implication

Based upon the discussion of the results obtained in the present study, the following suggestions seem relevant.

1. There is need to modify the procedure for applying, seeking and releasing of credit from the banks. The procedural difficulties are one of the major constraints, which have denied women the financial benefits of the banks. Therefore, the procedure for credit access to women should be made more easy and simple. If lack of land ownership with women is a problem, flexibility should be introduced to land even to non land owners.

Table 4: Economic Reasons for defunctness of SHG Members under NABARD model III (n=14)

Sl.No.	Economic Problem	Percentage	Rank
1.	Un-timeliness of loan	42.8	4
2.	Inadequacy of loan	50.1	3
3.	Repayment failure by members	21.4	6
4.	Neglect by bank/ block officials	28.5	5
5.	High interest rate	85.7	1
6.	Bad repayment practices adopted by NGO official	64.2	2

'n' represents the number of members in the sample.

2. NGOs and SHGs must find out ways to improve their functioning to cut down high interest rates and hidden costs which many times are interpreted as exploitation rather than social help. Institutions like NABARD and DRDA (District Rural Development Agency) must exercise control on their activities.
3. NGOs should provide quality training, nurturing of SHGs and monitoring their activities to help them perform better. NGOs should reasonably regulate and monitored by Government agencies so that they fulfill their commitments as per the spirit of their objectives.

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Effect of nitrogen and poultry manure on yield, quality and nutrient uptake by wheat crop (*Triticum aestivum L.*)

RAMAWATAR MEENA AND Y.V. SINGH

Department of Agricultural Chemistry and Soil Sci., B.H.U. Varanasi (U.P.)

Abstract

*Nitrogen-poultry manure interaction has been studied in pot experiments on soil low in fertility with wheat (*triticum aestivum L.*). The treatments were taken in factorial combination of four levels of N (0, 40, 80 and 120 kg ha^{-1}) and three levels of poultry manures (0, 10 and 20 tones ha^{-1}) applied through urea (NH_2-CO-NH_2) and poultry manure, respectively. The grain and straw yield increased with the application of N and Poultry manure individually, protein and yield also increased when N and Poultry manure were applied in different combinations. The contents and uptake of N, P, K and S were also improved the quality and uptake of nutrients by the crop. Available N, P & K status in soil after harvest of the crop increased with nitrogen and poultry manure application. The available sulphur in soil after crop harvest increased with the application of poultry manure but decreased with increasing levels of nitrogen.*

Key words: growth, nutrients uptake, wheat

Introduction

Wheat is the most dominant rabi crop in India occupying about 50% of the total area under food crops and more than 70% of the total food grain production in the country in rabi season. The soil is not an in exhaustive source to supply nutrients regularly to the ever-growing crops. The farm production at the present level depleted every year about 20-30 million tones of nutrients in addition to 8.4 million tones of nutrients lost through soil erosion alone. Soil fertility surveys indicate that nitrogen deficiency of is universal in most of the Indian soils. Nitrogen is the prime nutrient absorbed by wheat crop in large amount and is the most limiting factor for affecting crop production. Secondly, the low nitrogen content of Indian soil further accelerate the problem, hence there is a need of heavy application of nitrogenous fertilizer to meet out the crop requirement. Deficiency of phosphorus is next in order. Application of potassium has been avoided for a long period in many soils of the indo-Gangetic plains because of micaceous nature of soil clay. It now appears that is also becoming limiting in this highly productive region.

Sulphur deficiency is also emerging in many areas particularly in the pulses and oil seed crops. As continuous rising of crops depletes the soil of its plant nutrients, it is essential to replenish these losses. The use of commercial fertilizer is currently becoming more common to achieve the same objective. Besides supplying nutrients, the manures and fertilizer influence the crops in several other ways and may also bring about marked changes in the soil health. Phosphorus exerts many and a varied function in plant metabolisms and hence adequate phosphorus supply to the plant seriously affects numerous metabolic processes. However, it appears that the most important function is its formation of pyrophosphate bonds, which allows energy transfer. Further the Wheat *(Triticum aestivum L.)* yields are reduced by the use of alone inorganic fertilizers in many countries worldwide. The main objective of this study to determine the effects of nitrogen levels with and without organic manure (poultry manure).

Materials and Methods

A pot experiment was conducted at Department of Agricultural Chemistry and Soil Science R.B.S. College, Bichpuri, Agra with a sandy loam soil, slightly alkaline in nature pH 8.10, low in organic carbon (0.34 %), low available N (138 kg ha^{-1}), medium in available P (12.70 kg ha^{-1}), rich in available K (430 kg ha^{-1}) and deficient in available S (8.10 mg kg^{-1}) with electrical conductivity 0.28 dS m^{-1}. The experiment was laid out in a factorial combination with four levels of N (0, 40, 80 and 120 kg ha^{-1}) and three levels of poultry manures (0, 10 and 20 tones ha^{-1}) applied through urea (NH_2-CO-NH_2) and poultry manure respectively. Half dose of N and Full dose of P, K and poultry manure were applied and mixed well with soil filled in polythene bags except control. Remaining

half dose of N applied at 21 days after sowing. At appropriate moisture levels the soil in each pot was pulverized and calculates amount of fertilizers and poultry manure were thoroughly mixed with the soil. The each pot was seeded with five seeds of wheat. Sowing of crop was done in the polythene bags. Since the experiment was conducted under irrigated conditions during rabi season, irrigation was given to the crop and special care was taken to prevent overflowing the polythene bag (pots). The treatment effects were evaluated in terms of yields of grain, straw and total produce. Available N was determined by alkaline permanganate method (Subbiah and Asija, 1956). Available P in the soil extracts was determined by Olsen's method is based on extraction of available phosphorus from soil by shaking with 0.5 N sodium bicarbonate solution adjusted to pH=8.5 (Olsen *et al*., 1954). Available K in the extraction was determined by ammonium acetate method (Hanway and Heidal, 1952) and available S was determined turbidimetrically (Chesnin and Yien, 1950). Nitrogen was estimated in plant by "Colorimetric" method as quoted by (Snell and Snell, 1955) and the protein content was calculated from the total N content multiplied by 6.25. The P content in plant was determined by acid extract by ammonium molybdate vanadate yellow colour described by (Chapman and Pratt, 1961). The K content was determined flame photometrically and S content in the plant determined turbidimetrically as above methods.

Results and Discussion

Yield

In both cases (grain and straw), poultry manure significantly increased the yield over control. Application of poultry manure brought about significant improvement in the grain and straw yields of wheat. The production of wheat grain and straw per pot was increased by 3.37 and 4.49 percent under 10 t PM ha^{-1} respectively. The corresponding increases in grain and straw yields due to 20 t PM ha^{-1} were 6.25 and 6.76 percent (Table 1). Dhaiya *et al.,* 1980 and Singh and Dubey, 1987 have also reported such poultry manure (FYM) responses. The grain and straw yields of wheat were increased through application of nitrogen up to 29.05 percent and 30.61 percent respectively, associated with 120 kg N ha^{-1} over control. Singh and Singh (1986) have also reported of these results.

Protein

The protein increased in grain and straw significantly up to 20 t PM ha^{-1}. The maximum values of protein content were found in grain and straw at 20 t PM ha^{-1} treatment. The protein percentage in wheat grain and straw increased significantly also with nitrogen application. The increase in protein content was recorded with 120 kg N ha^{-1}. Memon and Jamro, 1988 have also reported similar results.

Nitrogen Uptake

Application of N significantly increased the N uptake by wheat grain and straw with every increase in the level of nitrogen. The magnitude of the increase in N assimilation by grain and straw were 10.9 and 14.8 percent respectively. The maximum nitrogen uptake by wheat grain and straw were recorded with 120 kg N ha^{-1} (Table 1). The increased N uptake with nitrogen application was also reported by Reddy and Bhardwaj (1983) and Balyan, J.K. (1992). The uptake of N also increased significantly with every

Table 1: Effect of nitrogen and poultry manure on yield, protein and nutrients uptake by wheat grain and straw

Treatments	Yield (g pot^{-1})		Protein (%)		N Uptake (kg ha^{-1})		P Uptake (kg ha^{-1})		K Uptake (kg ha^{-1})		S Uptake (kg ha^{-1})	
	Grain	Straw	Grain	Straw	Grain	Straw	Grain	Straw	Grain	Straw	Grain	Straw
Poultry manure(t ha^{-1})												
0.0	3.15	5.10	9.87	3.90	21.80	12.87	2.53	2.40	4.07	26.03	2.53	2.47
10.0	3.26	5.34	10.60	4.13	24.33	14.17	2.67	2.83	4.37	27.70	2.67	2.77
20.0	3.36	5.47	11.60	4.30	27.27	15.23	2.87	3.23	4.93	29.30	2.90	3.00
S.Em±	0.005	0.005	0.37	0.2	0.88	0.91	0.02	0.23	0.12	0.67	0.06	0.08
C.D. at 5%	0.014	0.014	NS	NS	2.59	2.67	0.08	NS	0.37	1.97	0.18	0.25
N levels (Kg ha^{-1})												
0.0	3.15	5.10	9.87	3.90	21.80	12.87	2.53	2.40	4.07	26.03	2.53	2.47
40.0	3.33	5.43	11.70	4.53	26.60	15.87	2.83	3.13	5.27	28.48	2.70	2.73
80.0	3.56	5.83	11.97	4.97	29.87	18.63	3.07	3.37	6.00	32.63	2.97	3.13
120.0	4.44	7.35	12.70	5.80	39.57	27.37	4.20	5.33	8.13	43.63	4.03	4.33
S.Em±	0.005	0.005	0.43	0.23	1.02	1.05	0.03	0.26	0.14	0.77	0.07	0.09
C.D. at 5%	0.016	0.016	1.27	0.68	3.00	3.09	0.09	0.79	0.42	2.28	0.21	0.29

increased level of poultry manure. Higher values of N uptake with poultry manure application were apparently the result of favourable effect of poultry manure on N absorption coupled with greater yields. Mandal *et al*. (1992) and Vyas *et al*., (1997) also reported similar results.

Phosphorus uptake

The uptake of phosphorus by grain and straw was increased significantly with the application of poultry manure levels. The application of poultry manure 10 and 20 t ha^{-1} enhanced the P uptake by grain and straw were 5.24 and 11.84 and 15.19 and 25.69, respectively. Dahiya et al. (1980) reported that the addition of organic manures increased the P uptake in grain. The maximum values of P uptake by grain and straw were recorded with 120 kg N ha^{-1}. The percent increases in P uptake by grain and straw with increased levels of nitrogen and control were 10.6, 17.5 and 39.7 and 23.3, 28.7 and 54.9 percent respectively. Reddy and Bhardwaj (1983) also reported increased P uptake with N application.

Potassium uptake

The increases in potassium uptake by wheat grain and straw due to 10 and 20 t ha^{-1} over no poultry manure treatments were 0.30 and 0.86 and 1.67 and 3.27 kg ha^{-1}, respectively Singh and Tomar (1991). The maximum values of K uptake by wheat grain and straw were recorded with 20 t PM and 120 kg N ha^{-1} individually. The increases in K uptake due to 40, 80 and 120 kg N ha^{-1} over control by wheat grain were 1.2, 1.93 and 4.06 kg ha^{-1}, respectively. The corresponding increases in K uptake by wheat straw were 2.44, 6.66 and 17.6 kg ha^{-1} respectively, Reddy and Bhardwaj (1983).

Sulphur uptake

The sulphur uptake by grain and straw of wheat was increased significantly with the increase in poultry manure concentration. The percent increases in S uptake by grain and straw under 10 and 20 t PM ha^{-1} were 5.24 and 12.7 and 10.8 and 17.6 percent, respectively, Vyas *et al*. (1997). The maximum values of S uptake by grain and straw were recorded with 120 kg N ha^{-1}. The percent increases in S uptake by grain and straw due to 40, 80 and 120 kg N ha^{-1} levels over control were 6.2, 14.8 and 37.2 and 9.5, 21.0 and 42.9 per cent, respectively.

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A Study on economics of button mushroom in Mathura district of Western U.P.

RAJESH KUMAR SINGH, DEVENDRA CHHONKAR, PRATHVI SINGH AND U.C.TRIPATHI[1]
Deptt. of Agri. Economics, R.B.S. College, Bichpuri, Agra

Abstract

The study was conducted in Mathura district in U.P. All the mushroom growers were studied. The mushroom growers were classified in to small (up to 100kg spawn), medium (100 kg to 500 kg spawn) and large (above 500 kg spawn). The number of cases in medium and large were 11 and 6 respectively. No case was found in case of small category. The study shows that the production of button mushroom is profitable on both the farms. However the returns were higher on medium size as compared to large farm size. Since the return per rupee of investment was maximum being 2.21 on medium farms and lower on large farms being 2.09.

Key words: Mushroom, production, category, return per rupee

Introduction

Agriculture is the most crucial sector of the Indian economy. Because it provides food security, generates employment , helps to alleviate poverty and contributes significantly to the country's exports. The role of the agriculture becomes even more important in the context of current global negotiation on bringing the farm sector in to the multilateral trading system, which will open up tremendous opportunities for export and imports at competitive prices for food surplus.

Agriculture production constitutes the single largest economic activity in India, The agriculture and allied sector contributes about 22.8% of gross domesticated product at current prices and account for about 11.20% of country's export's. In the process of economic development, relative importance of agriculture declines because of low productivity and larger proportion of population. Producing smaller proportion of income once agriculture is transformed and modernized through systematic policies of diversification and continuous biological developments, the productivity in agriculture may rise. In India the most farmers are small and marginal. Land-less agriculture labourers, small and marginal farmers spend 80 to 100% of their income to meet the consumption need of their families.

Increase in population is creating an alarming situation in the food problem in India. Malnutrition in terms of protein deficiency is becoming a major hazard in developing countries. Exploiting non-traditional food resources can make a substantial break through to meet the serious food deficit. In these circumstances, popularizing, mushroom as part and parcel of very day food in of paramount importance. Fungi have been at work since life began on earth.

Sufficient food supply is country's more precious assets. With increasing population and conventional agriculture methods we cannot cope with the food problem. In view of the current energy food crisis, it has become most important to make a substantial breakthrough in the technology of food production to meet a serious food deficit situation.

Mushrooms have been recognized by food and agriculture organization (FAO) as food item contributing to the protein nutrient to the developing countries like India, where there is heavy dependence on cereal diets. The significant feature of mushroom is that this nutritious and tasteful food is cultivated entirely from waste products and converts a wide spectrum of agricultural and industrial waste into substrate on which the growth of mushroom is supported. After harvesting the mushroom, the solid residual left is organic compost with natural nutrients to further enrich the soil. Haryana state is producing about 4000 tonnes of mushroom. Being in close vicinity to the National Capital i.e. Delhi. Haryana state is having high potential for mushroom cultivation.

The exports from India during 1993 were insignificant but presently, it is reported that India has pushed back Taiwan to gain position of top exporter of whole white button mushroom in the world. India has also gained the second position in the export of cut mushrooms. During 1997-98 total export of fresh, dried and covered mushrooms touched 57 crore rupees. Haryana, Himachal Pradesh, Uttar Pradesh, Punjab and Tamil Nadu are the main mushroom producing states in India.

The mushrooms are not highly palatable but are very good for health as well. It has rich amounts of various proteins, vitamins, minerals etc. along with certain essential amino acids which are normally are

[1] Deptt. of Agri. Economics, Janata Mahavidhyalaya, Ajitmal, Auraiya (U.P.)

not found in other vegetables. It has good amount of vitamin-B and C, which are good for beri-beri, heart patients and healthy teeth of children. The acids like Niacin and Penethanic found in mushroom are good for skin diseases. The folic acid found in mushroom can cure anemia. The nutritional advantage provided by mushrooms along with its capacity of income and employment generation were prompted the scientist strongly advocate the cultivation of which button mushrooms in the state. This could be the step towards solving the problem of unemployment income generation and malnutrition among rural population.

Objectives of the study

The Present study has been conducted with following objective:

1- To Work out the cost of cultivation of button mushroom.

2- To estimate the returns from button mushroom.

Research Methodology

The Present study was conducted in Mathura District of western U.P. A List of Button Mushroom growers along with their operational units was taken from concerning government agriculture and horticulture department , lekhpals, Gram pradhan, Block office, Mushroom experts, mushroom growers and traders in the Mathura district and all the mushroom growers were enumerated for the data collection. Further mushroom growers were classified into three size groups on the basis of quantity of spawn used viz. small (up to 100 kg of spawn) ,medium (100 to 500 kg spawn) and large mushroom growers (more than 500 kg). Thus, the final sample consists of 11 medium and 6 large mushroom growers.

The information required for the present study were collected for the year 2003-04 from both primary as well as secondary sources. Primary data were collected by interviewing all the mushroom growers personally with the help of well structured and pre tested schedules.

Results and Discussion

Cultivation of White Button Mushroom (Agaricus Bisporus)

It is grown on a specially prepared substrate called compost. The substrate on which the mushrooms will fruit must be sterilized of pasteurized in order to destroy any fungal and or bacterial competitors. This is prepared by mixing various raw materials in specific proportion either by long or short methods of composting. Straw based compost involved the use of wheat or paddy straw or sugarcane bagasse as base material, where as horse dung is used for preparation of natural compost. In both cases

Table 1: Per farm Cost of Button Mushroom Cultivation

Particulars	Medium		Large		Over all	
	Value (Rs.)	%	Value (Rs.)	%	Value (Rs.)	%
Composting						
Straw	41454.55	33.20	990000.00	35.94	376235.29	35.73
Brawn	4790.91	3.84	276208.33	10.03	100585.29	9.55
Manure	10836.36	8.68	154883.33	5.62	61676.47	5.86
Fertilizer	7030.64	5.63	69575.00	2.53	29105.12	2.76
Insecticide	7030.64	5.63	69575.00	2.53	29105.12	2.76
Fungicide	1152.27	0.92	11333.33	0.41	4745.59	0.45
Casing soil	770.45	0.62	17833.33	0.65	6792.65	0.65
Electricity	1480.00	1.19	138200.00	5.02	49734.12	4.72
Miscellanceous	1022.73	0.82	117000.00	4.25	41955.88	3.98
Other	636.36	0.51	0.00	0.00	411.76	0.04
Family Labour	2760.18	2.21	27596.67	1.00	11526.00	1.09
Casual Labour	4135.27	3.31	45070.00	1.64	18582.82	1.76
Total	83100.36	66.54	1917275.00	69.60	730456.12	69.36
Cost of Spawn	15943.18	12.77	180833.33	6.65	74139.71	7.04
Family Labour	6663.64	5.34	63846.67	2.32	26845.88	2.55
Casual labour	7205.45	5.77	95820.00	3.48	38481.18	3.65
Interest on variable cost	4076.03	3.26	131574.00	4.78	49075.31	4.66
Total variable cost	116988.66	93.68	2389349.99	86.74	918998.19	87.24
Rental Value	5636.36	4.51	341666.67	12.40	124235.29	11.80
Depreciation	451.27	0.36	4742.00	0.17	1965.65	0.19
Interest on fixed cost	1805.09	1.45	18968.00	0.69	7862.59	12.73
Total Fixed Cost	7892.73	6.32	365376.67	13.26	134063.53	12.73
Total Cost (Cost C)	124881.39	100.00	2754725.67	100.00	105361.72	100.00
Cost B	115457.57		2663282.33		1014689.84	
Cost A	108016.12		2302647.67		882591.96	

Table 2: Farms business income analysis of different size farm in button mushroom Production Per Farms (Rs.)

Particulars	Farm Size		
	Medium	Large	Overall
Per farm			
Gross Income	275465.78	575983.33	2211036.68
Net Income	150584.39	3004857.67	1157974.96
Family labour income	160008.21	3096301.00	1196346.84
Farm business income	167449.66	3456935.67	1328444.72
Farm investment income	158025.84	3365492.33	1290072.84
Per 100 Kg of Mushroom Production			
Gross Income (Rs.)	608.46	828.72	805.22
Net income	332.62	432.35	421.71
Family labour income	353.43	445.51	435.69
Farm investment income	349.05	484.24	469.82
Per Kg. of Mushroom Production			
Gross Income (Rs.)	40.23	57.50	55.58
Net income	21.99	30.00	29.11
Family labour income	23.37	30.91	30.07
Farm business income	24.45	34.51	33.39
Farm investment income	23.08	33.60	32.43
Cost of production (Per Kg.)	18.24	24.50	26.47
Input- Output ratio	1:2.21	1:2.09	1:2.10

the base materials are supplemented with some activators (chicken manure, molasses, wheat bran and nitrogen sources, organic or inorganic fertilizers, cakes). The nitrogen content is adjusted at 1.5% of the dry weight of the base materials used. Depending upon the availability of different base materials. Activators and nitrogenous sources, the following compost formulations are popular in study area.

Items	Formula-I	Formula-II
Wheat straw	1000 Kg	1000 Kg.
Chicken manure	400 Kg	—
Brewer's grain	72 Kg	60 Kg.
Urea	14.5 kg	07 Kg.
Gypsum	30 Kg	30 Kg.
Horse manure	—	300 Kg.

Table 1 under discussion reveals that the button mushroom was not being grown by small farm size group of sample households and per farm total cost of cultivation of button mushroom on overall farms came to about Rs. 1053062, out of which variable and fixed costs accounted for about 87 and 13% respectively. On medium and large farms the total cost was estimated to be about Rs. 124881 and 2754726 respectively. The variation in the per farm total cost of cultivation of button mushroom on different farm size groups attributed to the scale of production of button mushroom on these farms.

The table further reveals that the overall value of compost occupied maximum share (69.36%) followed by the rental value, value of spawn and labour charges. There was a big difference in the rental value of building used for the mushroom cultivation on medium and large farms, therefore the per farm proportionate share of rental value on medium and large farms was nearly came to 5 and 12% of the total cost with an overall average of about 11.80%.

