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Effect of Phosphorus, Sulphur and Zinc on Siliqua per plant, Test weight and Seed yield per plant of Mustard

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Abstract

A studies Effect of Phosphorus, Sulphur and zinc fertilization on Siliqua Per Plant and Test weight of Mustard conducted was rabi season Raja Balwant Singh college Agriculture research farm Bichpuri , Agra. Three levels of phosphorus, 0 Kg, 30kg, 60 Kg, per hectare, Three levels of sulphur 0 kg, 20 kg , 40 kg per hectare and zinc 0 kg, 5 kg, 10 kg per hectare were used in the study. Application of 60 kg phosphorus and 40 kg sulphur per hectare gave increased higher test weight of seed and siliqua per plant. The present studies was conducted in spilt plot design with three replication, Three levels of phosphorus 0kg, 30kg, 60kg per hectare, three levels of sulphur 0kg , 20 kg, 40 kg per hectare, three levels of zinc 0 kg, 5 kg, 10 kg per hectare 27 treatments combination and 81 plots were used to conduct this study.

Keywords: Phosphorus, Sulphur, Zinc, Mustard, Test weight, Siliqua, Yield

Introduction

Mustard is the second most important edible oil seed crop after groundnut. It plays an important role in the oil seed economy of the country. India occupies the third position in mustard production in world after China and Canada. In India during 2012-2013 the production of mustard was about 8.03 million tons from an area of 6.36 million hectares with an average productivity (yield) of 1263 kg ha[1] and total production 8.03 million tones . In UP it is grown in an area of 0.66 million hectares with production of 0.84 million tons. The average productivity in UP is 1,263 kg ha[1] which is quite equal than the national average productivity(Agriculture statistics at a glance 2014).

Oilseed Brassicas, rapeseed mustard accounting for over 13.2 per cent of the world's edible oil supply are third most important edible oil source after soybean and palm. In India Brassicas rank second acreage with 6.23 million ha, superseded by the groundnut only. Because of their ability to germinate and grow at low temperature, the oil seed Brassicas can be grown in the cooler agricultural regions and at higher elevations, as well as winter crops in the temperate zones. The Brassicas have about 40 per cent oil on a dry weight basis. The meal contains 38-44 per cent high quality protein. In India three ecotypes of Brassicas are grown substantially.

The production of rapeseed and mustard in India is around 1.62 million tonnes which account for about 18 per cent of the total oilseed production of the country. The oil obtained from the different types show slight variation in percentage of oil. The oil content varies from 37-49 per cent. The seed and oil are used as condiment in the preparation of pickles and for flavoring curries and vegetables. The oil is utilized for human consumption throughout northern India in cooking and frying purpose. It is also used in the preparation of hair oil and medicines. It is used in soap making, in mixtures with mineral oils for lubrication. Rapeseed oil is used in the manufacture of greases. The oil cakes is used as a cattle feed and manure. Green stems and leaves are a good source of green fodder for cattle. The leaves of young plant are used as green vegetable as they supply enough Sulphur and minerals in the diet. In the tanning industry, mustard oils are used for softening leather (Singh, 2001).

Important major oil seed primary source of edible oil crop groundnut, rapeseed & mustard, soybean, sesame, niger seed, safflower, caster, linseed. Mustered & rapeseed are wonderful gift of nature oilseed crop are the rich sources of oil specially for edible oil , Being rich in oil (38%-48%). Rapeseed & mustard producing states along with area (%) and production (million tonne)) are Rajasthan (47.51% & 3.81mt), Madhya Pradesh (11.45% &0.92 mt), Haryana (11.98% and 0.84 mt), Uttar Pradesh (10.41% and 0.84), West Bengal (5.91% and 0.47),

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Gujarat (4.50% and 0.36), Assam (%2.12 and 0.17), Bihar (1.22%and 0.12), Punjab (0.51% and 0.04) (Agriculture statistics at a glance 2012-13)

Phosphorus is the backbone of any fertilizer management programme and occupies a key place in intensive agriculture. It is the second important plant nutrient for the growth and yield of wheat. Application of phosphorus not only increases the crop yield but also improves the crop quality and imparts resistant against diseases. It is involved in a wide range of plant processes from permitting cell division to the development of a good root system. It is required mostly by young fast growing tissues and performs a number of functions related to growth, development, photosynthesis and utilization of carbohydrates. It is the constituent of ADP and ATP which are the most important substances in the life processes. Sulphur is the secondary plant nutrient which plays a significant vital role in increasing production. Sulphur is essential for synthesis of sulphur containing amino acids viz., methionine, cystine and cysteine and chlorophyll. It is essential for metabolism of carbohydrates, proteins, oils and synthesis of coenzyme-A.

Sulphur is important essential Secondary plant nutrient, important of sulphur in Indian agriculture is being increasingly emphasized and sulphur has been considered fourth important nutrient. The sulphur deficiency has been recognized as a factor in limiting the yield attributed characters and thus plants vital role in carbon assimilation (Aulakh and Pasricha, 1990). Keeping aspects in mind on study was conducted to Studies of phosphorus sulphur and zinc on Number of Siliqua and Test weight of Mustard.