The mushroom production is labour and management intensive. Specialty mushroom is not a "get rich quick" enterprise. On the contrary, it needs a considerable amount of knowledge, research, planning, and capital investment to set up a production system. One must also be prepared to face sporadic fruiting, invasions of "weed" fungi and insect pests. The overall human labour occupied about 6 percent to the total cost. The share of total human labour to the total cost was found highest on medium size group as compared to large farms.

Farm business analysis in the cultivation of button mushroom on the farms of different categories of sample growers is shown by the Table 2.

A Close perusal of the table indicates that although per kg cost of production was higher on large farms but they enjoy the higher net income as compared to medium growers. It is very interesting to note that the return per rupee of investment in the cultivation of button mushroom was noticed higher on medium unit which is resulted by the comparatively low cost. Over all input/ output ratio with respect to cost C was 1: 2.10, being 1:2.21 and 1:2.09 on medium and large size groups respectively.

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Factors associated with the adoption of chilli production technology among the farmers

D.K. JAISWAL, S.P.SINGH, M. K. DUBEY[1], AND DILIP YADAV [2]
JNKVV, College of Agriculture Tikamgarh, M.P.

Abstract

Present study was conducted on the chilli growers of Khargone district of M.P. regarding socio- personal economic attribute, the high percentage of chilli growers were belongs to young age group, and medium level group had high annual income, medium socio-economic status and medium economic motivation. Regarding relationship between various attributes i.e. age, annual income, socio-economic status, market orientation, mass media exposure, innovativeness, personal farming experience knowledge level plays significant role with the adoption behavior of improved chilli production technology among the farmers.

Key words: Socio- personal, socio-economic, adoption behavior

Introduction

Chilli (Capsicum annum) is one of the most important commercial vegetable and spice crops of the world. It is valued for its diverse commercial uses. It is widely cultivated over an area of 6218 million hectare with a production of 7182 million tones. The important chilli growing countries are China, U.S.A., Turkey, Italy, Japan, Spain and India. China leads in chilli production holding 42.3% share of the world's production (Chadha, 2001).

India is indeed the largest producer, exporter and consumer of chilli in the world. In terms of area and production, India ranks second in the world followed by China, covering an area of 1010.6 thousand hectares with an annual production 820 thousand tones (Chadha, 2001).

In India chilli grown in almost all the states. Andhra Pradesh has been the largest chilli growing state followed by Karnataka and Maharashtra. Productivity of the chilli is the highest in Andhra Pradesh followed by Arunachal Pradesh and Punjab.

Madhya Pradesh is also one of the chilli growing states. In M.P. the area under chilli is 43,000 hectares with the production of 13,000 million tones. Khargone district is the leading district in M.P. for maximum area and production of chill crop, covering an area of 10017 hectare with production of 12761 metric tones. Source: Department of Horticulture Khargone, Madhya Pradesh, 2008-09).

Methodology

The study was conducted in Khargone block of Khargone district of Madhya Pradesh due to being a leading district of M.P. in area and production of chilli. Five RHEOs circles which comes under the block were selected and from each RHEOs Circle two villages leading in area and production of chilli were selected, thus the total 10 villages were selected randomly. From each selected villages a list of chilli growers were prepared with the help of RHEOs and 12 equal number of chilli growers was selected on the basis of simple random sampling method. Thus the total 120 farmers were the sample of the study.

Results and Discussion

It revealed from the present study that the higher percentage of respondents was found in young age group. Most of the respondents were found in medium annual income category. The majority of respondents were found in medium socio-economic status category. Highest numbers of respondents were fall in medium economic motivation category. Most of the respondents were found in medium risk preference, Most of the respondents were found in low extension participation category. The majority of the chilli growers were found in medium mass media exposure category, a higher percentage of respondents was found in low information seeking behaviour category, the majority of the chilli growers were found in medium innovativeness category, higher percentage of respondents was found in medium market orientation category. The majority of chilli growers were found in low farming experience of chilli crop. Most of the respondents were found in medium knowledge level of chilli crop.

Age the positive and significant relationship with extent of adoption of the respondents. Hence, it may be concluded that age had influence on extent of adoption. A positive and significant relationship observed between annual income and extent of adoption of chilli growers. Hence, it reveals that annual income influenced extent of adoption. Socio-economic status was found positively and significantly correlated with extent of adoption. It can be

[1] Deptt. of Extension Education, College of Agriculture, JNKVV, Jabalpur M.P.

[2] M.Sc. (Ag.) Student, Deptt. of Extension Education, College of Agriculture, JNKVV, Jabalpur M.P.

Table 1: Distribution of chilli growers according to their socioeconomic and psychological attributes

S. No.	Attributes	Categories	No. of respondent	%tage
1	Age	Young	58	48.40
		Middle	48	40.00
		Old	14	11.60
		Total	120	100.00
2	Annual income	Below poverty line	35	29.16
		Low	30	25.00
		Medium	43	35.84
		High	12	10.00
		Total	120	100.00
3	Socioeconomic status			
		Low	48	40.00
		Medium	63	52.50
		High	09	7.50
		Total	120	100.00
4	Economic motivation			
		Low	34	28.40
		Medium	77	64.20
		High	09	7.40
		Total	120	100.00
5	Risk preference	Low	33	27.50
		Medium	68	56.67
		High	19	15.83
		Total	120	100.00
6	Market Orientation			
		Low	36	30.00
		Medium	74	61.60
		High	10	8.40
		Total	120	100.00
7	Mass media exposure			
		Low	42	35.10
		Medium	51	42.50
		High	27	22.40
		Total	120	100.00
8	Extension Participation			
		Low	62	51.80
		Medium	56	46.50
		High	02	1.70
		Total	120	100.00
9	Information seeking behaviour			
		Low	65	54.30
		Medium	34	28.30
		High	21	17.50
		Total	120	100.00
10	Innovativeness	Low	23	19.20
		Medium	91	75.80
		High	06	5.00
		Total	120	100.00
11	Farming experience of chilli crop			
		Low	74	61.70
		Medium	39	32.50
		High	07	5.80
		Total	120	100.00
12	Knowledge level	Low	22	18.30
		Medium	87	72.50
		High	11	9.20
		Total	120	100.00
13	Adoption level	Low	65	54.20
		Medium	47	39.20
		High	08	6.60
		Total	120	100.00

Table 2: Relationship between selected attributes of chilli growers and their extent of adoption.

S. No	Attributes	Correlation coefficient 'r'
1	Age	0.219*
2	Annual income	0.231*
3	Socio-economic status	0.333**
4	Economic motivation	0.048 NS
5	Risk preference	0.013 NS
6	Market orientation	0.277**
7	Mass media exposure	0.264**
8	Extension participation	-0.110 NS
9	Information seeking behaviour	0.034 NS
10	Innovativeness	0.240**
11	Personal farming experience	0.220*
12	Knowledge level	0.314**

* Significant at 0.05 level of significance
** Significant at 0.01 level of significance

concluded on the basis of above finding that socio-economic status had an influence of extent of adoption of chilli growers. There is no relationship between economic motivation and extent of adoption of the respondents. Hence, it may be concluded that economic motivation had no influence on extent of adoption. Risk preference was observed as non significant. Hence, it may be concluded that risk preference had no influence on extent of adoption. A positive and significant relationship was observed between market orientation and extent of adoption of chilli growers. This reveals that market orientation of respondents put great impact on extent of adoption of chilli growers. Positive and significant relationship was found between mass media exposure and extent of adoption of chilli growers. Thus, it may be concluded that mass media exposure and extent of adoption of chilli growers. There is no relationship between extension participation and extent of adoption of chilli growers. Hence, it may be concluded that extension participation had no influence on extent of adoption. Information seeking behaviour was observed as non significant. Hence, it may be concluded that information seeking behavior had no influence on extent of adoption. Positive and significant relationship was found between innovativeness and extent of adoption of chilli growers. Thus, it may be concluded that innovativeness and extent of adoption of chilli growers. Personal farming experience of chilli crop was found positively and significantly correlated with extent of adoption of chilli growers, this shows that personal farming experience of chilli crop has an impact on extent of adoption of chilli growers. A positive and significant relationship was observed between knowledge level and extent of adoption of chilli growers. Thus, it may be concluded that knowledge level and extent of adoption of chilli growers.

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Evaluation of Isabgol (*Plantago ovata forsk*) varieties to potash levels in semi-arid condition

S.B.SINGH, S.K.CHAUHAN AND VISHWANATH
Deptt. og Agronomy, R.B.S.College, Bichpuri, Agra-283105.

Abstract

A field experiment was conducted during two consecutive years of 2006-07 and 2007-08 at Agricultural Research farm R.B.S.College , Bichpuri, Agra to determine the effect of potash levels on Isabgol varieties. The yield attributing characters of Isabgol i.e. No. of spike/m row length, length of spike (cm), No. of spike /plant, No. of seed /spike, seed weight /spike(gm) and test weight (gm) were significantly higher in variety G-1 compared with variety G-2 and H-4.The attributes should be significantly higher in application of 40 kg K/ha compared with 0 and 20 kg K/ha. The yield of Isabgol significantly higher (10.9 q/ha) in G-1 compared with G-2 (9.2 q/ha) and H-4 (7.5 q/ha). The application of 40 kg K/ha significantly higher grain yield , straw yield ,biological yield compared with 0 and 20 kg K/ha but no significant difference in 60kg K/ha.

Key words: Isabgol, attributing, spike, biological yield,

Introduction

Isabgol (*Plantago ovata forsk*). is an annual herb, about 30-50cm tall, it is stem less, softy hairy plant belong to the family plantaginaceae. It is indigenous to the Mediterranean and West Asia extending up to Sutluz and Sindh in Pakistan. India produce about 13000 tonnes of isabgol seed and 3200 tonnes of seed husks annually, of which about 90% is reported India continues to hold a monopoly in its production and trade in the world market. In India Gujrat , Rajsthan, Madhya Pradesh, Haryana, Maharastra are major states for Isabgol cultivation. Isabgol is most important medicinal plant, its seed and husk are used in Ayurvedic, Unani, Allopathic and Naturopathy. The seed and husk are used to cure inflammation of mucous membrane of the gastro-intestinal and genitourinary tracts, duodenal ulcer gonorrhea and piles. The seed has property to absorbing and retaining water there fore, it works as an antidiarrhocal drug. It is most use ful in constipation and chronic dysentery. It is also reported that the soluble fiber in Isabgol lowers cholesterol levels in bloods. Potash is major element for plant growth and development. It is constituent of plant protein, chlorophyll, nucleic acid and other substances such as alkaloid, phosphate, enzymes, hormones and vitamins. Thus an adequate supply of potash is associated with various vegetative growth with deep green colour and efficient source sink relationship leading to higher productivity. Keeping these facts in mind the present study was done to standardize the potash levels for better growth and productivity of Isabgol.

Methods and Materials

A field experiment was carried out during rabi 2006-07 and 2007-08 at Agricultural Research farm, R.B.S.College, Bichpuri, Agra on sandy loam soils slightly saline (pH 7.9), low in organic carbon (0.31%) and available N (186 kg/ha), medium in available P (14.5 kg/ha) and K (222.1 kg/ha). The field experiment was lay out in three times replicated in randomized block design. The experiment consisted three variety of isabgol i.e. Gujrat-1 (G-1), Gujrat – (G-2) and Haryana -5 (H-5) and four levels of potash (Control, 20, 40 and 60 kg/ha). The nitrogen applied through urea 60 kg/ha the 50% at the time of sowing and 50% at the time of first irrigation. The full dose of phosphorus and potassium was applied at the time of sowing P as recommendation and K as per treatment combination. Other management practices were adopted as per recommendation and need of the crop. Seed/grain yield of component crop and important yield attributing characteristics were work out based on the net plot yield and randomly selected four plants sample. Soil samples were taken from 0-22.5 cm soil layer at the beginning and end of experiment to find out initial status of experimental site soil and changes in available N,P and K in the soil after the experimental period. Soils samples drawn at the beginning of the experiments were analyzed for organic carbon, pH, and available N, P and K by following standard procedure. The rain fall receiving the crop period time 74.9mm in 2006-07 and 58.5 mm in 2007-08. The crop was sown in 3 cm deep in furrow and with seed rate 5 kg/ha. The seed treated with Agroson GN @ 2.5g/kg before sowing.

Results and discussion

The yield attributing characteristics of Isabgol i.e. No. of spikes per meter, number of spike per plant, number of seed per spike, seed weight per spike and test weight (gm) Table 1 clearly indicated that the varieties statistically significant. The all yield

Table 1: Effect of varieties and potash levels on yield attributing characteristics of Isabgol (AV. Two years)

Treatments	No. of spike/m	Length of spike (cm)	No. of spike/plant	No. of seed per spike	Seed weight/ spike	Test weight (gm)
Varieties						
G-1	208.1	6.3	21.1	84.8	0.16	1.97
G-2	205.9	4.7	20.3	84.2	0.15	1.93
H-4	202.5	3.6	18.8	79.8	0.13	1.86
CD at 5%	1.1	0.2	0.4	1.0	0.005	0.02
Potash levels kg/ha						
0	204.1	4.6	19.4	81.3	0.15	1.89
20	205.1	4.6	20.0	81.9	0.15	1.93
40	206.6	5.0	20.6	83.2	0.16	1.93
60	205.9	4.9	20.3	82.8	0.15	1.92
CD at 5%	1.2	0.2	0.5	1.1	NS	0.03

attributing characteristics significantly higher in variety G-1 compared with variety G-2 and H-4. The next second variety G-2 but H-4 was not superior.

The data of two years pooled of yield attributing characteristics of isabgol the increase potassium levels increase the yield attributing characteristics significantly. The number of spikes per meter row length significantly higher in 40 kg K_2O/ha but no significant difference in 60 kg K_2O/ha. The length of spike also significant but lowest in control and 20 kg K2O /ha and significantly higher in 40 kg K_2O /ha but at par in 60 kg K_2O /ha The number of spike per plant maximum in 40 kg K_2O/ha and minimum in control treatments. The data clearly indicated that in Table 1 the number of seed per spike was significantly higher in 40 kg K_2O /ha and lowest in control and 20 kg / ha. The seed weight per spike and test weight was significantly higher in 40 kg K_2O/ha and no significant difference in 60 kg /ha the reduction of test weight and seed weight per spike in control and 20 kg /ha. The same results may be observed by Singh et al (2003).

Table 2: Effect of varieties and potash levels on grain yield, straw yield, biological yield and harvest index in Isabgol (Av. Two years)

Treatments	Grain yield (q/ha)	Straw yield (q/ha)	Biological yield (q/ha)	Harvest index (%)
Varieties				
G-1	10.9	28.2	39.1	27.9
G-2	9.2	27.1	36.3	25.3
H-4	7.5	21.8	29.3	25.6
CD at 5%	0.3	0.5	2.1	1.1
Potash levels kg/ha				
0	8.4	22.2	30.6	27.5
20	8.9	23.8	32.7	27.2
40	10.0	24.6	34.6	28.9
60	9.8	24.3	33.5	28.6
CD at 5%	0.3	0.4	1.8	0.9

The pooled data of two years of experimentation for seed yield, straw yield, biological yield and harvest index presented in Table 2. The data clearly indicated that the variety G-1 produced the significantly seed yield, straw yield, biological yield and H.I. compared with G-2 and H-4 varieties The significantly grain yield 10.9 q/ha give G-1 than reduction of grain yield significantly 16 and 31% for variety G-2 and H-4 in pooled analysis. The same results of straw yield maximum 28.2 q/ha variety G-1 and reduction 4 and 23% in G-2 and H-4 varieties. The maximum biological yield 39.1q /ha produced variety G-1 compared with reduction of 7 and 25% in G-2 and H-4. The harvest index may be higher in variety G-1 compared with G-2 and H-4 in two years experimentation.

This may be possible due to more number of shoot per hectare under G-1 variety genetic characters give the same results Singh et al (2003), Lal et al (2005).

Table 2 clearly indicated that increase the potash levels up to 40 kg/ha increase significantly seed yield, straw yield, biological yield and harvest index but no significant difference in application of 60 kg K_2O/ha. The seed yield reduction for 12% and 19% in application of 20 and 0 kg K_2O/ha compared with 40 kg K_2O/ha. The same results of straw yield, biological yield and harvest index in potash application in this experiment. The findings confirmed to Singh et al (2003) and Patel (2004).

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Adoption of ICDS programme in Agra district of Uttar Pradesh

VANDANA KUMARI, J.P.SINGH, D.V.SINGH[1] AND PUSHPA JATAVA
Department of Agricultural Extension, R.B.S. College, Bichpuri, Agra.

Abstract

Women in the rural area is mainly engaged so much and often, that her health is taken for granted dominated by men and guided by traditions, women in rural live a very hard life. The study was carried out in randomly selected block bichpuri of Agra district of Uttar Pradesh to study the adoption of ICDS programme by the rural families. The study revealed that cent- percent respondents adopted ICDS programme in terms of 'Taking precautions during pregnancy', 'Taking extra rich diet during pregnancy', 'Using breast feeding to baby just after delivery', 'Giving food just after birth', 'Child taking for health check-up early in symptoms of diseases' and attended 'physical hygine during bath on all organs', whereas, child taken for health check-up regularly', 'Dairy milk is sufficient', 'Times for baby bath during summer - three times', 'Extra milk was given to baby by bowl and spoon', 'Taking precaution during pregnancy in terms of give-up eating hot food', 'Cow / Buffalo milk is sufficient', 'vaccinated the baby by all vaccine, and 'Times for baby bath during summer - two times' were non adopted in terms of ICDS programme by the rural families. Overall majority of the respondents (79.11%) have adopted and 20.89% have non- adopted ICDS programme.

Key Words: Adoption, ICDS, Nutrition.

Introduction

Farming in India is mainly a family occupation. Most of the members of the family are actively engaged in farming. Even after 60 years of independence, our farm women continues to be in a state of neglect, being illiterate and ignorant, she is over exploited.

Women in the rural area is mainly engaged so much and often, that her health is taken for granted dominated by men and guided by traditions, women in rural live a very hard life. She although acts as a backbone of the economy possess immense tolerance, intellect and high level of co-ordination. Her day is typical she rises early in the morning and performs all household activities and then her duty is to collect fodder for animals, fuel wood and drinking

water for home, they did not get any time for themselves in between work till night. They help to grow the food crops. They provide water, gather fuel and perform most of the work which sustains the family.

A women is identified as a mother, a wife, daughter-in-law or a daughter but she is not identified as an independent unit of women society. Women constitute almost half of the population, perform nearly two-third of its work hours, receive one-tenth of the world's income and own less than one hundredth of world property. By the time a young girl has reached of age 5, she assumes adult responsibilities, both inside and outside the household, inside the home, she cares for her youngers siblings, and makes during cakes for fuel.

The status of women in India, particularly in rural areas needs to be raised to address the issue of empowering women, women specially in rural India are often exploited by their own communities because it suits the men and the women.

Ironically, women have not actively participated in their own emancipation mainly due to low economic independence. However, women have been identified as key agents of sustainable development. Certainly women's equality and empowerment are as central to a more holistic approach towards establishing new patterns and processes of sustainable development. Because all social development programmes are depend on women's activities. So as a number of programmes have been initiated by the Indian Government for empowering women. Keeping this in view, the present investigation was carried out to study the adoption of ICDS programme by the rural families.

Methodology

The study was carried out in randomly selected block bichpuri of Agra district of Uttar Pradesh. C.D. block bichpuri consists of 39 villages, out of which 5 villages were randomly selected. Forty five (rural women) respondents were randomly selected from each village, thus making a total sample of 225 respondents were finally selected. The structured interview schedule was developed and was pre-tested

[1]Department of Agricultural Extension, Sarvoday Mahavidyalaya, Chaumuhan, Mathura (U.P.)

on non sampled respondents. The data were collected through personal interview with the help of pre-tested schedule. The collected data were processed, tabulated, classified and analyzed with the help of parametric and non-parametric statistical tests.

Findings and Discussion

Adoption in terms of ICDS programmes by the respondents.

Table 1 reveals that cent-per-cent respondents have adopted ICDS programme in terms of 'Taking precautions during pregnancy', 'Taking extra rich diet during pregnancy', 'Using breast feeding to baby just after delivery', 'Giving food just after birth', 'Child taking for health check-up early in symptoms of diseases' and attended 'physical hygine during bath on all organs', respectively. Table further reveals that a very high majority of the respondents i.e. 96.00 per cent have adopted ICDS programmes in terms of 'Baby complementary food grain and pulse' followed by 'pulse polio given to the child' (96.00%), 'Getting

Table No. 1 . Showing ICDS Programme and its adoption by the rural women.

S.No	Statements	Adoption		Non-Adoption	
		No.	%	No.	%
1.	Taking Nutrition elements during pregnancy	203	90.22	22	9.78
	(a) Protein	178	79.11	47	20.89
	(b) Calories 300 Cal	150	66.67	75	33.33
	(c) Iron - 10 mg/day	200	88.89	25	11.11
	(d) Calcium - 500 - 600 mg	188	83.56	37	16.44
2.	Eating one fruit daily during pregnancy.	175	77.78	50	22.22
3.	Using milk, fruit, green leaf vegetables daily in the diet during pregnancy.	200	88.89	25	11.11
4.	Taking iron pills during pregnancy.	196	87.11	29	12.89
5.	Getting vaccination of Titanus during pregnancy.	210	93.33	15	6.67
6.	Taking precaution during pregnancy.	225	100	—	—
	(a) Extra rich diet	225	100	—	—
	(b) Rest	165	73.33	60	26.67
	(c) Give up eating hot food.	132	58.67	93	41.33
7.	Going for routine check up during pregnancy.	198	88.00	27	12.00
8.	Using breast feeding to the baby just after delivery.	225	100.00	—	—
	(a) After 4 hours.	205	91.11	20	8.89
9.	Giving colostrum to baby.	208	92.44	17	7.56
10.	Giving food just after birth.	225	100	—	—
	(a) Mother/s milk.	205	91.11	20	8.89
11.	Mother milk is sufficient.	198	88.00	27	12.00
	(a) Cow / Buffalo milk.	135	60.00	90	40.00
	(b) Dairy milk.	65	28.89	160	71.11
12.	Extra milk was given to baby.	199	88.44	26	11.56
	(a) By bottle.	165	73.33	60	26.67
	(b) By bowl and spoon.	125	55.56	100	44.44
13.	Giving more nutritious food to child.	187	83.11	38	16.89
14.	Vaccinated the baby by all vaccine.	135	60.00	90	40.00
15.	Dose of Pulse Polio was given to the child.	216	96.00	9	4.00
16.	Taking the child for routine health check-up.	165	73.33	60	26.67
17.	The child taken for health check-up.	225	100	—	—
	(a) Regularly.	35	15.56	190	84.44
	(b) In early symptoms of disease.	188	83.56	37	16.44
18.	Have taken precauution for preventing malnutrition.	210	93.33	15	6.67
19.	Times for baby bath during summer.	211	93.78	14	6.22
	(a) One time.	181	80.44	44	19.56
	(b) Two Times.	135	60.00	90	40.00
	(c) Three times.	79	35.11	146	64.89
20.	Nails cutting of child whenever required.	199	88.44	26	11.56
21.	Sending child to Anganwadi School.	175	77.78	50	22.22
22.	Getting the items child in Anganbadi School.	175	77.78	50	22.22
	(a) Sweet powder of Soyabean.	175	77.78	50	22.22
	(b) Daliya.	175	77.78	50	22.22
	(c) Puri - vegetables.	175	77.78	50	22.22
	(d) Fruits.	175	77.78	50	22.22
	Total	7816	3473.70	2084	926.00
	Average	178	79.11	47	20.89

vaccination of titanus during pregnancy' (93.33%), 'have taken precaution for preventing malnutrition' (93.33%), 'Time for baby bath during summer one time' (93.78%), 'Giving colostrum to baby' (92.44%), 'Using breast feeding to the baby after delivery of 4 hours' (91.11), 'Giving food just after birth mother milk' (91.11%), 'Taking nutrition elements during pregnancy' Iron-10 mg/day (90.22%), 'Taking nutrition during pregnancy' (88.89%), 'Using milk, fruits, green leaf vegetables daily in diet during pregnancy' (88.89%), 'Extra milk given to baby' (88.44%), 'Nails cutting of child' (88.44%), 'Going for routine check-up during pregnancy' (88.00%), 'Mother milk is sufficient' (88.00%), 'Taking iron pills during pregnancy' (87.11%), 'Taking nutrition during pregnancy-calcium - 500-600 mg' (83.56%), 'The child taken for health check-up' (83.56%), 'Giving more nutritive food to child' (83.11%), 'Times for baby bath during summer' (80.44%), 'Taking nutrition during pregnancy protein' (79.11%), 'Eating one fruit daily during pregnancy' (77.78%), 'Sending child to Anganwadi School (77.78%), 'Getting the items child in Anganwadi School' (77.78%), 'Sweet powder of Soyabean' (77.78%), 'Daliya (77.78%), 'Puri and vegetables' (77.78%), Fruits (77.78%), 'Taking precaution during pregnancy extra rich diet' (73.33%), 'Extra milk was given to baby by bottle' (73.33%), 'Taking the child for routine health check-up' (73.33%), 'Taking nutrition elements during pregnancy calories - 300 cal' (66.67%), 'Vaccinated the baby by all vaccine' (60.00%), 'Taken precautions for preventing malnutrition in terms of increasing the quantity of milk (60.44%), and and 'Times for baby bath during summer two times (60.00%).

The outcomes of this aspect clearly reveals that overall encouraging picture is emerged out which clearly indicates that majority of the respondents in general have adopted the ICDS programme and its recommendations including Agricultural activities, Dairy Development and Handicrafts practices.

From the foregoing discussion, it may be concluded that in terms of ICDS practices cent-per-cent respondents have adopted the practices like 'Taking precaution during pregnancy', 'Taking rest during pregnancy', 'Using breast feeding to baby just after delivery', 'Giving food just after birth', 'Child taking for health check-up early in symptoms of disease', 'attended the physical hygiene during bath on all organs and baby complementary foodgrain and pulses, 'Pulse polio given to the child', 'Getting vaccination of titanus during pregnancy', 'Have taken precaution for preventing malnutrition', 'Times for baby bath during summer one time', 'Giving colostrum to baby', 'Using breast feeding after 4 hours to baby after delivery', 'Mother milk was given to baby just after birth', and 'Taking nutrition elements during pregnancy like iron-10 mg/day'.

Non-adoption in terms of ICDS programme by respondents.

In reverse the majority of the respondents who have not adopted the ICDS practices are; 'The child taken for health check-up regularly' (84.44%), 'Dairy milk is sufficient' (71.11%), 'Times for baby bath during summer - three times' (64.89%), 'Extra milk was given to baby by bowl and spoon' (44.44), 'Taking precaution during pregnancy in terms of give-up eating hot food' (41.33%), 'Cow / Buffalo milk is sufficient' (40.00%), 'vaccinated the baby by all vaccine (40.00%), and 'Times for baby bath during summer - two times' (40.00%),.

From the above discussion, it may be concluded that majority of the respondents have not adopted ICDS practices like child taken for health check-up regularly', 'Dairy milk is sufficient' 'Times for baby bath during summer - three times'.

Table 2: Showing overall adoption in terms of ICDS programme.

S.No.	Statements	Number	Percentage
1.	Adoption	178	79.11
2.	Non-adoption	47	20.89
	Total	225	100.00

Table 2 clearly reveals that overall majority i.e. 79.11% respondents have adopted the ICDS programme in to practice while only 20.89% respondents have still not adopted the ICDS programme for which they need special effort on this direction. Thus from the above discussion, it may be concluded that majority of the respondents have adopted the ICDS programme in to practice, which is good sign of progress.

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Association of Psycho-social Factors with Constraints in Credit Management by the Farmers

PANKAJ KUMAR RAV, PRAKASH SINGH[1], SHESH NARAIN SINGH[1] AND KEROBIN LAKRA[2]
Research Scholar Deptt. of Extension Education. BHU, Varanasi

Abstract

The study was conducted in Faizabad district of Uttar Pradesh state to find out the association of psycho-social factors with constraints in credit management by the farmers.A total of120 farmers were selected as respondents from five villages. The independent variables such as, education, caste, land holding, family size, Family type, social participation, housing pattern, occupation, material possession, were measured by the scale of Trivedi (1963) and scientific orientation, value orientations, economic motivation and risk orientation were measured by scale of Supe (1969). For measuring the constraints five point rating scale developed on Likerts fashion was used for the purpose. It was observed that annual income, overall material possession, scientific orientation, risk orientation, value orientations and economic motivation were found significant with constraints.

Key word: Psycho-social factors, credit, constraints.

Introduction

Agricultural credit is considered as one of the basic inputs for any kind of development activity. Credit in right quantity and of right kind and at right time immensely contributes to economic growth. As Prof. Muhammad Yunus, an economist said, "Credit is a kind of key, a passport to explore the potential of a person. Credit was the real missing link between people and their potential. I wanted to make credit available to more and more poor people to give them chance of better future". Therefore, rural credit has to play a critical role in the socio-economic development of our country (Kumar *et al*., 2007).

India's rural credit system is unique in its reach and diversity. Besides in the basic role of financial intermediation, the Rural Financial Institutions play a unique role in accelerating agricultural growth. They have contributed substantially to the country's continuing efforts to reduce poverty and regional imbalances. To make the rural credit delivery system vibrant and dynamic and the functioning of the RFIs proactive, the RFIs have been under periodic examination over the years and made recommendations. In addition, a number of issues specific and institution-specific studies have also been made from time to time by various agencies. The recommendations of these committee/studies and the actions thereon have brought about momentous changes in the rural credit scenario of the country.

The institutional credit delivery system in rural India comprises the Cooperative Credit Institutions, Commercial Banks and the Regional Rural Banks. There are 1 lakh cooperative window, 28 public sector commercial banks and 32 banks in private sector operating in villages through their more than 32000 branches in rural and semi-urban areas. Similarly, 196 RRBs provide their financial services to rural masses through 14311 branches.

Despite massive bank expansion, rural credit systems has therefore been found to be intrinsically very difficult like as delay in loan sanction and corruption in its release, difficult banking procedures, delay in adjustment in subsidy, lack of crucial input, less effective marketing support and beneficiaries dependence on officials at each stage was heavy which made them not only vulnerable, discourages but also exploits them. The simultaneous precautions/ provisions have been made to minimize or eradicate these constraints, but the satisfactory results could not be achieved. Therefore, there is need to do something more for maintaining smooth credit system in our society particularly in rural areas. Keeping this in view the present study was conducted with following objectives:

1. To study Psycho- social profile of farmers.
2. To study relationship between psycho-social factors with constraints in credit availability, utilization, re-payment and overall constraints.

[1] Deptt. of Ext. Education, NDUAT, Faizabad
[2] Research Scholar Deptt. of Agril. Economics, BHU, Varanasi

Methodology

The study was conducted in purposively selected faizabad district of Uttar Pradesh .There are nine community development blocks in district out of that one block Amaniganj was selected purposively. This block has 109 villages from which five were selected randomly, and then the list of total farmers was prepared of selected villages. Thereafter 120 farmers were selected as respondents though proportionate random sampling technique with respect to the categories of the farmers for each selected village. Data were collected with the help of semi structured interview schedule through personal interviews specially developed on standard scales with slight modifications in the light of object and analyzed with suitable statistics.

Results and Discussion

Demographic attributes and relationship have been discussed and presented in Table 1 and Table 2, respectively.

Table 1 shows that maximum numbers of respondents (61.66 %) were observed in middle age category, this finding similar to Singh and Singh (2003), Singh (2004) and Mishra (2005). The literacy percent of respondents was observed 70 per cent, while 30 per cent respondents were found to be illiterate. Further, in literate farmers most of them have (18.33%) middle class education. Maximum number of respondents (35 %) belonged to general caste. Table indicates that most of respondents belonged to joint family system (76.67%) and hed medium size family (66.67%) 5 to 12 members. Therefore, it can be said that joint family system prevailed dominantly in the study area. Almost similar finding was obtained by Gautam (2007), Saikia and Tripathi(1986). Majority of the respondents (73.33%) was found in the land holding category of marginal farmers (below 1.0 ha), the findings are in conformity with the findings of gill et al. (2009). 43.33 per cent respondents were found having their houses of mixed type. Table indicates that out of 120 respondents, 64.17 per cent did not take participation at all in any organization, almost similar findings were obtained by Mandal *et* al. (2010). It is obvious from the table that 71.67 per cent respondents were found such whose families annual income were in the category of below Rs. 21000. The data given in Table reveals that highest numbers of respondents (69.17%) were observed in medium category (0.12 to 0.64) of material possession. Thus, it can be concluded that the materials possession of respondents was appreciably better. Maximum number of respondents (53.33 %) was observed in medium category (17 to 38) of agricultural experience. Two third respondents were found having medium level of scientific orientation Tiwari (2005). Maximum numbers of respondents (67.50%) were found having medium level of economic motivation, risk orientation (72.50 %) and value orientations (53.33 %).

On perusal of the Table 2, it could be noticed that out of 16 variables studied, the variables *i.e.* holding size, annual family income, farm power, over all material possession, were found significant but negatively correlated, where value orientations and risk orientation had significant and positive correlation with credit availability. Those variables which showed the positive and significant relationship had direct influence over credit availability. It means that if the value of these variables increased the seriousness of constraints in credit availability will also increased. The variables which showed the significant and negative correlation had direct influence over credit availability means that the value of these variables is increased the seriousness of constraints will decrease.

In credit utilization the variable like annual family income had highly significant and negative correlation with credit utilization, whereas the relationship with caste, holding size, household material, transportation material, communication media possession, over all material possession were found significant and negatively correlated. It means that the value of these variables is increased the seriousness of constraints in utilization would decreased.

In credit repayment it could be noticed that out of 20 variables studied, the variables *viz.*, scientific orientation and economic motivation were found highly significant and positively correlated, value orientations and risk orientation had highly significant and negative correlation with credit repayment. The variables which showed the highly significant and positive correlation, it means that the value of these variables increased the seriousness of constraints in credit repayment will also increased. The variables which showed highly significant and negative correlation, it means the value of these variables increased the seriousness of constraints in credit repayment will decreased.

In context of overall constraints table shows that the variables like, scientific orientation, value orientations, risk orientation highly significant and positive correlated with overall constraints where as annual family income were found highly significant and negative correlation and caste, holding size, farm power overall material possession and economic motivation were found significant and negatively correlated. It can be concluded that the variables which showed the positive and highly significant relationship had direct influence overall constraints. It means that the value of these variables is increased the seriousness of constraints would also be increased.

Table 1: Psycho-social profiles of farmers.

N=120

Profile attributes		Frequency	Percentage
Age (in years)	Young (upto37)	19	15.84
	Middle (38 to 64)	74	61.66
	Old (above65)	27	22.50
Education	Illiterate	36	30.00
	Can read and write	14	11.67
	Primary	18	15.00
	Middle	22	18.33
	High school	9	7.50
	Intermediate	18	15.00
	Graduate and above	3	2.50
Caste	General	42	35.00
	Backward	37	30.83
	Scheduled	41	34.17
Family Type	Nuclear/Single	28	23.33
	Joint	92	76.67
Family Size(No.)	Small (upto4)	18	15.00
	Medium (5 to 12)	80	66.67
	Large (13 and above)	22	18.33
Land Holding (ha.)	Marginal (below 1 ha.)	88	73.33
	Small (1 ha. to 2 ha.)	19	15.83
	Medium (2 ha. to 3 ha.)	7	5.84
	Large (3 ha. and above)	6	5.00
Housing pattern	Hut	2	1.67
	Kuchcha	44	36.67
	Mixed	52	43.33
	Pucca	22	18.33
Social participation	No participation	77	64.17
	Member of one org.	40	33.33
	Member of two org.	2	1.67
	Member of more than two org.	1	0.83
Family income(ann.)	Upto Rs.21000	86	71.67
	Rs.21001-60000	27	22.50
	Rs.60001-90000	4	3.33
	Rs.90001-1,20,000	3	2.50
Material possession	Low(upto0.11)	20	16.67
	Medium(.12to .64)	83	69.17
	High(0.65and above)	17	14.16
Agricultural experience in (years)	Low (upto 16)	19	15.83
	Medium (17 to 38)	64	53.33
	High (39 and above)	37	30.87
Scientific orientation (scores)	Low(upto21)	38	31.67
	Medium(22 to 24)	80	66.67
	High(25 and above)	2	1.67
Economic Motivation (scores)	Low(upto20)	19	15.83
	Medium(21 to 24)	81	67.50
	High(25 and above	20	16.67
Risk orientation (scores)	Low(upto19)	23	19.17
	Medium(20 to 24)	87	72.50
	High (25and above)	10	8.33
Value orientations	Low (up to 20)	19	15.83
	Medium (21 to 26)	64	53.33
	High (27 and above)	37	30.84

Table-2.Relationship between psycho- social variables with constraints in credit availability, utilization, repayment and overall constraints.

N=120

S. No. Variables	Correlation coefficient values (r)			
	credit availability	credit utilization	credit repayment	overall constraints
1. Age	-0.0894	-0.1232	0.0515	-0.0837
2. Education	-0.0988	-0.1742	0.0456	-0.1088
3. Caste	-0.1779	-0.2211*	-0.0569	0.2079*
4. Family size	-0.1211	-0.0001	-0.0896	-0.1067
5. Holding size	-0.2549*	-0.2260*	-0.0916	-0.2705*
6. Occupation	-0.0046	-0.1508	-0.0938	-0.0829
7. Social participation	-0.1087	-0.1610	-0.0365	-0.1363
8. Annual family Income	-0.2815*	-0.3816**	-0.1528	-0.3592**
9. Agriculture experience	-0.1627	-0.1297	0.0222	-0.1427
10. Extent of contact with information sources	-0.0967	-0.0663	0.0729	-0.0626
11. Farm power	-0.2511*	0.1910	-0.1408	-0.2715*
12. Agricultural implements	-0.1142	-0.1506	-0.0801	-0.1500
13. Household materials	-0.1488	-0.2283*	0.0140	-0.1694
14. Transportation materials	-0.0993	-0.2766*	0.0626	-0.1383
15. Communication media possession	-0.1630	-0.2660*	0.0112	-0.1922
16. Overall material possession	-0.1968*	-0.2817*	-0.0293	-0.2321*
17. Scientific orientation	-0.2846*	0.1203	0.3244**	0.3264**
18. Economic motivation	-0.1930	0.1380	0.3326**	0.2754*
19. Value orientations	0.2783*	0.0495	-0.3639**	0.3108**
20. Risk orientation	0.2843*	0.1519	-0.3253**	0.3372**

* Significant at 0.05 probability level = 0.195

** Significant at 0.01 probability level = 0.295

The variables which showed negative and significant relationship, it means the value of these variables is increased the seriousness of constraints will decrease.

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Farmers' insight about extension activities and capacity building programmes of Krishi Vigyan Kendra Bichpuri Agra

GOPICHAND SINGH AND S S RATHORE[1]
Krishi Vigyan Kendra, R B S College, Bichpuri, Agra, Uttar-Pradesh

Abstract

The impact of improved technologies of agricultural and allied activities was observed to be positive in selected village of Bichpuri block of Agra under operational area of KVK, Bichpuri, Agra. The dedicated team work in terms of transfer of technologies among the farmers led to increased in farm productivity and economic profitability. The farmers have very good response for the improved crop production, horticultural and other technologies. But due to some social- economic, administrative and technical constraints the adoption level of some of the improved technologies was not satisfactory. The KVK need to demonstrate such technologies by which agriculture could be insulated against risks and various forms of biotic and abiotic stresses in fragile agro-ecosystems. There is need to address theses constraints properly for wider diffusion of the advantage of training and demonstration of KVK programme.

Key words: improved technologies, productivity, constraints, training, demonstration

Introduction

The KVK stands as a bridge between the research laboratories and the application of modern agricultural science in rural India, aiming at technology assessment, refinement and frontline demonstration of the technology and its dissemination through training of farmers and extension personnel. This helps in achieving human resources development of rural mass through various training and extension activities. Growth in agricultural productivity can only be sustained through continuous technological up-gradation.

In the long run, the resource use efficiency will be the key to make agriculture more efficient. An inefficient use of inputs leads to cost escalation, lowering profitability and adversely impacts the agro ecosystem. Land resources for agricultural purposes are actually shrinking and water is really becoming a most scarce resource globally. The efficiency in use of other inputs, fertilizers, seeds, feeds, energy etc. is also to be enhanced for agricultural transformation. KVK's have immense responsibility to utilize the knowledge available in addressing the vital weaknesses in ensuring competing ability of agriculture and allied sectors. With the policy of the Government for establishment of one KVK in each of the rural districts of the country aiming at technology assessment, refinement and demonstration of technology/product, there is need for continuous technology backstopping. It is contemplated to have one KVK in each of the 589 districts of the country and 540 districts are already represented by KVKs. For achieving enhanced profitability, productivity, job opportunity and sustainability, knowledge intensive agriculture is essential which would require unlocking the potential of technologies and overcoming impediments and bottlenecks. The KVKs have a definite role to play, as they are specialized establishment at district level. The KVKs are helping in capacity building through demonstrations and training and also serve as a lighthouse towards which farmers would look forward for something new, something novel and something innovative to add value to their agriculture in meeting aspirations. The KVKs are striving for a holistic development of agriculture, horticulture, livestock, fisheries, processing and value addition and product development and give appropriate advices so that production becomes demand-driven, market-led and ultimately results in enhanced income and livelihood security of the farmers. The KVKs use to demonstrate such technologies by which agriculture could be insulated against risks and various forms of biotic and abiotic stresses in fragile agro-ecosystems (Anonymous 2006).

The KVK Bichpuri, Agra has been in operation from last almost ten years and spearheading the training programme for the farmers in the areas of crop production, horticulture, home science, plant protection, animal husbandry and dairying and seed production of various crops. The need based and demands driven training programme are being

[1]Directorate of Rapeseed-Mustard Research, Sewar, Bharatpur, Rajasthan

organized from time to time in a very planed and coordinated ways. Thus to assess the actual impact of training and demonstration of KVK extension activities , Krishi Vigyan Kendra, RBS College, Bichpuri, Agra conducted a study to find out the farmers' perception and adoption of relevant economically viable , profitable technologies and constraints in non adoption of some of them. This will help in improvement of future extension activities of KVK in Agra district of Uttar Pradesh.

Methodology

The study was conducted in KVK operational area of Bichpuri development block of Agra district, where KVK is located and due to proximity of the areas with KVK, the farmers from this block benefited most from the KVK's activities. Other than group training programme the farmers are usually coming with their problem at any time and getting the suitable remedies for improvement of their farm productivity. For this study, four villages were selected as Anguthi, Nagar, Nagala Gujra and Nagala Bhalra. The response of the farmers in these four villages was also estimated by taking random sample of 25 farmers from each village. Thereby sample included 100 numbers of farmers in the study. The farmers were asked to reply questions about the component wise crop production technologies transferred their dissemination and adoption level by contact farmers in each village. The subject wise training was conducted and the farmer's response for cost of production, economic viability of crop production technologies, animal rearing etc was also acquired for this study. This study was conducted for the year 2005-06 and 2007-08. The data collected were tabulated and the results are interpreted statistically.