Materials and Methods

A study was conducted at agriculture research farm of Raja Balwant Singh College Bichpuri, Agra (Uttar Pradesh). Which is situated about 11 km to the south west of Agra city on Agra Bharatpur Road. Study was carried out for two consecutive years to assess the effect of phosphorus, sulphur and zinc of Test weight of Black gram. experiment was conducted in Kharif season on that field whose soil was sandy loam in texture the pH value of the soil 0-25 cm depth was found to be 8.10 in both years.

The value of organic carbon, available Nitrogen, available phosphorus, available potash, available sulphur Kg per ha in the soil were found to be 0.42, 171.30 kg ha^{-1}, 18.90 kg ha-1, 212.20 kg ha^{-1}, 8.10 kg ha^{-1} respectively in the first year. The after in the second year of experimentation the value of organic carbon, available nitrogen, available phosphorus, available potash, available sulphur in the soil were found 0.44,174.40 kg ha^{-1} 19.40 kg ha^{-1}, 220.70 kg ha^{-1}, 8.30 kg ha^{-1} .

Table 1: Mechanical Analysis of the soil

Component	Content 02-03	Content 03-04	Methods of determination
Sand %	60.19	60.99	International pipette methods (piper, 1996)
Silt %	21.98	21.23	Do
Clay %	17.83	17.78	Do

The experiment was conducted in split plot design with three replication, three levels of phosphorus 0 kg (P_O), 30 kg (P_1), 60 kg (P_2) per hectare, three levels of sulphur 0 kg (S_O), 20 kg (S_1), 40 kg (S_2), per hectare, three levels of zinc 0 kg (Zn_0), 5 kg (Zn_1), 10 kg (Zn_2) per hectare, 27 treatment combination and 81 plots were used to conduct this study.

Table 2: **Observation recorded**

S. No	Observation recorded on plant basis	Sample Size
1	Number of siliqua plant-¹	Number of siliqua were counted from the four tagged plant and average
2.	1000seed weight(gm)	Per plot basis from produce(Random sample per plot)
3	Seed yield per plant	Seed obtained four tagged plant from each plot were weighed and averaged

Results and discussion

Different levels of phosphorus fertilizer indicate that in case of 30 kg phosphorus and 60 kg phosphorus application remained at par with each other but gained significant higher test weight than control during both years studies (Table 3). On an average basis 60 kg phosphorus level produced 0.70 gm and 0.28 gm higher test weight than control plot and 30 kg phosphorus respectively and phosphorus fertilizer role of number of siliqua per plant were canted significant maximum under 60 kg phosphorus level While minimum number of siliqua per plant was counted under control plot. An increase was observed under each higher dose of phosphorus application over control. On mean basis 60 kg phosphorus produced 28.12% and 8.22% more number of siliqua per plant than 30 kg and 0 kg phosphorus per hectare respectively. Results supported by Ali (1993), Deshbhrataret et al (2010). On average basis of two years phosphorus 60 kg produced 16.93% and 25.79% more seed yield per plant than 0 kg and 30 kg levels of phosphorus respectively. Sulphur produced significant impact on 1000 seed weight during

Table 3: Number of siliqua Per Plant, Test weight (g) and Seed Yield per Plant as effected various treatments

Treatments	Number of Siliqua/Plant			Test Weight (1000 seed weight gm)			Seed Yield/Plant		
	First year	Second year	Mean	First year	Second year	Mean	First year	Second year	Mean
Phosphorus Levels									
P_0	259.33	265.44	262.38	4.76	4.87	4.81	10.66	10.96	10.81
P_1	307.33	314.00	310.66	5.12	5.34	5.23	12.94	12.95	12.64
P_2	337.44	335.00	336.22	4.41	5.61	5.51	13.73	14.41	14.07
CD at 5%	41.376	41.327		0.413	0.432		1.216	1.234	
Sulphur Levels									
S_0	256.33	262.00	259.16	4.73	4.94	4.83	10.70	11.04	10.87
S_1	316.33	323.33	319.83	5.10	5.33	5.23	12.52	13.14	12.83
S_2	331.33	339.33	335.35	5.41	5.61	5.51	13.50	14.14	13.83
CD at 5%	41.246	41.278		0.410	0.429		1.205	1.222	
Zinc Levels									
Zn_0	289.00	296.33	292.66	5.00	5.19	5.09	12.06	12.74	12.40
Zn_1	303.00	309.66	306.33	5.11	5.31	5.21	12.29	12.70	12.49
Zn_2	312.00	318.44	315.22	5.19	5.40	5.29	12.45	12.92	12.69
CD at 5%	41.246	41.278		NS	NS		NS	NS	

both the year of investigation. It is seed form the table under reference that the test weight (1000 seed weight) was improved with every increase in the level of sulphur up to 40 kg sulphur in both the years of investigation on average mean basis 40 kg Sulphur improved 14.08 per cent and 5.65 per cent seed weight over control plot and 20 kg sulphur hectare application respectively and number of siliqua per plant increased with increasing level of sulphur dose up to 40 kg per hectare, result supported by Patra et al (2013) and Bairwa et al (2012), and sulphur 40Kg application showed significant improvement in seed yield per plant during both year Singh et al (2002).

Table 3 indicates also clears that zinc application increase of the 1000 seed weight, seed yield per plant and siliqua per plant were increase with every increase in the level of zinc from control to 10 kg zinc. Test weight and seed yield per plant response is levels of zinc application but the increase was statistically non significant result supported by Ram et al (2013).

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