Results and discussion

The main mandate of KVK is to conduct need based training programme on the aspects of upgrade technological innovation in agriculture and allied activities in the farmers in operational areas. The KVK has identified through extensive survey the need felt requirement for training programmes for improvement of capacity of the farmers on latest improved agricultural technologies. The refinement in existing practices of agricultural operation by proper blend of new package of practices of crop production, protection, dairying, animal husbandry and home science aspects was felt to have multifarious impact in overall economic and well being of the farmers. The trainings were also conducted for farm women, rural youth and weaker sections of the society.

It can be viewed clearly from Table 1 that Krishi Vigyan Kendra , Bichpuri, Agra is conducting training programme on various aspects of agricultural and allied activities which includes crop production, protection, home science, animal husbandry , dairying and horticulture. The training was attended by male and female farmers and also by scheduled caste

Table1. Training achievements conducted for the farmers and rural youth

Particular	Crop production	Horticulture	AH& D	H.Sc.	Plant protection	Total
No. of training	35	25	7	13	20	100
No. of participants						
Male	346	288	44		216	894
Female	-	-	9	55	-	64
Scheduled caste						
Male	159	87	9	-	89	344
Female	-	-	72	178	-	250
Total Trainees	505	375	134	233	305	1552
Percentage of SC trainees	31.49	23.20	60.45	76.39	29.18	38.27

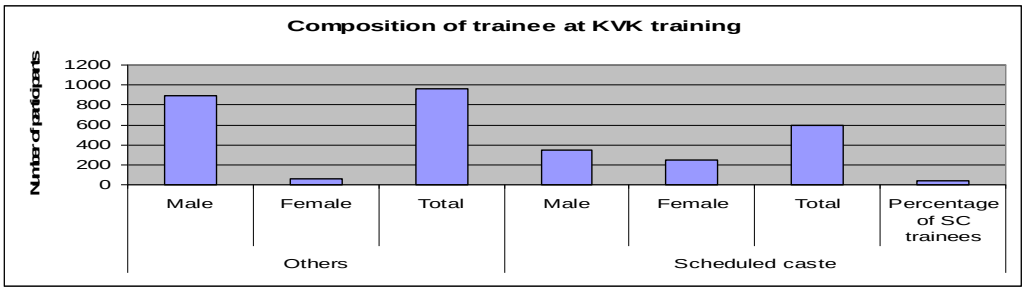

Figure1: Participants composition for various raining programme as conducted by KVK

Table 2: Subject wise training programme on component technologies, conducted by KVK Bichpuri, Agra

Component technology	No. of courses	No. of participants Male	Female	Total	Adoption C	P	N	Total
Crop production (n = 40)	35	505	-	505	200	250	55	505
Integrated Weed management								
Integrated nutrient management								
Efficient irrigation management								
Horticulture (n=40)	25	375	-	375	180	120	75	375
Improved cultivation of vegetables								
Rejuvenation of old orchard								
Seed production								
Nursery management								
Cultivation of off season vegetables								
Training and pruning of orchards								
Animal science (n= 20)	7	53	81	134	64	46	24	134
Dairy management								
Animal disease management								
Feed management								
Goatary management								
Home Science (35)	13	-	233	233	55	53	135	233
Nutrinal gardening								
Value addition								
Women & children care								
Grain storage								
Adulteration in food material								
Plant protection (n = 40)	20	305	-	305	110	45	150	305
IPM								
Safe grain storage								
Use plant protection equipments								

C- Complete, P-partial, N-Nil

farmers (Fig. 1). The training on crop production and horticulture aspects was found to be most useful among the farmers. This may be due to the fact that a sizeable area in these villages during rabi and kharif season was under field crops especially cereals and the vicinity of these villages to Agra city fetches them good price of their produce. Though overall training on animal husbandry and dairying and home science aspects was less responsive but among weaker sections these discipline were admired the most (Table 1).

Technology dissemination and adoption among the farmers:

The data on component of improved crop production, protection, horticulture, animal science and home science component technologies were collected season wise from respondent farmers of selected four villages and presented in Table 2. Improved component technologies among various disciplines with expert in KVK were evaluated and maximum number of training was conducted in crop production and least in animal science. This was due to the demand of more training on improved aspect of crop production from the farmers. Complete adoption of component technologies was observed highest under crop production and this is followed by horticulture. However with regards to poor response of training, minimum interest was shown by the farmers for training in home science and followed by training on animal science components. The number of training / demonstrations were conducted under crop production, horticulture, animal science, home science and plant protect ton were 40, 40, 20, 35 and 40 respectively in four villages during 2005-2008 (table 3).

Table 3: Assessment of economic viability of crop production technologies

Crops	Production Cost (Rs/ha)	Gross return (Rs/ha)	Net Return (Rs/ha)	B:C ratio
Potato	60000	248000	188000	3.1
Okra	30000	120000	90000	3.0
Capsicum	80000	350000	270000	3.4
Marigold	40000	131000	91000	2.3
Baby corn	25000	136000	111000	4.4
Tomato	62000	392000	330000	5.3
Chilli	70000	290000	220000	3.1

The KVK Bichpuri Agra have expert in agronomy, soil science, horticulture, animal science, home science and plant protection and the training/ demonstration wee conducted in close supervision and

Table4. Problem faced by the peasants for meager adoption of technologies

S.No.	Limitations faced by the peasants	Percentage respondent reported
1	Non availability of critical technical inputs	65.0
2	Poor marketing facilities at village level	45.0
3	Non availability of improved agricultural implements on subsidy basis	30.0
4	Poor supply of electricity for irrigation	60.0
5	Lack of technical knowledge for scientific cultivation of crops	55.0
6	Lack of enough refrigeration and storage facility	65.0

direct monitoring of specialist with full coordination among the farmers. Under crop production technologies integrated weed management, integrated nutrient management, and efficient irrigation management were important, whereas in horticulture improved cultivation of vegetables, rejuvenation of old orchard, nursery management, cultivation of off season vegetables , training and pruning of orchards were the technologies responded well by the farmers in selected villages of Bichpuri block , Agra.

Profitability of improved crop production technologies:

Economics of various crop production technologies were estimated and presented in Table 3. Highest net return was recorded from technologies of cultivation of tomato which was Rs 3.3 lakh and followed by Cpsicum (shimala mirch), chilli, potato and baby corn, however minimum economic return was observed with production technologies of okra and marigold. With regards to B: C ratio, it was again tomato and followed by baby corn. Baby corn production technologies were found to be highly remunerative Capsicum needs more technical input that's why the cost of cultivation for this vegetable was highest but due to attractive market price for capsicum make it one of the highest economically rewarded crop among the farmers.

Limitations in poor adoption of improved technologies by the farmers':

It is clear from this study that improved technologies influence the productivity of agricultural and allied activates to a great extent but their adoption among at the farmers' field is far from satisfaction in some of the components. The reasons for poor adoption were analyzed and response of the farmers was assessed. The information collected on the constraint may be very use full in further making the sound training programme for the farmers. The respondents opined that non availability of critical technical inputs and lack of refrigeration and storage facilities were the main reason for poor adoption of improved technologies by the farmers. Poor supply of electricity in rural areas hamper the irrigation to the crops especially during rabi crops, poor marketing infrastructure, lack of technical knowledge on scientific cultivation of crops etc were observed other reasons for low adoption of farm technologies (Table 4). This was in conformity of Rathi and Singh , 2010.

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Impact of frontline demonstrations for the change of parameters in livestock production

SATYENDRA PAL SINGH AND D. V. SINGH[1]
Krishi Vigyan Kendra, R. B. S. College, Bichpuri-283105, Agra (U. P.) India

Corresponding author Email*:* singhsatendra57@gmail.com

Abstract

The study impact of front line demonstrations in the field of livestock production management for the year 2010-11 was carried out at Krishi Vigyan Kendra, Bichpuri, (Agra) Uttar Pradesh. To demonstrate the, theme 145 buffalo calves, 67 kids and 1 hectare green fodder production front line demonstrations were organized by K. V. K., Bichpuri (Agra) at two adopted villages under whole village situations. The mortality of calves and kids under demonstration recorded was 29 and 12 percent respectively. The calf and kid mortality check due to technological intervention was to the tune of 71 and 82 percent over control. The green fodder barseem and oat yield enhancement due to technological intervention was to the tune of 20.7 and 26.6 percent over local check. The economics and Benefit Cost Ration (BCR) of both demonstrated and local check was worked out. On an average of per calf and kid Rs. 1160 and Rs. 250, barseem and oat Rs. 3960 and Rs. 3040 per hectare was recorded as additional income in this demonstration in comparison to local check. BCR of demonstrated and local check was 2023 and 1.73, 2.61 and 2.11, 2.31 and 2.05, and 2.91 and 1.97 from calf, kid, barseem and oat respectively. Conducting front line demonstration of proven technologies reduces mortality, yield potential and net income from calf, kid and green fodder production to a great extent with increase in the income level of the farming community.

Key words*:* Buffalo calf; kid; fodder production*;* mortality; *BCR;*

Introduction

Animal husbandry contributes between 25 to 30 percent of GDP of agriculture and milk alone contributes 68 percent of GDP from livestock. The dairy sector today provides triple benefits of nutritional, financial and employment security to approximate 70 million families of India (Sahu et al.). Available agricultural technology does not serve its purpose till it reaches and adopted by its ultimate users, the farmers. Technology transfer refers to the spread of new ideas from originating sources to ultimate users (*Prasad et al. 1987*).

The Indian Council of Agricultural Research (ICAR) has established Krishi Vigyan Kendras (KVKs) all over the country as an institutional innovation for application of agricultural science and technology on the farmer's field. The KVKs are playing strategic role in technology backstopping, knowledge management and advisory to the different stake holders like farmers, farm-women, rural youths and extension personnel. The important mandate of KVK is to plan and carry out Front Line Demonstrations (FLDs) organised in the operational areas for the enhancement of production and productivity. In view of this mandate the FLDs were organised in the operational villages after identifying important thematic areas in livestock production.

The present study was taken up to asses the impact of frontline demonstrations for the change of parameters in livestock production, with the investigation planned with three specific objectives:

1. Buffalo calves and kids mortality management through deworming technology,
2. Balance green fodder production management through balance green fodder production technology
3. Economics of demonstration.

Methodology

Krishi Vigyan Kendra, Bichpuri, Agra has conducted trials on 145 buffalo calves, 67 kids and management of balance green fodder production in 1 1hectare land Front Line Demonstrations were carried out under whole village situations in the year 2010-11 at two adopted villages, namely Bhavanpura and Nooharika located in Saiya block under K.V.K. operational area. The areas under each demonstration consisted of buffalo calves (66 farmers), goat kids

[1] Cost of cultivation Scheme, R.B.S. College, Bichpuri, Agra

(25 farmers) and balance green fodder production (21 farmers). Through survey, on and off campus training, scientist visit and field diagnostic visit during the previous year and cropping period, higher mortality of buffalo calves/kids and low yield of green fodder production were recorded. Majority of farmers did not use any medicine for deworming of buffalo calves and kids. Farmer also lack knowledge for balance green fodder production. To manage assessed problem, improved and recommended technologies were followed as intervention during the course of front line demonstrations programme.

In case of recommended practice to check buffalo calves mortality the deworming schedule followed in the FLD program consisted of deworming at three stages. The 1st dose at the age of 10 days followed by 2nd dose at 40 days. The 3rd dose was given at 70 days, post birth. In case of kids the deworming schedule consisted 1st dose at the age of 30 days followed by 2nd dose at 60 days. The 3rd dose was given at 90 days, post birth. In case of recommended practice use in balance green fodder production legumes and non-legumes fodder crops barseem and oat were grown in rabi season using all recommended practices. Well before the conduct of demonstrations, training to the farmers of respective villages was imparted with respect to envisaged technological interventions. All other steps like site and farmer selection, layout of demonstration, farmer's participation etc were followed as suggested by *Choudhary (1999)*. Visits of the farmers and the extension functionaries were organized at demonstration and field days to disseminate the message at large.

Yield data was collected from control (Farmer's practice/local check) and demonstration and economics of demonstration, net income and Benefit Cost Ratio (BCR) were computed and analysed. The formula by BCR was calculated is given below:

$$BCR = \frac{\text{Gross return}}{\text{Gross cost}}$$

Work out the demonstration economics: buffalo calves and goat kids in per animal and green fodder production in per hectare.

Results and Discussion

The results of the study were divided into three parts: (a) Calf and kid mortality management (b) Balance green fodder production management and (c) Economics of demonstration.

(a) Calf and kid mortality management: The performances of calf and kid mortality are presented in Table 1 and Figure 1. The data reveal that under demonstration the mortality percentage of calves and kids was lesser than that under local check (control). The mortality percentage of calves and kids under demonstration recorded was 29 and 12 percent respectively. The enhancement in mortality control was due to technological intervention to the tune of 71 and 82 percent over control. The other parameters of buffalo calves under demonstration, calf gain were 62 kg body weight at the age of 7 months. In case of local check calf gain was only 45 kg body weight in this period. This shows clearly impact of deworming technology.

In case of kids other parameter under demonstration was recorded good health and control loose motion than that under local check kid's health is poor and face the problem of loose motion.

(b) Balance green fodder production management: The yield performance of balance green fodder production (Table 1and Figure 2) under demonstration plot, barseem and oat yield were found to substantially higher than that local check. The yield of green fodder barseem and oat under demonstration recorded was 930 and 570 q/ha respectively. The yield

Table 1: Performance of front line demonstration of calf, kid mortality and fodder production

Category	Thematic area	Name of the technology demonstrated	No. of farmer	No. of demonstration (animals/area in ha)	Major parameters mortality (%) and yield (q/ha)		% change in major parameters	Other parameter	
					Demo.	Local Check		Demo.	Local check
Buffalo calves	Mortality management	Deworming technology	66	145 Calves	29	75	71	62 Kg. at 7 months of age	45kg at 7 months of age
Goat kids	Mortality management	Deworming technology	25	67 kids	12	42	82	Good health and control loose motion	Health is poor and loose motion
Fodder production	Balance green fodder production management	Balance green foddeer production technology	21	1 ha berseem Oat	930 570	770 450	20.7 26.6	5 cutting 3 cutting	4 cutting 2 cutting

Table2: Showing economics of demonstration in relation to BCR

Category	Economics of demonstration (Rs./animal/ha)				Economics of local check (Rs./animal/ha)			
	Gross cost	Gross return	Net return	BCR	Gross cost	Gross return	Net return	BCR
Buffalo calves	2240	5000	2760	2.23	2200	3800	1600	1.73
Goat kids	450	1200	750	2.61	450	950	500	2.11
Fodder production								
Barseem:	12090	27900	15810	2.31	11250	23100	11850	2.05
Oat:	7410	1700	9690	2.91	6850	12500	6650	1.97

BCR: Benefit Cost Ratio

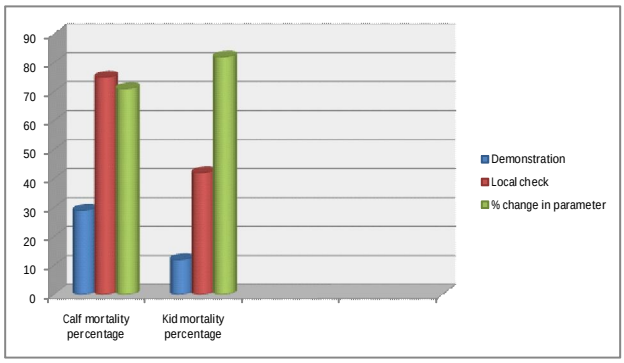

Figure 1: Performance of calf and kid mortality

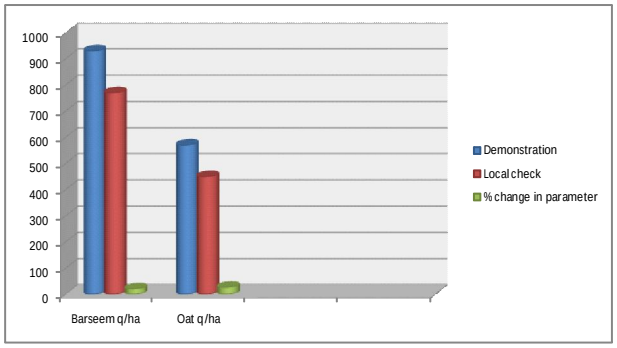

Figure 2: Performance of barseem and oat prod

enhancement due to technological intervention was to the tune of 20.7 and 26.6 percent over local check. The observed other parameters of green fodder yield of barseem and oat was 5 and 3 cutting in the season. In case of local check cutting was 4 and 2 time of barseem and oat. Yield enhancement in different crop in front line demonstration has amply been documented by Tiwari and Sexena (2001), Tomar et al. (2003) and Mishra et al. (2009).

(c) Economics of demonstration: Economic indicators i. e. gross cost, gross return, net return and BCR of front line demonstrations are presented in Table 2. The data clearly revealed that, the net returns from the demonstration (recommended practice) were substantially higher than local check (control) in calf, kid and fodder crops (barseem and oat). The net return from demonstration per calf and kid, barseem and oat were observed to be Rs. 2760 and Rs. 750, Rs. 15810 and Rs. 9690 per hectare in comparison to local check i. e. Rs. 1600 and Rs. 500, Rs. 11850 and Rs. 6650 per hectare. On an average of per calf and kid Rs. 1160 and Rs. 250, barseem and oat Rs. 3960 and Rs. 3040 per hectare as additional income is attributed to the technological interventions provided in demonstration, i. e. timely following the deworming technology of calves and kids. In case of green fodder production use in balance fertilizer specially urea and DAP, improved seed, timely management of sowing and irrigation of crop.

Economic analysis of the yield performance revealed that benefit cost ratio of demonstration were observed significantly higher than local check. The benefit cost ratio of demonstrated and local check was 2.23 and 1.73, 2.61 and 2.11, 2.31 and 2.05, and 2.91 and 1.97 from calf, kid, barseem and oat respectively. Hence, favorable benefit cost ratios proved the intervention made under demonstration and convinced the farmers on the utility of intervention.

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Yield gap and economics of tropical maize (*Zea mays* L.) as affected by seasons, locations and cultivars

S.K. SINGH, S.K. CHAUHAN[1] AND V. GOYAL
Krishi Vigyan Kendra, Parwaha Auraiya -206244,

Abstract

The field experiments were conducted during 2005-06 and 2006-07 to assess the potential of maize as affected by season, location and cultivar. The experiments were conducted in kharif *and* rabi *season at 3 different locations viz. Karnal (Uchani), Gorakhpur (Belipar) and Bulandsahar with 5 different cultivars viz. Seed Tech 2324, Pro 311, Bio 9681, local 1 and local 2. The result revealed that season differed significantly in grain yield of the maize crop.* Rabi *maize produced significantly higher yield (51.4 q/ha in 2005-06 and 52.4 q/ha in 2006-07) and it was 8.95 and 16.98 % higher than that of* kharif *maize, respectively. Maize sown at Karnal location shows significantly higher cob length & diameter, kernels/cob, test weight, plant height, number of cobs/plot. Grain yield was also found to be higher at Karnal than at Bulandsahar and Gorakhpur. Among the cultivars, Seed Tech 2324 showed higher yield than the other cultivars. The net returns/ha and net returns/Re invested also showed a similar trend as season, location and cultivar. The increased grain yield/ha of rabi maize increased the net returns/ha than the kharif maize. Also the maximum returns/ha was recorded in maize grown at Karnal and cultivar Seed Tech 2324 during both the year of the study. Thus, there is a lot of potential of growing rabi maize especially in Karnal to meet the ever increasing food grain production of the world.*

Key words: Cob length, kernels/cob, cultivar, production

Introduction

Maize (*Zea mays* L.) has occupied an important place in India due to its potential and greater demand for food, feed and industrial utilization. The total production has surpassed over both sorghum and pearl millet giving it a third place after wheat and rice. The demand for maize grain is increasing every year because of its utilization in poultry, piggery and industrial uses. It is known for its versatile nature and tremendous genetic variability, thus enabling it to grow successfully throughout the world. There are several reasons for lower productivity of maize in the country. *Kharif* season (June-October) during which the crop is mainly grown, is characterized by heavy and frequent rainfall, which creates temporary water logged conditions at one or other crop stage, especially in the Indo-Gangetic plains and North Eastern part of the country. Maize growing areas in Uttar Pradesh and Bihar states in India are highly prone to floods and water logging during the monsoon season. In these states, maximum precipitation is received during July-September, which saturates the entire soil profile leading to water logging situation. On an average 30-40% loss of the maize crop due to water logging is common in this region every year.

Uptake of improved maize has been accompanied by changes in crop management practices. Farmers who grow hybrids apply more fertilizer and use herbicides and insecticides more frequently than farmers who grow local varieties. Thus, the study was planned to see the effect of season, location and cultivar on yield gap of tropical maize.

Materials and Methods

The field experiments were conducted during *kharif* and *rabi* seasons of 2005–06 and 2006-2007 at three different locations viz. Uchani (Karnal), Belipar (Gorakhpur) and Bulandsahar to identify the potential, actual and attainable productivity of maize across the environments, locations and cultivars. The soil of Uchani (Karnal), Bulandsahar and Belipar (Gorakhpur) have been classified as, it belongs to order inseptisol, Mahauli series possessing sandy loam texture with slightly alkaline in reaction having pH of 7.8, 7.4 and 7.6 respectively. Soil samples were taken from the experimental site initially before the start of the experiment to determine the physico-chemical properties of the soils following the standard procedures. Five different maize cultivars Seed Tech-

[1]Salinity Project, RBS College Bichpuri, Agra

2324, Bio-9681, PRO-311, Local-1and Local-2 were being tested on the experimental site. Out of these, Seed Tech- 2324, Bio-9681, PRO-311 are the improved hybrid varieties and local 1 and local 2 are the commonly grown farmers varieties of the particular area. The experiments were laid out in factorial randomized block design with five replications having plot size of 5 x 7.5 m. All the experimental sites were low to medium in organic carbon, available N, P_2O_5 & K_2O with sandyloam in texture ranging in pH from 7.4 to 7.8. The experimental plot received a basal dose of 60 kg P_2O_5, 40 kg K_2O and 25 kg $ZnSO_4$ per hectare in the form of single super phosphate, potassium chloride and zinc sulphate, respectively during both the years of study. While nitrogen @ 120 kg/ha was supplied through urea in three equal splits at sowing, knee height (20-30 DAS) and tasseling (50-60 DAS) stages of the crop during both the year. Sowing was done on ridges at a depth of 0.05-0.06 m with rows 0.75 m apart and plants 0.25 m apart. A light irrigation was applied just after the sowing. Later irrigations were applied at required intervals depending upon the crop water requirement and weather conditions in both years of experimentation.

Data on growth and yield attributing characters viz. ears per plant, number of kernels per cob, cob length & diameter, 100 kernel weight (test weight), kernel weight/ cob, grain yield and stover yield were recorded during the experiment. Among the yield attributes, cobs per plant were counted from randomly selected five plots from each plot which were tagged and recorded at harvest. The 100-kernel weight was recorded by counting 100 grains from the yield obtained per plot and kept for oven drying at 50°C for 24 hours and their weight was taken on electronic balance in grams. Grain yield was calculated by recording the fresh weight of cob of each plot of randomly selected tagged plants and were adjusted to their shelling percentage and moisture percentage (15 %) and grain yield per was worked out. Stover yield was calculated by cutting the maize stalks at ground level and are exposed to sun for 72 hours. Stover yield was expressed in q/ha. Measurement of yield gap at different locations was surveyed from various maize grown areas and presented in terms of actual yield at farmers field in relation to potential yield (data collected from DMR Annual Report – 1992-2001) and attainable productivity was obtained on the basis of experiment conducted at various locations.

Results and Discussion

Growth and Yield attributes

The seasons gave significant result in plant height and maximum plant height was found under *Kharif* season (181.5 & 178.6 cm) during 2005-06 and 2006-07 respectively as compared to *Rabi* season (162.0 & 160.8 cm) as shown in Table 1. In locations, Karnal showed significantly more plant height (177.8 & 175.7 cm) in both the years of the study as compared to other locations. This may be due to sufficient rain received during *kharif* season 2005-06 and 2006-07 at Karnal (273.5 mm & 684.1 mm) as compared to *rabi* season (69.6 & 203.5 mm). The higher rainfall received at Gorakhpur (1276.5 mm & 863.3 mm) and Bulandsahar (363.0 mm & 556.3 mm) was not too favorable for maize crop. The highest plant height

Table 1: Effect of no. of cobs/plot, cob length, cob girth, no. of Kernels/cob, Plant height, 100 seed weight on grain yield and stover yield of maize crop

Treatments	No. of cobs/plot		Cob length (cm)		Cob girth (cm)		No. of Kernels/cob		Plant height (cm)		100 seed weight	
	2005-06	06-07	2005-06	06-07	2005-06	06-07	2005-06	06-07	2005-06	06-07	2005-06	06-07
Seasons												
Kharif	201.64	209.36	16.20	15.49	14.75	14.82	408.20	411.20	181.5	178.6	24.05	25.1
Rabi	213.57	219.45	16.84	16.81	16.67	16.50	469.90	462.70	162.0	160.8	27.53	28.9
CD(P=0.05)	1.67	1.80	0.50	0.40	0.55	0.44	24.11	23.14	5.4	4.9	1.55	1.4
Location												
Karnal	208.82	214.40	17.16	16.87	15.76	16.55	481.90	486.30	177.8	175.7	27.29	28.7
Gorakhpur	205.34	215.78	16.66	16.28	15.75	15.37	439.80	434.60	172.5	171.1	25.71	27.1
Bulandsahar	208.66	213.04	15.73	15.30	15.62	15.07	396.50	389.20	166.3	162.4	24.38	25.2
CD (P=0.05)	NS	NS	0.62	0.50	NS	0.54	40.10	35.13	6.6	6.0	1.84	1.7
Cultivars												
Seed												
Tech-2324	204.06	216.43	18.10	17.71	16.72	16.70	507.40	506.90	180.1	177.5	27.78	29.1
Bio- 9681	207.40	213.76	16.71	16.43	16.21	16.36	454.50	456.60	179.7	177.4	27.49	29.5
Pro- 311	208.90	214.06	16.24	16.34	15.91	15.99	438.60	454.40	178.0	174.4	28.08	29.4
Local-1	208.56	212.66	15.70	15.36	15.17	14.95	433.80	418.0	160.8	157.5	22.21	22.7
Local-2	209.10	215.10	15.86	14.91	14.53	14.31	364.20	361.10	165.1	162.0	23.39	24.2
CD (P=0.05)	NS	NS	0.89	0.64	0.88	0.71	66.14	58.21	8.2	7.8	2.45	2.2

Table 2: Effect of Seasons, locations and cultivars on, grain yield, harvest index stover yield and economics of maize crop

Treatments	Grain yield (%)		Harvest Index (q/ha)		Stover yield (x10^3 Rs/ha)		Net returns (q/ha)		Net return/Re invested (Rs)	
	2005-06	06-07	2005-06	06-07	2005-06	06-07	2005-06	06-07	2005-06	06-07
Seasons										
Kharif	51.4	52.4	42.72	43.0	119	120	20.24	20.45	1.31	1.36
Rabi	56.0	61.3	43.79	44.0	127	139	20.53	23.41	1.17	1.34
CD (P=0.05)	3.5	2.7	NS	NS	24.3	29.4	NS	6.79	0.025	0.027
Location										
Karnal	54.5	64.4	43.27	43.5	125	148	20.78	25.74	1.26	1.59
Gorakhpur	53.9	55.0	43.16	43.4	124	127	20.50	21.37	1.25	1.32
Bulandsahar	52.7	51.1	43.35	43.6	120	114	19.88	18.67	1.21	1.14
CD (P=0.05)	NS	3.3	NS	NS	29.8	36	5.03	8.32	0.031	0.033
Cultivars										
Seed Tech-2324	70.9	72.7	45.75	46.0	155	161	28.97	30.38	1.77	1.92
Bio- 9681	58.4	62.4	45.12	45.0	129	138	22.73	24.72	1.38	1.50
Pro- 311	53.4	57.8	42.89	43.3	124	133	20.22	22.30	1.23	1.34
Local-1	42.4	44.8	41.16	41.7	102	108	14.73	15.95	0.89	0.96
Local-2	43.5	46.8	41.39	41.6	105	108	15.28	16.29	0.93	1.03
CD (P=0.05)	5.6	4.2	1.84	1.6	38.4	46.5	6.49	8.74	0.039	0.043

(180.1 & 177.5 cm) was recorded in variety Seed Tech-2324 and lowest in local-1 (160.8 & 157.5 cm) during both the year of study, respectively. Significant difference in number of cobs/plot was seen due to season in both the year of study (Table 1). Inspite of low plant height, *rabi* season maize crop have higher number of cobs per plot (213.57 & 219.45) which was 5.97 and 4.82 % more as compared to *kharif* season (201.64 & 209.36) during both the year of study. This may be due to lower incidence of insect-pest and diseases during *rabi* season at flowering stage as compared to *kharif* season. However, no significant difference was found in number of cobs/ plot due to location and cultivar. Such difference in number of cobs/plot due to season was also recorded by Chapman *et al*. (1997. Also the cob length and cob girth produced under rabi season maize was 3.95 & 9.22 % longer and 13.02 & 11.34 % bigger in 2005-06 and 2006-07 (Table 1) over the kharif maize which shows the positive correlation between cob length and girth with grain yield (Metu *et al*. 1999). Number of kernels per cob was also counted to see the effect of season, location and cultivar. Variety Seed Tech 2324 (507.4 & 506.9) in Karnal (481.9 & 486.3) during *rabi* season (469.9 & 462.7) have higher number of kernels/cob as compared to other cultivars, location and season. These results were in accordance with the findings of Sorenson *et al*. (1991). A significant positive correlation was observed between number of grains/row/cob and grain yield (Mishra *et al*. 2002).

The data also speculated that the 100 test weight of grain gave significant result due to season, location and cultivar (Table 1). The test weight (27.5 & 28.9 g) found in *rabi* season, location Karnal (27.3 & 28.7 g) was significantly higher than *kharif* season and at other location. Such variation in test weight and plant height due to season effect was noticed by Feil *et al*. (1992). Also the variety Pro-311 (28.1 & 29.4 g) showed significantly higher test weight than the other varieties while least test weight was recorded in local cultivar 1 (22.21 & 22.7 g) and local cultivar 2 (23.39 & 24.2 g) during both the year of study.

Yield

Table 2 showed that seasons differed significantly the grain yield of maize crop. *Rabi* maize produced significantly higher grain yield (56.0 & 61.3 q/ha) than *kharif* season and it was 8.9 and 16.9 per cent higher than that produced during *kharif* season. Such variation in grain yield due to seasons have been reported earlier by Feil *et al.* (1992). Grain yield of maize crop was not significantly different in 2005-06 at the various locations but quiet a significant yield was recorded in 2006-07 at the respective locations (Gorakhpur, Bulandshahr and Karnal). Karnal location recorded significantly higher (64.4 & 54.5 q/ ha) grain yield than that of Gorakhpur (55.0 & 53.9 q/ha) and Bulandshahr (52.7 & 51.1 q/ha) during both the years of the study. Among the maize cultivars (hybrid cultivar Pro-311, Seed Tech-2324 and Bio-9681, Local Cultivar-1 and Local Cultivar-2), hybrid maize Seed Tech-2324 produced highest grain yield (70.9 & 72.7 q/ha) while hybrid cultivars Pro-311 (53.4 & 57.8 q/ha) and Bio-9681 (58.4 & 62.4) being at par recorded significantly higher grain yield than the local cultivars 1 (42.4 & 44.8) and local cultivar 2 (43.5 & 46.8) during both the years of the study. Much

Table 3: Average yield of farmer field, attainable and potential yield of different location

Location	Farmer Yield(t/ha) (F)	Potential Yield(t/ha) (P)	Attainable Yield (t/ha) (A)	Yield gap (t/ha) (P-F)	(A-F)	(P-A)
Karnal (Uchani)	1.72	7.35	5.96	5.63	4.24	1.39
Gorakhpur (Belipar)	1.77	6.25	5.42	4.48	3.65	0.83
Bulandshahr	1.80	6.03	5.20	4.23	3.40	0.83

variation in the grain yield between hybrid cultivar and local cultivars have been reported by Ahmad *et al.* (1993. The data presented in table 3 revealed that season and location failed to influence the harvest index in both the year of study. Among the cultivars, hybrid maize Seed Tech-2324 (45.8 & 46.0) and Bio 9681 (45.12 & 45.02) recorded significantly higher harvest index than rest of the cultivars in both the year of study while local cultivar 1 (41.16 & 41.70) and local cultivar 2 (41.39 & 41.57) being at par recorded significantly lower harvest index during both year of study. The data also showed that significant result found in stover yield (Table 2). The highest stover yield was observed in *rabi* season (127 & 139 q/ha) which was 6.8 and 15.93 % higher than *kharif* season and at Karnal location (125 & 148 q/ha) during 2005-06 and 2006-07 respectively. Significant finding observed in case of cultivar, Seed Tech-2324 gave the highest stover yield (155 & 161 q/ha) and lowest in local-1 (102 & 108 q/ha) during both the years of the study.

Economics

Season, location and cultivar showed significant variations in net returns/ha and net return/Re invested (Table 2). Rabi maize, Karnal location and cultivar Seed tech 2324 produces higher net return than the *Kharif* maize, other locations and cultivars respectively. The net return/ha and net return/Re invested varied from Rs 20531 to Rs 223418 and Rs 1.17 to 1.34 for *rabi* maize and Rs 20243 to Rs 20445 and Rs 1.37 to Rs 1.36 for *kharif* maize during 2005-06 and 2006-07 respectively. Among the various locations net return/ha and net return/Re invested of Rs 20783 to 25743 and Rs 1.26 to 1.59 was recorded at Karnal during 2005-06 and 2006-07 respectively, as compared to net returns at other locations (Frietas et al. 2001).

Also Cultivar Seed Tech 2324 recorded the net return/ha and net return/Re invested (Rs 28967 to 30384 and Rs 1.77 to Rs 1.92) during 2005-06 and 2006-07 and least was recorded for local check 1 (Rs 14732 to Rs 15952 and Rs 0.89 to 0.96) The per cent increase in net return/ha due to Seed Tech 2324 over local check 1 was 96.63 and 90.48 in 2005-06 and 2006-07.

Yield Gap

On the basis of the data showing the effect of location, the yield gap was calculated and is presented in Table 3. There was a perceptible variation in yield of maize crop due to location. Among the various locations, yield of maize was highest (54.2 q/ha) at Karnal and lowest at Bulandsahar (52.0 q/ha). Yield gap was higher at Karnal location (56.3 & 42.4 q/ha) which shows that Karnal have more potential for higher maize yield as compared to other locations. The higher potential yield was also due to higher nutrient status (P & K), favourable weather condition and also more fertilizer use efficiency. The gap between potential and attainable yield was less due to use of hybrid variety, ridge sowing and better agronomical practices adopted during the study.

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Drying characteristics of spinach using open sun and tray drying system

P.S.TIWARI[1], SAMSHER AND B. R. SINGH
Department of Agril.Engg and Food Tech., S.V.P. University of Agric. and Technology, Meerut

Abstract

Spinach was dehydrated in mechanical tray dryer at 40, 50, 60 and 70^{0}C temperatures and in open sun drying with loading density 2.0, 2.5 and 3.0 kg/m^2. It was found that spinach did not have any constant rate of drying period and major drying took place in falling rate period except some accelerating period in open sun drying initially. It was observed that drying temperature affects the rehydration ratio, coefficient of rehydration and moisture content in rehydrated samples. It was also observed that the loading density did not influence rehydration characteristics in rehydrated samples. Thus results indicated that chemically treated samples had higher rehydration ratio than blanched and untreated samples and more acceptable than others.

Keywords**;** blanching, loading density, tray dryer, open sun, rehydration ratio, coefficient of rehydration, moisture contents

Introduction

The fresh spinach is more commonly used after cooking because of its perishable nature. The most commonly used leafy vegetables are green and red amaranth, spinach(palak), chakota, fenugreek leaves, coriander leaves, kachi leaves, pudina, drumstick and curry leaves, which contribute to flavour, green colour, minor nutrients as well as medicinal properties. The conventional cooking of these vegetables results in the losses of water soluble vitamins and minerals and change in colour. However, the changes that occur during processing of leafy vegetables with regard to vitamins and colour are less understood. Secondly because of perishable nature, leafy vegetables are more commonly used immediately after harvest .The leafy vegetables are seasonal and available in plenty at a particular area bringing complexity in its post harvest processing. In peak season, prices fall steeply. The producer have to sell at throw away prices, delay leads to sharp fall in market prices, enormous deterioration in quality as well as quantity of vegetables. There are many methods of preservation of foods**.** Among these, the techniques of drying is well accepted and probably the oldest method of food preservation practiced by the mankind**.** It is relatively economical method, as concentration of solids become high, water activity reduces greatly, and product becomes chemically stable and free from insect-pest attack and mould-yeast growth during storage. Drying has been practiced at domestic level by utilizing solar energy. Long drying time, variation in weather and exposer to direct sun light leads to poor quality of the end product. Tray dryers operated by electrical energy, solar energy and gasifires are commonly used for dehydration of vegetables, Mandhyan et al.(1988),. The study was conducted to see the effect of drying temperature, loading density and pretreatment on drying characteristics of spinach.

[1]SMS/Asstt. Professor, K.V.K., Pilibhit

Materials and Methods

Preparation of samples

The fresh spinach was washed thoroughly in tap water so as to remove roots and stem. Leaves and soft stem were separated from the rest parts. Care was taken to avoid bruised and discoloured leaves. Pretreatment were given by three methods (i) Dipping in solution containing 0.1% magnesium chloride, 0.1% sodium bicarbonate and 2% potassium metabisulphite in distilled water for 15 min. at room temperature (ii) Blanching in boiling water for 2 min (iii) Blanching in boiling water containing 0.5% sodium metabisulphite for 2 min. The ratio of spinach to pretreatment mixture was maintained at 1:5 (w/w).

Drying of Spinach

After pretreatments, the spinach were loaded in perforated stainless steel trays at the rate of 2.0, 2.5 and 3.0 kg/m^2 tray area and dried at 40, 50, 60 and 70^{0}C temperature in tray dryer with constant air velocity of 2.0 m/s. The open sun drying was also carried out during the day time (temp: 37-45^{0}C, RH: 25-37%). The untreated samples of spinach were dried as control samples. Spinach were dried from 91% ± 1percent moisture content to about 5±1 moisture content (wb). The dried samples were packaged in polythene bags (film thickness 95 micron,

density 0.922), sealed air – tight and stored at room temperature and kept away from sun light.

Determination of M.C. and M.R.

The method recommended by Ranganna (1986) was used for determination of moisture content. The moisture content was calculated using the following formula:

IMC, % (d. b.)

$$= \frac{[(W2 - W1) - (W3 - W1)]x100}{(W3 - W1)}$$

Where,

W1 = Weight of metallic dish with cover, g

W2 = Weight of sample before oven drying plus weight of metallic dish with cover, g

W3 = Weight of dried and desiccated sample plus weight of metallic dish with cover, g

W2-W1 = weight of sample, g

W3-W1 = Weight of dried and desiccated sample, g

Moisture content of the samples during drying were computed through mass balance. For this purpose, weights of the sample during drying were recorded at predetermined time interval. The following formulae were used to calculate the moisture content.

$$\text{MC, \% (d. b.)} = \frac{(W - Wd)x100}{Wd}$$

Where,

W = weight of sample at any time, g

Wd = Weight of bone dry matter, g

Weight of bone dry matter were calculated as

$$Wd = \frac{(100 - Mc)x\ Wi}{100}$$

Where,

Wi = Initial weight of the sample, g

Mc = Moisture content of the sample, % (w.b.)

The final moisture content was taken as equilibrium moisture content (Pande et al 2000 and Jain et al 2000).

Moisture Ratio (MR) is defined as follows

$$MR = \frac{M - Me}{Mo - Me}$$

Where,

M = Moisture content, % (d. b.) at time t (min.) during drying

Mo= Moisture content, % (d. b.) at the initiation of drying i.e. at zero time.

Me= Equilibrium moisture content, % (d. b.).

The moisture ratios at different time intervals were calculated to study the drying characteristics of spinach

Results and Discussion

Moisture content

The plots were drawn to see the variation in moisture content with drying time for all treated and untreated samples which exhibited a non linear decrease of moisture with drying time. Initially, moisture content decreased rapidly and then the decrease was slower down in tray dryer. Two graphs (Fig.1 & Fig.2) reflects the variation of M.C. with time in tray dryer and sun drying respectively. The moisture content decreased slowly during first hour under open sun because of low temperature in the morning and it decreased rapidly during 90-150 min and then slowed down considerably. The drying time ranged from 270 min (chemical treated, 2.0 kg/m^2, 70 ^{0}C) to 570 min (chemically blanched, blanched and untreated, 3.0 kg/m^2 in open sun drying. It was observed that drying time increased with loading density at a particular temperature e.g. 390 min at 2.0 kg/m^2, 420 min at 2.5 kg/m^2 and 450 min at 3.0 kg/m^2 for 40 ^{0}C in all treated and untreated samples. Again, it was observed that chemical treated samples took less time at 40 ^{0}C temperature as compared to chemically blanched, blanched and untreated samples with loading density of 2.0, 2.5 and 3.0 kg/m^2. Chemically blanched and blanched samples took more time as compared to untreated samples. The final moisture content varied from 4.114-5.243 % (d.b.)

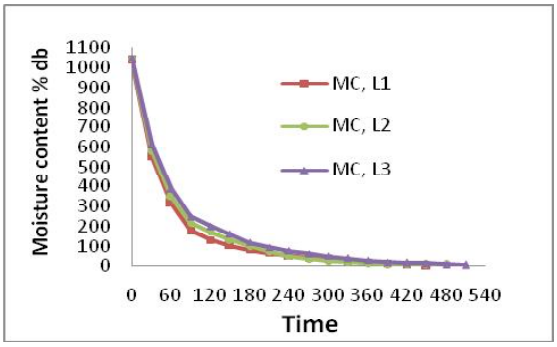

Fig 1. Variation of moisture content with time in tray drying

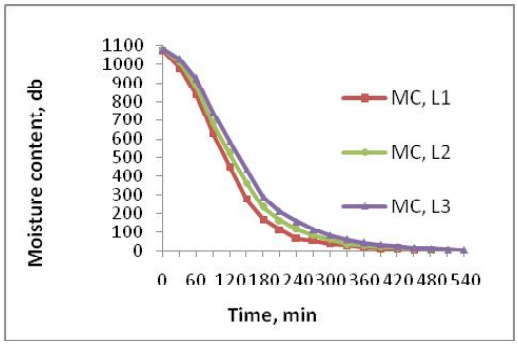

Fig 2. Variation of moisture content with time in sun drying

Moisture ratio

The moisture ratio was calculated and plots were drawn to study the variation of M.R. with time. Out of which two graphs (Fig.3 & Fig.4) as shown here shows that there was rapid decrease in moisture ratio at initial stage up to 90 min of drying at all temperature and loading density. However, in later stage of drying, the decrease in moisture ratio was at slower rate in tray dryer. Under open sundrying at initial stage of drying, the moisture ratio was slower and increased up to 90 minute of drying and then decreased continuously in all cases shows the relationship between moisture ratio verses drying time and had moisture ratio value at zero time of drying i.e. one and successive drying it decreases nonlinearly. So moisture ratio versus drying time curves could better describe the drying phenomena than the curves of moisture content verses drying time because the former had same initial value (MR =1) but latter had different initial moisture content.

From the figure, it is clear that the moisture ratio is mainly affected by loading density and drying of 2.0 kg/m^2 was faster than 2.5 and 3.0 kg/m^2. Similar trend were observed for other temperatures including open sun drying and also for chemically blanched, blanched and untreated samples.

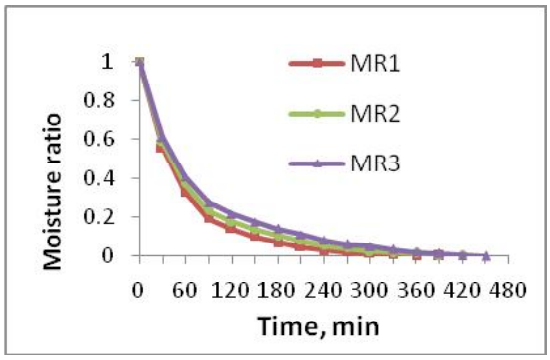

Fig 3. Variation of moisture ratio with time during tray drying

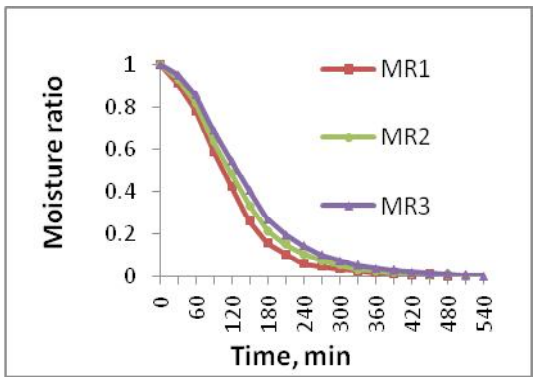

Fig 4. Variation of moisture ratio with time during sun drying

Average drying rate

Several plots were drawn to study the variation of drying rate with time, out of which only two graphs have been shown here for reference (Fig.5 & Fig.6). The rate of drying was affected by temperature, loading density and to some extent by pretreatments. The drying rate was faster at higher temperatures and it decreases with drying time in tray dryer. For example, at 70^{0}C, chemical treated and 2.0 kg/m^2 loading density, the drying rate in the first 15 minute was 18.642 %db/ min, which decreased to a value of 0.203 % db/min at the end. Under open sun the drying rate was slow in the first hour, because of lower air temperature in the morning, as the climate warmed up, the drying rate was faster and maximum drying occurred during 90-270 minute. After 90 minute, the rate of drying was begun to decrease up to end of drying and it decreased markedly after 270 minute. For example, under open sun chemical treated, 2.0 kg /m^2 loading density, the rate of drying was in the first 30 minute was 2.467, which increased to 7.333 at 90 minute , then started decreasing and finally decreased to a value of 0.053 at the end. Similar trend was also observed at the other temperatures and loading densities. The decrease in drying rate with the period of drying was non-linear. It was observed that the drying rate was more at higher temperature.

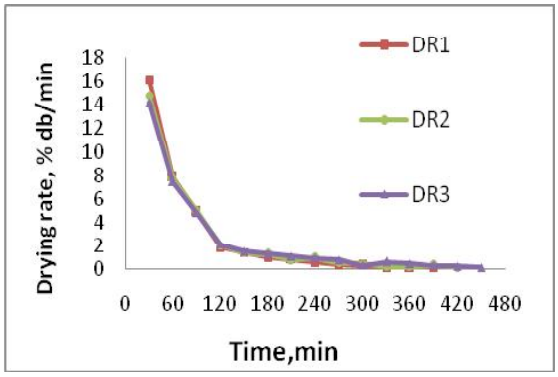

Fig 5. Variation in drying rate with time in tray drying

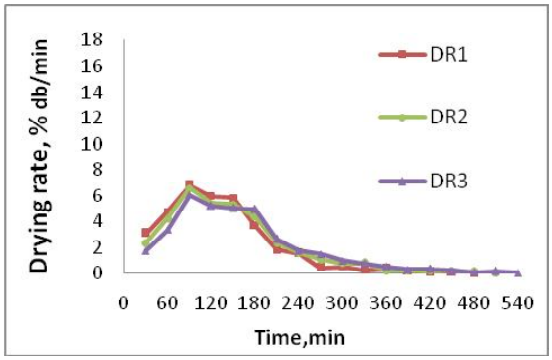

Fig 6 Variation in drying rate with time in sun drying

Table 1: Overall drying rates and rehydration characteristics at various drying conditions

Temperature.(^{0}C)	Loading	*Treatments*	Initial moisture content (%db)	Final moisture content(% db)	Drying time (min)	Overall drying rate
40	2.0	CT	1073.452	4.534	390	2.741
		BC	1079.568	4.789	450	2.388
		B	1094.57	4.943	450	2.421
		UT	1036.341	4.356	420	2.457
	2.5	CT	1043.265	4.864	420	2.472
		BC	1050.214	5.127	480	2.177
		B	1036.341	4.228	480	2.150
		UT	1043.265	4.228	450	2.309
	3.0	CT	1050.214	4.956	450	2.323
		BC	1011.254	4.897	510	1.973
		B	1012.265	5.134	510	1.975
		UT	1022.637	5.213	480	2.120
50	2.0	CT	1072.536	4.342	360	2.967
		BC	1080.265	4.806	390	2.758
		B	1096.325	4.872	390	2.799
		UT	1036.341	4.564	360	2.866
	2.5	CT	1043.265	4.784	390	2.663
		BC	1050.214	5.105	420	2.488
		B	1036.341	4.322	420	2.457
		UT	1043.265	4.784	390	2.663
	3.0	CT	1050.214	4.957	420	2.489
		BC	1011.254	4.872	450	2.236
		B	1012.265	4.957	450	2.238
		UT	1022.637	5.114	420	2.423
60	2.0	CT	1075.265	4.342	330	3.245
		BC	1079.325	4.563	360	2.985
		B	1097.325	4.824	360	3.035
		UT	1037.345	4.535	330	3.130
	2.5	CT	1043.265	4.759	360	2.885
		BC	1050.214	4.976	390	2.680
		B	1037.345	4.376	390	2.649
		UT	1043.265	4.789	360	2.885
	3.0	CT	1050.214	4.875	390	2.680
		BC	1011.457	4.721	420	2.397
		B	1012.452	4.754	420	2.399
		UT	1022.325	4.824	390	2.609
70	2.0	CT	1075.265	4.162	270	3.967
		BC	1079.325	4.265	300	3.584
		B	1100.000	4.384	300	3.652
		UT	1043.256	4.114	330	3.149
	2.5	CT	1041.256	4.357	300	3.456
		BC	1054.265	4.895	330	3.180
		B	1027.25	4.376	330	3.100
		UT	1045.265	4.465	330	3.154
	3.0	CT	1052.145	4.895	330	3.173
		BC	1010.018	4.678	360	2.793
		B	1012.265	4.758	360	2.799
		UT	1022.637	4.834	390	2.610
OSD	2.0	T	1070.235	4.568	480	2.220
		BC	1078.345	4.892	510	2.105
		B	1076.492	4.986	510	2.101
		UT	1043.485	4.624	510	2.037
	2.5	CT	1047.648	4.856	510	2.045
		BC	1052.784	5.026	540	1.940
		B	1043.485	4.687	540	1.924
		UT	1047.648	4.976	540	1.931
	3.0	CT	1052.784	5.124	540	1.940
		BC	1010.458	4.875	570	1.764
		B	1012.458	5.149	570	1.767
		UT	1022.425	5.243	570	1.785

Overall drying rate

The effect of temperature, loading density and treatment on the overall drying rate was studied using the analysis of variance technique. The overall rate of drying was calculated as ratio of difference of initial and final moisture content and total drying time. The overall drying rate was calculated which varied from 1.764 to 3.967 % d.b./min for the total range of variables of the study. Normally, it can be expected that the overall drying rate should be higher at higher temperature, which is reflected in the results presented in Table1. The overall drying rate linearly increased with increase in temperature from 40 to 70 ^{0}C including open sun drying. It was seen that the overall drying rate decreased with increase in loading density at all experimental temperatures including open sun drying. The overall drying rate was observed slightly lower for chemically blanched, blanched and untreated sample than those of chemical treated samples at almost all experimental temperatures including open sun. From an examination of data in Table1, it is obvious that the chemical treated spinach, dried faster than others, as chemical used in chemical treatment caused more expansion of the spinach pores. It was considered that the expansion of the spinach pores caused faster heat and mass transfer between spinach surface and air therefore, drying rate increased. The overall drying rate of chemically blanched and blanched samples were found to be almost equal whereas drying rate of untreated samples were observed slightly higher as compared to blanched samples.

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Enhancing grain yield & economics of chick pea (*Cicer aritinum L*) through modern production techniques under rainfed farming system of bundlekhand region in Madhya Pradesh.

B.S.KASANA, A.K.SINGH, P. KUMAR AND P. SHARMA
Krishi Vigyan Kendra, Datia (M. P.)

Abstract

Chick pea is a major pulse crop in rainfed farming system of bundelkhand region especially in Datia district. Farmers were not be able to harvest the potential of chick pea in this region, because of some climate change especially unpredictable, irregular and deficient rainfall pattern and inappropriate production practices. To demonstrate the scientific production technology & optimize the fertilizer does on the soil test value, a demonstration conducted by krishi vigyan Kendra, Datia for two conjunctive years 2008-09 & 2009-10. The results showed that improved production technology gave higher seed yield (1658 kg/ha), net return 25590 Rs/ha) and B:C ratio (2.81) as compared to farmers practices (1302kg/ha, 8575 Rs/ha and 2.16)

Key words: scientific production, technology, B:C ratio

Introduction

Chick pea (*Cicer aritinum L.)* is a drought tolerant leguminous crop used in various foods in several developing countries, particularly in India as a source of dietary protein. Chick pea is a major pulse crop in rainfed farming system of bundelkhand region especially in Datia district. The major constraints responsible for this untapped yield potential are some climate change especially unpredictable, irregular and deficient rainfall pattern and inappropriate production practices viz., usage of low yielding and non responsive genotype, pest and disease problems, lack of stress resistant high yielding genotype and improper and injudicious use of fertilizers. To, demonstrate the scientific production technology & optimize the fertilizer does on the soil test value, Krishi Vigyan Kendra, Datia was conducted the demonstration for two conjunctive years 2008-09 & 2009-10.

Material and Methods

Krishi Vigyan Kendra, Datia was selected the farmers in Sersa, Sanora, Khareg, Raruapura & Rajapur villages for demonstrations. Systemically collected soil samples from the fields of selected farmers and analyzed for pH, Ec, N, P & K status. The soil analysis indicates that the fields were low in N (187.05 – 375.00 kg/ha), high in available P (15.26-49.5 kg/ha) and high in exchangeable K (197-385 kg/ha). pH value of the soils were normal to slightly alkaline (7.1-8.6) and Ec were normal (0.1-0.25). This critical information aided in identifying better option to improve the yield levels and for sustaining natural resources.

Thirteen demonstrations in 2008-09 & thirteen 2009-10 were conducted during the post rainy season with the objective to demonstrate the beneficial effects of improved production technologies over farmers practice. Improved production technology was compared with the farmers practice in an area of 1000 m2 in each of the farmer's fields. The improved technology package included cultivar JG-130 in 2008-09 and JG -11 in 2009-10, a seed rate of 75 kg/ha with fertilizer does on basis of soil analysis. Need based pest and disease control measures were adopted as per recommendation. The amount of rain fall during June to December was 754.6 mm during 2008 and 704mm during 2009. The data was analyzed separately for both the years considering farmers as a plot. All thirteen plots were used for mean data to pool the data for both the years.

Results and Discussion

The improved technology gave higher grain yields and recorded a mean yield of 16.58 q/ha which was 27.34 % higher then that obtained with the farmers practice yields of 13.02q/ha (Table 1). The increased grain yield with improved technology was mainly because of appropriate and timely performance of different production practices. Ramakrishna et al. (2005) reported that the increased grain yield with improved production technology was mainly because of increased total dry matter, higher 100-grain weight & harvest index. Yield increase in response to fertilizer

Table 1: Yield and economics of chickpea in Improved production technique Vs Farmers Practice, post rainy season 2008-09 & 2009-10

Cultivation method	Grain yield (q/ha)			Cost of cultivation (Rs./ha)			Net Return (Rs./ha)			Benefit Cost Ratio		
	2008-09	2009-10	Pooled	2008-09	2009-10	Pooled	2008-09	2009-10	Pooled	2008-09	2009-10	Pooled
Improved Production technology	17.5	15.65	16.58	9225	9025	9125	25775	25405	25590	2.8	2.82	2.81
Farmers practice	13.8	12.25	13.02	8625	8525	8575	18925	18095	18535	2.2	2.12	2.16
Percent increase over Farmers Practice	26.81	20.19	27.34	6.95	5.8	6.4	36.19	40.39	38.06	-	-	-

recommendation was also reported by Tamboli et al. (1996). Thiygarajan et al. (2003) also reported that balance nutrition is indispensable for achieving higher productivity.

The economic viability of improved technology over traditional farmers practice was calculated depending on prevailing prices of input & out put costs. The additional cost Rs. 550=00 per hectare (table) incurred in improved technology as compared to farmers practice was mainly due to balanced fertilization and improved seed. However, the improved technology resulted in increase mean income of Rs. 7055=00 per hectare with a benefit cost ratio of 2.81 (Table 1). This additional income could substantially benefit the resource poor farmers and improve their livelihoods in rain fed farming system of Bundelkhand region of M.P. especially in Datia district. Sachdev et al. (1992) obtained increased grain yield and harvest index of chick pea due to balanced fertilization. Shinde and Mane (1996) reported that balanced application of fertilizer based on soil testing improved the yield of chick pea by 47% and monetary returns by Rs. 7676=00 per hectare over control.

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Socio-economic profile of dairy entrepreneurs in Eastern Uttar Pradesh

SHESH NARAIN SINGH, PRAKASH SINGH, R.K.DOHAREY, SHALINI SRIVASTAVA AND SURENDRA PT. SONKAR[1]
Deptt. of Ext. Edu., N.D.U.A.T., Kumarganj, Faizabad (U.P.) 224 229

Abstract

This study was conducted in milkipur block of faizabad district on 120 respondents selected through propositionate random sampling technique. There were 61.66 percent respondents found in middle age group i.e. 37 to 58 years and observed to be literate (81.67 %), belonging to scheduled caste (40%), residing in joint families (50.83 %) and 84.16 percent respondents having 5 to 13 members in their families. The maximum respondents (62.50 %) were having marginal land holding, (40.83%)family annual income of Rs 40001 to 80000, reported agriculture as the main occupation (80.33%) and half of the respondents (50%) having participation in one organization. The maximum i.e. (54.16 %) respondents residing in mixed type of houses. The maximum number of respondents (78.33 %) were found having material possession satisfactory The radio (93.33 %) and mobile (81.66 %) were observed as main communication media with respondents. The maximum number of (88.33 %) respondent reported 2 to 15 litres of milk production. Maximum contact was observed with gram pradhan (0.52) under formal sources, family members (0.98) under informal sources and radio (0.97) under mass media sources of information. Maximum number of respondent's were found in medium level of economic motivation, scientific orientation and risk orientation with 50.83 per cent, 65 per cent and 63.33 per cent, respectively.

Key words: propositionate, respondents,economic motivation, scientific orientation, risk orientation

Introduction

India is predominately agrarian economy country with more than 70 per cent of the population in villages, depending on agriculture, animal husbandry and allied activities for their livelihood. Among many livestock enterprises, dairying is the most ancient occupation established in the rural setting of our country. Dairy sector contributes significantly in generation of employment opportunities and supplementing the income of small and marginal farmers and landless labourers of rural India, beside providing food security.

During 2000, the production of milk of world was estimated 488,904, (000 tons) and in the year 2005 the milk production was increased with 8.93 per cent (534, 104000 tons). In the year 2006 the production of milk was noted-549,897(000 tons) which was increased at least 2.96 per cent in comparison to the 2005.The world milch cattle population in 2000 was estimated 6,033,708000, while in the recent year (2007) it has become 6,562,798000 which seems to be increased with 8.45 per cent over the year 2000.

During 2007-08, 102.0 million tones of milk was produced in the country. India stands first in the world in milk production, while, USA stands second in the world. The per capita availability of milk has also increased from 112 grams in 1968-69 to 246 grams per day in 2007-08. But, it is still low as compared to the world average of 265 gram/day. Dairying is the main sector of livestock farming and plays a multipurpose role in India. More than 80% of milch animals are owned by small and marginal farmers and landless labourers and have their life inexorably linked with dairying for their existence. Keeping this in view, the present investigation was carried out with the following specific objective:

- To study the socio-economic profile of the dairy entrepreneurs.

Methodology

The present study was carried out in Milkipur block of Faizabad district in Uttar Pradesh. In this block, there were 113 villages existence, out of which only five villages were selected randomly. A total of 120 respondents those were selected though proportionate random sampling technique on the criteria of herd size possessed by them viz., small (having one cattle), medium (having 2 to 3 cattles), and large (having 4 and above cattles) were interviewed purposely for data collection. The socio-economic characteristics of the respondents were studied on the basis of SES (Socio-economic scale) scale developed by Trivedi and Pareek (1964) with

[1]Ph.D. Student(B.H.U.)

suitable modifications. The classification of the received values was done on basis of mean – S.D. (low), mean ± S.D. (medium) and mean + S.D. (high).

Results and Discussion

The maximum number of the respondents (61.66) was observed in the middle category of age followed by young (21.67) and old (16.67%) respectively. So it focuses that the farmers of middle categories were mostly engaged in dairy farming in the study area.

The literacy percentage of the respondents was observed 81.67 % while 18.33% respondents were found illiterate. Further, the distribution of literate respondents in descending order was found 19.17%, 19.17%, 19.17%, 18.33%, 2.50%, 3.33% to the levels of primary, middle, high school, intermediate, undergraduate and postgraduate respectively. Hence, it is concluded that the existing ratio between literate and illiterate respondents was 1:4.45, which is more than state as well as national literacy level.

It indicates that scheduled caste and backward caste were almost same i.e. 40.00 and 39.16 % respectively, while the general were observed to be 20.83%. Thus, it is concluded that the scheduled caste and backward caste were dominant in the study area.

It is projected that 50.83 per cent respondents families belonged to joint family system followed by 49.16 per cent families to single family system. Hence, data shows equal representation of nuclear and joint families in the study area.

The 84.16% of the respondents families were observed such who had 5 to 13 members followed by 10.83% families having 14 and above members and only 5% respondents families were found having upto 4 members in their families. The average size of the family was observed to be 8.79 members. The range between minimum and maximum number of family members was recorded from 3 to 50.

The data indicates that the majority (62.50%) of the respondents was found in the land holding category of marginal farmers (below 2.5 acre) followed by 23.33% in the categories of small farmers (2.5 to 5 acre), 7.5% in the category of medium farmers (5 to 7.5 acre) and 6.66% in the category of large farmers (7.5 acre and above) respectively. The average land holding of the respondents was found to be 2.65 acre. Hence, it may be concluded that land holding has become marginalized in the study area.

It is apparent from the data that 54.16% respondents were found having their houses of mixed types, 28.33% were residing in kachcha houses and 17.50% were reported such who had pucca houses. Thus, it may be indicated that mixed houses were more in comparison to other types.

In case of main occupation, it is clear from data that a overwhelming majority (80.83%) of the respondents families were reported agriculture as their main occupation followed by service (7.50%), agriculture labour (5.0%), business (4.16%) and dairying (2.5%) while, in case of subsidiary occupation the maximum (23.33%) of the respondents families have adopted service as subsidiary occupation followed by Agriculture (18.33%), Agriculture labour (17.5%), dairying (10.83%), caste based occupation (9.16%) and business (3.33%) respectively. There were 17.52% respondents who had not responded on subsidiary occupation.

A cursory glance over the data depicted indicates that out of 120 respondents, 50 per cent respondent participated in one organization followed by participation in two organizations (15.83%) and participation in more than two organizations (4.16%), respectively. There were 30 percent respondents who did not participate in any social activities.

It is obvious that maximum (40.83%) of the respondents were from those families whose annual income was found in the categories of Rs. 40001 to 80000 followed by other categories *viz*., 32.5% (upto Rs. 40000), 11.66 per cent (Rs. 160001 and above) 10 per cent (Rs. 80001 to 12000) and 5 per cent (Rs. 120001 to 160000) respectively. The average income was observed to be Rs. 81442 with a range of minimum Rs. 25000 and maximum Rs. 390000.

The data revealed that highest numbers of respondents (78.33%) were observed in the medium category (11 to 50) of materials possession followed by high (17.50%) and low (4.16%) categories, respectively. Thus, it can be concluded that the material possession with respondents was observed appreciably better. The mean of scores for materials possession was observed to be 31.5833 with a range of minimum 3 and maximum 97 scores.

The perusal of data included in shows that a maximum number of respondents (88.33%) was observed in medium category of milk production (2 to 15 liters) followed by high (10.83%) 16 liter and above respectively. Only one respondent was 0.83% such who had no milk production. The average mean of milk production per family was observed to be 8.25 liters with a range of minimum nil and maximum 50 liters.

It is evident that in case of formal sources, more contact was found with gram pradhan by the respondents which ranked I (0.52) followed by kisan sahayak II (0.41), co-operative society III (0.29), Agril. School/college IV (0.27), K.V.K./K.G.K. V (0.227), Veterinary officer VI (0.223), V.D.Os. VIII (0.188), A.I. centers VIII (0.186), Veterinary scientists IX (0.17), Kisan call centers X (0094) and milk co-operative societies/milk collection centers XI (0.073)

Table 1: Socio-personal, economic and psychological profile of the respondents:

N=120

S.No. Variables	% of the respondents	Mean	Standard Deviation	Minimum	Maximum
A. Age.		47.5	11	22	72
I. Young (up to 37 years)	21.67				
II. Middle(38 to 58 years)	61.66				
III. Old (59and above years)	16.67				
B. Education					
.a. Illiterate	18.33				
b. Literate	81.67				
I. Primary	19.17				
II. Middle	19.17				
III. High school	19.17				
IV. Intermediate	18.33				
V. Undergraduate	2.50				
VI. Postgraduate	3.33				
C. Caste composition.					
I. General caste	20.83				
II. Backward caste	39.17				
III. Scheduled caste	40.00				
D. Family type.					
I. Single family	49.17				
II. Joint family	50.83				
E. Family size.		8.79	5.22	3	50
I. Small(up to 4 members)	5.00				
II. Medium(5 to 13 members)	84.17				
III. Large(14 and above members)	10.83				
F. Housing pattern.					
I. Hut	0.00				
II. Kachcha	28.33				
III. Mixed	54.17				
IV. Pucca	17.50				
G. Land holding.		2.65		0.25	17.50
I. Marginal(below 2.5 acre)	62.50				
II. Small(2.5 to 5.0 acre)	23.33				
III. Medium(5.0 to 7.5 acre)	7.50				
IV. Large(7.5 acre and above)	6.67				
H. Occupation.					
I. Agriculture labour	5.00				
II. Caste based occupation	0.00				
III. Service	7.50				
IV. Agriculture	80.33				
V. Business	4.17				
VI. Dairying	2.50				
I. Social participation.					
I. No participation	30.00				
II. Participation in one organization	50.00				
III. Participation in two organizations	15.83				
IV. Participation in more than two organizations or office bearer	4.17				
J. Family annual income (Rs.).		81442		25000	390000
I. Up to 40000	32.50				
II. 40001 to 80000	40.83				
III. 80001 to 120000	10.00				
IV. 120001 to 160000	5.00				
V. 160001 and above	11.67				
K. Overall material possession (scores)		31.58	22.61	3	97
.I. Low (up to10)	4.17				
II. Medium(11 to 50)	78.33				

cont...

III. High (51 and above)	17.50				
L. Milk production.		8.25	7.24		50
I. Low (up to 1 liter)	Nil				
II. Medium (2 to 15 liters)	88.33				
III. High (16 liters and above)	10.83				
IV. Having no milk production	0.84				
M. Extent of contact with information sources.					
I. Formal sources		0.2428			
II. Informal sources		0.7103			
III. Mass media sources		0.3561			
N. Economic motivation (scores).		20.65	2.73	11	26
I. Low (up to 18)	19.17				
II. Medium (19 to 22)	50.83				
III. High (23 and above)	30.00				
O. Scientific orientation (scores).		19.08	3.02	11	26
I. Low (up to 16)	21.67				
II. Medium (17 to 22)	65.00				
III. High (23 and above)	13.33				
P. Risk orientation (scores)		19.37	2.62	13	26
.I. Low (up to 17)	25.00				
II. Medium (18 to 22)	63.33				
III. High (23 and above)	11.67				

respectively. The average score was found to be 0.24. With respect to informal sources, the family members, neighbors, friends, relatives, local leaders and progressive farmers were ranked at I, II, III, IV, V and VI in descending order of their values i.e. 0.98, 0.85, 0.76, 0.67, 0.50 and 0.47 respectively with the average score value was 0.71.

In case of mass media source utilization, the radio, T.V., newspaper, farmers fair, posters, agril. books, cattle exhibition, farm magazines, film shows, folders and circular letters got rank orders as, I, II, III, IV, V, VI, VII, VIII, IX, X and XI with mean score values 0.97, 0.83, 0.65, 0.319, 0.311, 0.29, 0.20, 0.13, 0.09, 0.05 and 0.04 respectively. The average score value was found 0.35. Hence, it can be concluded that informal sources of information seemed to be most important as generally utilized by most of the respondents. The formal and mass media information sources were also utilized by the respondents with considerable extent. The overall mean of scores for formal, informal and mass media information sources was found to be 0.43 which may be considered not good contact with information sources.

It is apparent that the maximum number of respondents (50.83 %) were found having medium level of economic motivation, while 30 per cent and 19.16 per cent respondents were such who had high and low level of economic motivation respectively. The average mean of scores for economic motivation was observed to be 20.65 with a range of minimum 11 and maximum 26. Hence, it can be concluded that most of the respondents were found having medium level of economic motivation.

It is clear that 65 per cent of the respondents were found having medium level of scientific orientation followed by low (21.66%) and high (13.33%) levels respectively. The mean of scores for scientific orientation was observed to be 19.08 with a range of minimum 11 and maximum 26. Hence, it can be inferred that most of the respondents (65%) had medium level of scientific orientation.

It is apparent that 63.33 per cent of the respondents were found having medium level of risk orientation followed by (25%) and (11.66%) who had low and high levels respectively. The mean of scores for risk orientation was observed to be 19.37 with a range of minimum 13 - 26. Hence, it can be concluded that the respondents have medium level of bearing the risk relating to improved farming system.

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Effect of Integrated nutrient management on the growth, productivity and economics of Black gram (*Vigna mungo*)

M.C. DWIVEDI , SUDHAKAR DWIVEDI[1] AND S.S.SINGH[2]
Research Farm Chatha ,Sher-e-Kashmir University of Agricultural Sciences & Technology of Jammu,Chatha, Jammu – 180009 (J&K)

Abstract

A field experiment was conducted at AAI Deemed University Allahabad to study the effect of Integrated nutrient management on the growth, productivity and economics of Black gram (Vigna mungo L.).The experiments during both the years consisted of 10 treatments, viz. T_1 - control, T_2,- 75%RDF+25%FYM, T_3 - 50%RDF+50%FYM, T_4,-25% RDF+75%FYM, T_5- 75%RDF+25%Com,T_6, - 50% RDF+50% Com, T_7-25% RDF+75% Com, T_8, - 75% RDF+25% PM, T_9- 50% RDF+50% PM, T_{10} -25%RDF+75 % PM. Incorporation of fertilizers with manure increased grain yield of Black gram. The higher grain yield of Black gram(9.06q/ha) was recorded in the treatment that received 25% RDF +75% poultry manure(T_{10}).However, it was at par with the yield obtained in treatment fertilized with100% RDF(T_1). Account of all the treatments, highest net profit (Rs.16270.0 and 16515.0) observed in both the year of experiment. *The benefit: cost ratio was also superior with this treatment.*

Key words: Nutrient management, bio-fertilizer, gross income, net income, b: c ratio.

Introduction

Pulses occupy 68.32 million ha area and contribute 57.51 million tonnes to the world's food basket. India shares 35.2% area and 27.65% of the global production. India has always been the largest producer, consumer and importer of pulses. The same trends follow in the context of Black gram. The Black gram is the fourth important pulse crop grown in the country, covering an area of about 2.5 million hectares, with production of around 1.5 million tonnes with an average productivity 400 kg/ha.Thus accounting 10% of the total production in our country(www.crnindia.com)

The continuous use of chemical fertilizers after given revolution in late 1960's increased crop productivity but had adverse effect on soil health and environment (Dwivedi and Dwivedi, 2007). In recent years, the productivity level has stagnated and in some situations declined even with the application of recommended dose of fertilizers. Now the thoughts among pioneers, scientists and farmers is how to increase the stagnant or declined yield to higher and sustained level. It seems that one of the practical ways to boost crop yield is to encourage the use of organics in field crops. Because agriculture is a soil-based production system, that extracts nutrients from the soil, effective and efficient approaches to slowing that removal and returning nutrients to the soil will be required in order to maintain and increase crop productivity and sustain agriculture for the long term. Since organics alone can not meet the nutrient requirement of various cropping systems due to limited availability, the use of integrated nutrient management holds great promise in increasing crop productivity and maintaining good soil health and also discourage emergence of multiple nutrient deficiency, It refers to combined use of fertilizers, organic manure, green manure, bio-fertilizers and crop residues with the objective of sustaining high yields over year and ensuring environmental safety (A.K. Sarkar 1989 and Patel et al., 2002). Hence the present investigation was conducted to evaluate effect of inorganic fertilizers and organic manures nutrient sources on productivity and profitability of Black gram cultivation.

Methods and Materials

A field experiment was conducted in two consecutive seasons of 2001 and 2002 at A. A. I. Deemed University Allahabad located at latitude 25° 57t N, longitude 81° 50t E and altitude 98 meters above M.S.L. The climatic condition of Allahabad is subtropical and semiarid. Monsoon rains from July to September and winter rains are limited .The atmospheric temperature varies widely. The temperature reaches up to 47.5^{0}C in summer and goes down to as low as 3^{0}C or even low during winter season. The metrological data including the weekly

[1] Assistant Professor, Agri. Eco., SKUAST-Jammu
[2] Ex. Head, Division of Agronomy, AAI, Deemed University, Allahabad.U.P.

Table 1: Meteorological data of 2001 and 2002 cropping season (Based on average of seven days).

Period	Temperature ^{0}C				Relative Humidity				Rainfall (mm) in the week	
	2001		2002		2001		2002		2001	2002
	Max	Min	Max	Min	Max	Min	Max	Min		
March	27.6	12.5	29.9	14.2	82.0	21.1	86.7	31.6	0.6	Nil
	32.8	14.1	32.9	15.8	78.6	17.6	77.3	29.3	6.0	Nil
	35.2	17.4	36.1	16.5	77.6	18.8	84.3	21.6	Trace	Nil
	36.8	18.4	37.6	18.9	68.4	14.1	77.3	17.4	Trace	Trace
April										
	37.1	18.5	39.9	20.8	62.0	12.3	71.4	14.7	Nil	Nil
	38.8	23.2	38.7	22.3	55.6	16.3	65.7	16.6	4.0	Nil
	36.0	21.0	43.1	24.3	74.0	23.4	53.9	10.3	20.0	Nil
	43.0	23.9	39.4	24.8	48.3	8.6	66.6	25.3	Nil	Trace
May										
	40.5	26.6	39.8	25.7	65.1	26.0	72.1	30.6	Trace	Nil
	40.2	28.1	41.0	28.5	58.4	29.9	64.8	24.9	Trace	Nil
	38.6	24.8	44.1	27.5	77.4	30.6	61.9	20.5	3.2 & Trace	Nil
	41.7	27.5	35.7	24.1	67.1	22.5	85.5	48.3	3.0	9.1

average of maximum and minimum temperature, relative humidity and rainfall recorded at Allahabad during the period of experiment are presented in Table 1. The soil was sandy-loam having pH 7.5 along with electrical conductivity of 1.3m mhos/cm at 25°C and organic carbon 0.39%, respectively. The experimental site soil having available nitrogen, phosphorous and potassium 210.9, 13.5 and 220.4 kgha^{-1}, respectively and total seasonal rainfall received during season of 2001 and 2002 was 36.8 and 9.1 mm respectively. Black gram crop (Type-9) was grown during Zaid season on the experimental plot. The experiments during both the years consisted of 10 treatments, viz. T_1 - control; T_2 -75%RDF+25%FYM; T_3-50%RDF+50%tFYM,; T_4 -25%RDF+75%FYM, T_5 -75%RDF+25%Com, T_6 -50%RDF+50%Com, T_7 -25%RDF+75%Com, T_8 -75%RDF+25%PM, T_9 -50%RDF+ 50%PM and T_{10} - 25%RDF+75%PM respectively.

The recommended dose of nitrogen, phosphorus and potash (20 N_2, 60 P_2O_5 and20 K_2O kg/ha respectively) and 7.5, 5.0, 2.5 t/ha FYM, 6.0, 4.0, 2.0, t/ha compost &1.87, 1.25, .625 t/ha poultry manure to Black gram crop was applied uniformly according to treatments. The entire nutrient was applied as basal placement. Standard agronomic operations and plant protection measures followed local recommendations. The experimentation was laid out in randomized block design with three replications. Spacing of 30 cm x 10 cm was maintained in Black gram by thinning and gap filling. Economics were computed using the prevailing market prices for inputs and outputs.

Results and Discussion

Data (Table 2) revealed that the *Pods* per plant was highest in 25%RDF+ poultry manure treated plot(T_{10}) followed by25%RDF+ compost(T_7) and25%RDF+ F.Y.M(T_4) in both the years .The differences were found to be statistically highly significant. The No. of pods obtained in highest dose of poultry manures was found to be two times more compared to fertilizer alone. The similar trend in grains per pod was noticed as that in case of number of pods/plant and differences were found to be statistically highly significant. The test weight (g) was observed to be higher in case of organic manure treated plot as compared to that inorganic fertilizers treated plot though; the differences were not much marked. Highest test weight was recorded of in poultry manure treated plot. The higher grain yield of Black gram(9.06q/ha) was recorded in the treatment that received 25% RDF +75% poultry manure(T_{10}).However, it was at par with the yield obtained in treatment fertilized with100% RDF(T_1). The highest decline with (31.57% in 2001 and 29.21% in 2002) in yield over best treatment (T_{10}) in sole in*organic* treatment (T_1). Highest grain yield was found in poultry manure treated plot (T_{10}) followed by compost (T_7) and FYM (T_4) and the differences were statistically significant. The same result was reported by Mondal et *al* (2004*)*. The same trend in straw yield was noticed as that in case of grain yield with significant differences in the values. The harvest index also showed same trend as that of grain yield and straw yield.

The Table 3 presented the cost of cultivation during the first year was lower when compared with second year in all treatments due to higher cost of inputs in the second year.Net profit and benefit cost ratio were also influenced by nutrient treatments. Account of all the treatments, highest net profit (Rs.16270.0 and 16515.0) observed in both the year of experiment. The benefit cost ratio was found

Table 2: Effect of integrated nutrient management on the growth and yield attributes

Treatment	Pods/plant		Grains/pod		1000 grainswt(g)		Grain yield (q/ha)		Straw yield (q/ha)		Harvest index	
	2001	2002	2001	2002	2001	2002	2001	2002	2001	2002	2001	2002
T_1, control	30.00	31.00	4.00	3.93	27.70	28.00	6.20	6.52	7.20	7.40	0.470	0.466
T_2,75%RDF+25%FYM	35.33	35.66	5.03	5.10	28.20	28.50	6.80	6.90	7.60	8.00	0.460	0.460
T_3,50%RDF+50%FYM	43.33	42.66	6.00	6.10	29.00	29.10	7.10	7.21	8.40	8.40	0.455	0.460
T_4,25%RDF+75%FYM	47.00	47.66	7.10	7.20	30.80	31.20	8.60	8.82	9.50	9.60	0.450	0.455
T_5,75%RDF+25%Com	36.00	46.66	5.13	5.53	28.60	28.70	7.10	7.33	8.30	8.40	0.453	0.458
T_6,50%RDF+50%Com	44.33	46.00	6.13	6.46	29.50	29.60	7.80	7.90	9.30	9.50	0.450	0.455
T_7,25%RDF+75%Com	51.00	51.33	7.20	7.33	31.20	31.40	8.90	9.02	10.40	10.50	0.445	0.450
T_8,75%RDF+25%PM	50.00	50.33	5.00	5.3	29.00	29.20	7.60	8.03	8.50	8.60	0.450	0.445
T_9,50%RDF+50%PM	60.33	64.66	6.00	6.06	30.60	31.00	8.70	8.62	9.40	9.50	0.445	0.450
T_{10}25%RDF+75%PM	63.33	68.00	7.33	7.40	31.90	32.00	9.06	9.21	10.70	11.00	0.440	0.445
SEm+	3.67	3.97	0.226	0.210	0.270	0.216	0.183	0.243	0.210	0.190	0.010	0.010
CD(P=0.05)	7.71	8.36	0.475	0.442	0.567	0.455	0.386	0.511	0.442	0.414	0.021	0.022

RDF**:** Recommended dose of Fertilizers, FYM: Farm yard manure, COM: Compost Manure, PM: Poultry manure

Table 3: Effect of Integrated Nutrient Management on Economics of Black gram.

Treatment	Cost of cultivation(Rs./ha)		Gross income(Rs./ha)		Net Profit(Rs./ha)		Benefit: cost ratio	
	2001-02	2002-03	2001-02	2002-03	2001-02	2002-03	2001-02	2002-03
T_1	13,250.00	13,310.00	18,600.00	19,560.00	5,350.03	6,250.00	1:1.40	1:1.47
T_2	12,195.00	12,200.00	20,400.00	20,700.00	8,205.00	8,500.00	1:1.67	1:1.69
T_3	11,990.00	12,015.00	21,300.00	21,630.00	9,310.00	9,615.00	1:1.78	1:1.80
T_4	10,880.00	10,920.00	25,800.00	26,460.00	14,920.00	15,540.00	1:2.37	1:2.42
T_5	12,316.00	12,450.00	21,300.00	21,990.00	8,984.00	9,540.00	1:1.73	1:1.77
T_6	11,680.00	11,800.00	23,400.00	23,700.00	11,720.00	11,900.00	1:2.00	1:1.98
T_7	11,220.00	11,400.00	26,700.00	27,060.00	15,480.00	15,660.00	1:2.38	1:2.34
T_8	12,118.00	12,530.00	22,800.00	24,090.00	10,682.00	11,560.00	1:1.88	1:1.82
T_9	12,310.00	12,580.00	26,100.00	25,860.00	13,790.00	13,280.00	1:2.12	1:2.07
T_{10}	10,910.00	11,115.00	27,180.00	27,630.00	16,270.00	16,515.00	1:2.49	1:2.44

highest in T_{10} i.e.1:2.49 & 1:2.44 followed by T_7(1:2.38 &1:2.34) and T_5 (1:2.37 &1:2.42) respectively in both the years. In case of net profit the similar trend has been observed.

From the above finding it may be concluded that the yield of summer Black gram (Type-9) can be profitable by combined application of organic manures and inorganic fertilizers preferably poultry manure and inorganic fertilizers. Hence it may be recommended to the farmers to follow the combination of T_{10} i.e.25% RDF+75% poultry manure to enhance the productivity as well as net return in Black gram crop.

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Assessment of training programs of KVK Rampur, its duration and preference time of training programs

DAN SINGH, S.P. SINGH[1], R.P. SINGH[2], C.P. GUPTA[3] AND V.K. SINGH[4]
Deptt of Agril. Comm. & R.D., S.V.P.U. & T., Meerut

Abstract

This study was carried out during the year 2004-05 in Rampur district of Uttar Pradesh. To assess the performance of training programmes, its duration and preference time. Maximum training programs were organized as off campus, followed by on campus. The study revealed that one day training programmes are most effective and September, October and November are the most suitable months for organizing training to farmers in Rampur district of Uttar Pradesh.

Key words: KVK, KVK personal, trained trainees, primary and Secondary data

Introduction

The Krishi Vigyan Kendras are required to play four important functions viz., demonstrations, on farm trials, vocational training to particing farmers, farm women and rural youths and in service training to extension workers. Out of these four functions, training is one of the most effective metjhod of transfer of technologies which brings changes in attitudes, skills and knowledge to the farmers, farm women, rural youths and extension workers. The KVK Rampur is engaged in imparting such training.

Most of the farmers of this district belonging to marginal and small categories group and face problems of limited resources, lack of knowledge and problem of low productivity. Keeping this in view KVK, Rampur arranged PRA survey to benefit the farmers and to collect information, problems and find out scientific solution of the problems. The KVK Rampur arranged a series of training programmes. The training were organized either on the campus as well as off the campus in different disciplines. In order to training impact it is necessary to assess the training programmes, its duration and preference of time by the trainees. This study comprises the data of training programmes last ten years from October 1995 to September 2005.

Methodology

The study was conducted in Rampur district during the year 2004-05. Rampur district comprises six blocks in which four blocks were selected for study as per cropped area and productivity per hectare. Again these villages from each block were selected randomly and ten trained trainees were selected purposively from each village. Thus the total sample size was of 120 trained trainees. The primary data were collected through personal interview with the help of structure scheduled and secondary data were collected from KVK annual progress reports. The data were analyzed, calculating percentage and giving the rank.

Results and Discussion

The perusal of the data revealed that the maximum training programmes were organized as off campus (564), followed by on campus (245) at KVK. Thus a total of 809 training programmeswere organized for 12600 practicing farmers (Table 1).

Similarly the maximum training programmes were organized as off campus (30) followed by on campus (25) at KVK for rural youths. Thus a total 55 training programmes were organized for 608 rural youths (Table 2).

The data presented in Table 3, indicated that the maximum training programmes were organized as off campus (165) followed by on campus (110) at KVK. Thus a total of 275 training programmes were organized for 3206 in service trainees.

The data presented in Table 4, indicated that the maximum training programmes were organized as off campus (44) followed by on campus (28) at KVK. Therefore, the total of 72 training programmes were organized for 3135 in sponsored trainees.

Maximum training programs were organized as off campus, followed by on campus at KVK. This shows that the nearest is more conductive for motivation. So off campus training programmes are most effective as the number of participants were maximum in all group of trainees. Also the environment their own field being given to them with proper justification and other routine domestic works are not totally.

[1] Deptt. Ag. Ext., R.B.S.College, Bichpuri, Agra
[2] Associat Director Extension, S.V.P.U. & T., Meerut
[3] KVK Sahaganpur, S.V.P.U. & T., Meerut
[4] Deptt. Ag. Ext., R.B.S.College, Bichpuri, Agra

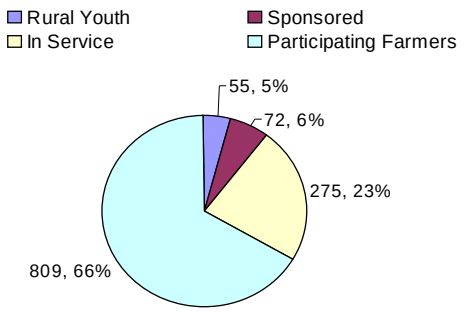

Fig. 1: Total training programmes organized by the KVK-1211(100%)

The data presented in Fig. 1, reveals that the scientists of KVK Rampur were organized 1211 total training programmes from October 1995 to September 2005. The majority of 809 training programmes were organized for practicing farmers, followed by 275 training programmes were organized for in service trainees, 72 training programmes were organized for sponsored trainees and the remaining 55 training programmes were organized for rural youth trainees.

Table 1: Number of practing farmers training programmes organized by the Krishi Vigyan Kendra.

Year	On Campus		Off Campus	
	Training	Participant	Training	Participant
1995-96	34	544	79	1331
1996-97	26	416	21	827
1997-98	22	252	49	765
1998-99	19	224	65	943
1999-2000	18	252	43	643
2000-2001	08	141	61	909
2001-2002	14	267	65	955
2002-2003	27	441	46	674
2003-2004	42	710	63	1018
2004-2005	35	542	42	747
Total	245	3788	564	8812

Table 2: Number of rural youth training programmes organized by the Krishi Vigyan Kendra.

Year	On Campus		Off Campus	
	Training	Participant	Training	Participant
1995-96	1	10	2	27
1996-97	1	10	3	37
1997-98	1	9	2	21
1998-99	1	11	-	-
1999-2000	1	10	2	23
2000-2001	1	11	-	-
2001-2002	1	11	1	11
2002-2003	3	30	2	20
2003-2004	8	81	10	125
2004-2005	7	70	8	91
Total	25	253	30	355

The data presented in Fig. 2, indicate that the total beneficiaries participants were 19549 by the KVK training programmes. The majority of 12600 beneficiaries participants were belonging to group of practicing farmers, followed by 3206 beneficiaries participants were belong to group of in service trainees, 3135 beneficiaries participants were belonging to group of sponsored trainees and the remaining 608 beneficiaries participants were belonging to group of rural youth trainees.

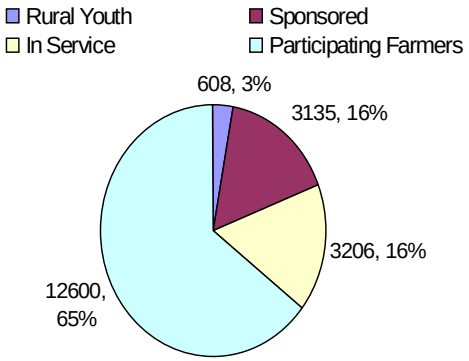

Fig. 2: Beneficiaries participants -19549(100%)

The data presented in Table 5, reveals that the number of participats decreased with the increase in number of days for training. The maximum 55 per cent) of trained trainees preferred one day training programme, followed by 35.83% for two days and the remaining 9.17% trainees preferred for three days training programmes. This shows that the trainees were unable to spare more time outside due to critical farming works. The results of these findings are in confirming with the observations of Sangeeta (2001) who suggested on day training most suitable for trainees.

Table 3: Number of service training programmes organized by the Krishi Vigyan Kendra.

Year	On Campus		Off Campus	
	Training	Participant	Training	Participant
1995-96	21	213	26	408
1996-97	12	128	22	231
1997-98	16	164	25	309
1998-99	18	193	23	239
1999-2000	6	60	9	91
2000-2001	6	61	9	136
2001-2002	4	42	15	242
2002-2003	4	40	9	107
2003-2004	12	120	12	175
2004-2005	11	110	14	137
Total	110	1131	165	2075

Table 4: Number of sponsored training programmes organized by the Krishi Vigyan Kendra.

Year	On Campus		Off Campus	
	Training	Participant	Training	Participant
1995-96	-	-	-	-
1996-97	-	-	-	-
1997-98	-	-	-	-
1998-99	3	82	7	202
1999-2000	1	38	3	126
2000-2001	1	42	3	154
2001-2002	3	116	1	581
2002-2003	5	205	4	170
2003-2004	9	414	12	575
2004-2005	6	258	4	172
Total	28	1155	44	1980

Table 5: Showing the duration of training programmes

Duration	Frequency	%tage	Rank
One day	66	55.00	I
Two days	43	35.83	II
Three days and above	11	9.17	III
Total	120	100.00	

The data presented in Table 6, indicate that the maximum 48.34% of trained trainees were participated training programmes in months of September, October and November, followed by 32.50%, 11.66% and 7.50% trained trainees were participating training programmesin the month of June, July, August, December, January, February and March, April, May, respectively.

Table 6: Showing the duration of training programmes

Month of Training	Frequency	%tage	Rank
March-April-May	9	7.5	IV
June-July-August	39	32.50	II
Sept.-Oct.-Nov.	58	48.34	I
Dec.-Jan.-Feb.	14	11.66	III
Total	120	100.00	

September, October and November are the most suitable month for training this shows that the trainees are not having important operational work in the month of September and after this month Rabi crop showing is started and the next preferential time for taining of this district is on set of monsoon (June-August) as kharif season. The finding of this study are quite agreement with the observations of Dubey et al (1976) who reported that the September, October and November can be best months for training to the trainees.

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Assessment of the intake of energy and β -Carotene and food habits of allergic patients

VINITA SINGH, PRIYA VASISHTHA AND PANKHURI GUPTA
C. S. A. University of Agriculture & Technology, Kanpur (U.P.)

Abstract

The burden of allergic rhinitis goes beyond the obvious symptoms of rhinorrhea, nasal congestion and itchy eyes. Patients have difficulty in sleeping, which leads to fatigue and poor productivity at work. Kanpur was the selected as the area of the study because being an industrial area it displays exposure to different kind of variables which are not only hazardous but also a number of diseases just like allergy. 100 samples were selected in the study and samples were selected in the study and samples were selected purposively and randomly. In female patients maximum 31.8% deficiency of calorie was found in 15-25 years of age group, and in male patients 32.5% deficiency of calorie was found in 34-45 years of age group. In male patients 8% deficiency of protein was found in 35-45 years of age group. In female patient's 13.3% deficiency of iron was found in 25-35 years of age group and in male patients 50.7% deficiency of iron was found in 25-35 years of age group. In female patients I maximum 67.0% deficiency of β -carotene was found in 45 years and above and in male patients 59.2% deficiency of β-carotene was found in 25-35 years of age group.

Key words: Nutritional consumption Allergy

Introduction

An allergy is a type of immune reaction, the immune system responds to foreign micro-organism of particles by producing specific proteins called antibodies. These antibodies are capable of binding of identifying molecules, or antigens. This reaction between antigen set off a series of chemical reaction designed to protect the body from infection. Sometimes, this same series, of reaction is triggered by harmless, everyday substances such as pollen, dust and animal dander's. When this occurs, an allergy develops against the offending substance (an allergen).

Nutrition can also affect the health of the skin through the development of a food allergy or hypersensitivity. Hypersensitivity to one or more components in the diet commonly manifests itself as inflammatory dermatomes.

Materials and Methods

The study was carried out in Kanpur City to assess the dietary pattern and food habits of allergic patients. Objectives necessitated a descriptive survey, design, and observation. Selection of samples was done by purposive and random sampling. The information regarding nutrient consumption was obtained by questionnaire, cum-interview methods. The 24 hours recall method is the most widely used method for nutrient intake. Under this method the subjects were asked to recall/describe in as much details as possible about the food intake for the past 24 hours. The nutritive value of diet consumed per day by the person was calculated using the food consumption table of Gopalan et al. (1989).

Results and Discussion

Table 1 shows that calorie consumption of respondents as compared to recommended dietary allowances (R.D.A.). the table reveals that in female patient maximum 31.8% deficiency of calorie was found in 15-25 years of age group. 10.5% deficiency was found in the age group of 45 years and above, 7.2 % deficiency was found in the age group of 25-35 years and 2.6% increment was found in the age

Table 1: Energy consumption of female allergic patients as compared to R.D.A.

Age group (years)	Female frequency	Energy (KCAL) Average	S.D.	R.D.A.	Deficient/increment(%)
15-25	43	1611.4	335.8	2060	-31.8
25-35	12	1739.3	350.2	1875	-7.2
35-45	9	1924.2	497.1	1875	+2.6
45 and above	4	1678.6	244.7	1875	-10.5
Total	68	1679.3	367.0	1875	-10.4
	r =0.2053*			P > 0.5	

Table 2: Energy consumption of male allergic patients as compared to R.D.A.

Age group (years)	Male frequency	Energy (KCAL) Average	S.D.	R.D.A.	Deicient/increment(%)
15-25	43	1822.8	233.1	2640	-30.9
25-35	12	1794.7	259.9	2425	-26.0
35-45	9	1635.7	195.3	2425	-32.5
45 and above	4	2070.8	395.6	2425	-14.6
Total	68	1843.1	300.4	2425	-24.0
	r =0.2064			P > 0.5	

Table 3: β -carotene consumption of female allergic patients as compared to R.D.A.

Age group (years)	Female frequency	â-carotene	S.D.	R.D.A.	Deicient/increment(%)
15-25	43	1312.9	1499.6	2400	-45.3
25-35	12	1038.0	1329.6	2400	-56.7
35-45	9	1902.0	1996.0	2400	-20.7
45 and above	4	791.9	339.4	2400	-67.0
Total	68	1311.7	1502.4	2400	-45.3
	r =0.0369			P > 0.5	

Table 4: β-carotene consumption of male allergic patients as compared to R.D.A.

Age group (years)	Female frequency	â-carotene	S.D.	R.D.A.	Deicient/increment(%)
15-25	9	1466.0	1717.4	2400	-38.9
25-35	12	978.2	5335.5	2400	-59.2
35-45	4	1345.6	2120.6	2400	-43.9
45 and above	7	1756.7	1884.5	2400	-26.8
Total	32	1331.6	1441.9	2400	-44.5
	r =0.0369			P > 0.5	

group of 35-45 years in comparison to recommended dietary allowances. It can be calculated that maximum patients were consuming low calorie diets.

The Table 2 shows that calorie consumption of male respondents as compared to recommended dietary allowances. The table reveals that in male patients maximum 32.5% deficiency of calorie was found in 35-45 years of age group. 30.9% deficiency was found in 15-25 years of age group, 26% deficiency was found in 25-35 years of age group and maximum 14.6% deficiency was found in 45 and above years of age group in comparison to recommended dietary allowances. It may be concluded maximum patient were consuming low calorie diet.

Table 3 reveals that in female patients maximum 67.0% deficiency of β-carotene was found in 45 and above years of age group, 56.7% deficiency of β-carotene was found in 25-35 years of age group, 45.3% deficiency of β-carotene was found in 15-25 years of age group and 20.7% deficiency of β-carotene was found in 35-45 years of age group in comparison to recommended dietary allowances. It can be concluded that the maximum female patients were consuming low β-carotene diets.

Table 4 shows that the β-carotene consumption of respondents as compared to recommended dietary allowances. The table reveals that in male patients maximum 59.2% deficiency of β-carotene was found in 35-45 years of age group, 38.9% deficiency of β-carotene was found in 15-25 years of age group, 26.8% deficiency of β-carotene was found in 45 years and above of age group in comparison to recommended dietary allowances. It can be concluded that the maximum male patient consuming low β-carotene diet.

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Varietal Response to Nitrogen and Foliar spray of Boron respect of growth, Yield and quality of cabbage (*Brassica oleraeesh. Var. Capitata*)

GOPI CHAND SINGH, RAJESH KUMAR[1]
Krishi Vigyan Kendra, R B S College, Bichpuri, Agra

Abstract

It was thought worth while to find out appropriate level of Nitrogen and Boron for the Maximum Production of high quality heads of these three Varieties of Cabbage at lower cost of production during winter-spring season, however, very little information is available in India on the effect of variety, level of Nitrogen and foliar spray of boron on yield and quality of cabbage but there is Lack of information in relation to the effect of these factors on productivity and quality of cabbage during winter spring season in Agra region, Highest cabbage yield recorded the variety Hybrid 261 with 324 kg N/he and 0.24% of foliar spray of boron at 30 & 60 days after sowing.

Key word: Nitrogen, Foliar spray Boron, Brassica oleraeea Variety Capitata.

Introduction

India is the world's second largest producer of vegetables next only to China and the number of vegetables grown in the country is quite large. According to rough estimates, vegetable occupy 2.5% of the total cultivated area of the country with the total annual production of about 45 Million tones from a cropped area of four million hectare excluding Potato and tuber. Considering the present area and yield, the yield of vegetables in India is inadequate to meet the need of the country, As per information available, an average Indian Consumes 434 gm of cereals per day and 21 gm of leafy vegetables and 71 gm of other vegetables including tuber crops. At present per capita availability is around 120-130 gm per day whereas according to dieticians each adult requires 295 gm of vegetables a day for maintaining proper health, It is there fore necessary that the vegetables have to be raised by 300 to 400% indicating future scope for expansion of vegetables industry in India. The cabbage is an important Cole crop in India during rabi season. The area, production and productivity of cabbage in India is 0.31 Mha, 6.9 MT and 220 q/ha respectively during 2008-09 (Anonymous, 2010). But the poor productivity is major cause of concern. There are many reasons for low productivity of cabbage in India but the cultivation of obsolete varieties, inadequate nitrogen and micro nutrient management especially that of B. However, productivity of different vegetables including cabbage in our country is comparatively lower than the world's average productivity because the vegetable, production of our country is still dominated by the locally available varieties. Here great scope exists to replace the local cultivars and a well strategy is needed to enhance the area under improved varieties and hybrids. Keeping this in view experiments were undertaken to find out the varietal response of cabbage to various levels of nitrogen and boron under Agra region during 2004-05 and 2005-06.

Materials and Method

The experiments were conducted KVK Bichpuri R.B.S. College Bichpuri Agra during the rabi season of 2004-2005 and 2005-2006 in factorial RBD with three replications. The varieties, levels of nitrogen and Boron were undertaken as three factors for finding out the effect on growth, yield attributes and productivity of cabbage. The Treatments consist of 3 varieties, 4 levels of Nitrogen (0.150 kg/ha 300 kg/ha and 450 kg/ha) and 4 level of foliar spray of boron (0, 0.1, 0.2 and 0.3%) thus the treatment combinations were 48 **(**4x4x3) in the experiments. All the recommended agronomic practices were followed as and when required. The observation recorded on height of plant (cm), diameter of stem, (cm) number of fully opened leaves per plant, fresh weight per whole plant (kg) and fresh weight per trimmed head kg and yield of trimmed heads per hectare. The data were analyzed statistically

Results and Discussion

1. Growth parameters

The results showed that plant height (cm), diameter of stem (cm), number of fully opened levels per plant, fresh weight per whole plant (kg) and Fresh

[1] Research Scholar, Deptt. of Hort., R.B.S.College, Bichpuri, Agra

Table 1: Effect of variety, levels of Nitrogen and concentration of boron on the height of plant, diameter of stem and number of fully opened leaves per plant

Treatment	Height of plant (cm)		Diameter of stem (cm)		No. of fully opened leaves/plant	
	2004-05	2005-06	2004-05	2005-06	2004-05	2005-06
Variety						
Golden acre (V_1)	26.03	25.52	1.56	1.54	10.34	9.85
Pride of India (V_2)	28.49	27.99	1.81	1.79	12.17	11.67
Hybrid-261 (V_3)	31.26	30.81	2.00	1.99	14.09	13.59
C.D. at 5%	0.70	0.50	0.03	0.11	0.20	0.10
Level of Nitrogen						
0 Kg/ha (N_0)	27.56	27.11	1.70	1.68	11.64	11.15
150 kg/ha (N_1)	28.66	28.14	1.80	1.79	11.85	11.35
300 kg/ha (N_2)	29.66	29.16	1.92	1.90	12.48	11.98
450 kg/ha (N_3)	28.51	28.01	1.74	1.72	12.84	12.34
C.D. at 5%	0.80	0.80	0.10	0.20	0.20	0.10
Concentration of boron						
0 Percent (B_0)	26.06	25.56	1.57	1.55	11.81	11.31
0.1 Percent (B_1)	28.43	27.93	1.70	1.68	11.98	11.50
0.2 Percent (B_2)	30.74	30.28	2.11	2.09	12.82	12.32
0.3 Percent (B_3)	29.16	28.66	1.78	1.76	12.19	11.69
C.D. at 5%	0.80	0.80	0.10	0.20	0.20	0.10

weight per trimmed head (kg) and yield of trimmed heads per hectare (quintal) significant different influenced during both the year. The data recorded on the height of plants, as indicated by in table -1, maximum plant height was recorded in Hybrid-261 in both the years .The effect of Nitrogen levels of heights of the plant was statistically significant in both years, it is evident from Table 1 that both the years the height of plant were recorded from 29.66 and 29.16 cm at 300 n/ha in the years 2005 and 2006 which was significantly superior to all the lever and higher levels in this respect in both the years. The study effect of foliar spray boron levels of the plant were increased correspondingly and significantly with the increase in the concentration of boron from 0% to 0.2% (B_0 to B_2) in both the years, the maximum height of the plant were recorded from 30.79 and 30.28 (cm) at 0.2% (B_2), which was significantly superior to lower and higher concentration in this respect in both the years. The effect of variety and level of Nitrogen and foliar spray of boron were statistically significant on diameter of stem in both the years, the Hybrid No-261 (V_3) was significantly superior to the other two varieties, because it gave the maximum diameter of stem (cm) (2.00 and 1.99) in both the years 2005 and 2006, respectively as compared to 1.81 and 1.79 in pride of India and 1.56 and 1.54 in Golden Acre, in this respect in both the years. The diameter of stem had increased as the nitrogen levels from 0 kg to 300 kg/N/ha and 0.2 % of boron during both the years. The data on the number of fully opened leaves per plant as obtained in different varieties, Nitrogen and boron levels resulted in significant effect on number of fully opened laves per plant were noted in Hybrid-261 (V_3) (Table 1). The effect of foliar sprays of boron on the number of leaves per plant and fresh weight per whole plant were increased significantly with the increase in the concentration of boron from 0 % to 0.2 in both the years, further increase in the 0.2% foliar spray of boron to 0.3% foliar spray of boron reduced, the maximum number of leaves per plant was obtained under (12.82 and 12.32) 0.2% which was significantly superior to all the lower and higher concentration in both the years. Similar findings were reported by Bowers and Loudenslager (1971), Bondarenko, 1983.

2. Yield attributes

The effect of variety and level of Nitrogen and foliar spray of boron were statistically significant fresh weight per trimmed head in both the years, the variety Hybrid No-261 (3.39 and 3.29) which was significantly superior pride of India, golden acer, in both the years (Table 2). The fresh weight per trimmed head as the Nitrogen level from 0 kg 300 kg N/ha in both the years, the highest (1.95 to 1.85) fresh weight per trimmed head was recorded in both the years and its was significant superior to all other lower and higher levels in this respect in both the years, that the weight of trimmed head was increase and significantly with each increase in the foliar spray of boron form 0% to 0.2% in both the year. The maximum fresh weight of trimmed head was recorded with (1.80 and 1.70) which was significantly superior to all other lower and higher foliar spray of boron in this respect

Table 2: Effect of variety, levels of Nitrogen and concentration of boron of the Fresh weight of whole plant, Fresh weight per trimmed head and yield of trimmed heads per hectare (ha)

Treatment	Fresh weight per whole plant (use roots) (kg)		Fresh weight per trimmed head (kg)		Yield trimmed heads per hectare (ha)	
	2004-05	2005-06	2004-05	2005-06	2004-05	2005-06
Variety						
Golden acre (V_1)	2.21	2.11	1.39	1.30	413.96	412.96
Pride of India (V_2)	2.62	2.52	1.75	1.65	508.77	507.77
Hybrid-261 (V_3)	3.39	3.29	2.10	2.00	609.01	608.03
C.D. at 5%	0.20	0.21	0.30	0.21	4.03	5.21
Level of Nitrogen						
0 kg/ha (N_0)	2.39	2.29	1.59	1.49	441.01	440.01
150 kg/ha (N_1)	2.64	2.54	1.66	1.57	522.11	489.11
300 kg/ha (N_2)	3.03	2.93	1.95	1.85	568.52	567.52
450 kg/ha (N_3)	2.89	2.79	1.79	1.69	510.67	541.70
C.D. at 5%	0.28	0.29	0.38	0.29	5.04	6.23
Concentration of boron						
0 Percent (B_0)	2.56	2.46	1.71	1.61	478.64	476.62
0.1 Percent (B_1)	2.66	2.58	1.73	1.63	500.25	499.67
0.2 Percent (B_2)	2.90	2.80	1.80	1.70	539.25	538.28
0.3 Percent (B_3)	2.83	2.73	1.75	1.65	523.75	523.77
C.D. at 5%	0.28	0.29	0.38	0.29	5.04	6.23

during in both the years. 1. This was also reported by Alvares et al., 1985, Batal et al., 1997 and Chakarbarty, B.K. (1976).

3. Yield of trimmed heads (q/ha)

Hybrid No-261 (V_3) was recorded maximum yield of trimmed heads in both the years (Table 2). The yield of trimmed heads had as the level of Nitrogen from 0 kg to 300 kg N/ha in both the years. The higher (568.52 and 567.52) yield of trimmed heads was recorded in both the years and its was significant superior to all other levels and higher line in this respect in both the years, the yield of trimmed heads was increased significantly with the application 0.2% (B_2) foliar spray of boron in both the years, the maximum (539.25 and 538.28) yield of trimmed heads were recorded 0.2% foliar spray of boron in both the years. Dixit et al., 1997, Parmar et al., 1999 and Sharma and Arga 2001 were also reported similar finding of increase in cabbage productivity due to better nutrient management in hybrids.

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