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# Effect of phosphorus, sulphur and zinc on nitrogen, phosphorus, sulphur and zinc composition in mustard seed

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**Abstract**

*The study of effect of phosphorus, sulphur and zinc on nitrogen, phosphorus ,Sulphur , and Zinc composition in Mustard Seed was conducted during rabi season at the agriculture research farm of Raja Balwant Singh college Bichpuri, Agra (Uttar Pradesh) . The result revealed that application of 60 kg phosphorus per hactare also improved Nitrogen ,Phosphorus ,Sulphur, and Zinc composition in mustard seed and application of 40 kg Sulphur per hectare also improved Nitrogen and sulphur composition in mustard seed .*

Keywords: Phosphorus, Sulphur, Zinc, Composition, Mustard, Seed

## Introduction

Indian mustard is one of the important oil seed crops of Agra region in western Utter Pradesh. Mustard crop is grown in the rabi season from September – October to February- March. 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. Important major oil seed primary source of edible oil crop groundnut, rapeseed & mustard, soybean, sesamun, nigerseed, safflower, castar, linseed.

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 is used for softening leather (Singh, 2001).

Sulphur is one of the sixteen essential plant nutrient elements which all plants must have for normal growth and development. Sulphur is the secondary plant nutrient which plays a significant vital role in increasing production. Sulphur plays an inevitable and imperative role so for the formation of amino acids (methionine 21% and cystine 27%) Synthesis of protein, chlorophyll and oil in the oil seed in concerned (Aulakh et at 1980) most attractive quality character with respect to sulphur fertilization production hence more profit to farmers.

This crop seeds proper nutrient value , Keeping aspects in mind an experiment was conducted to study effect of phosphorus, sulphur and zinc on Nitrogen ,Phosphorus, Sulphur , and Zinc composition in Mustard Seed .

## Materials and Methods

A field experiment was conducted at agriculture research farm of Raja Balwant Singh College Bichpuri, Agra (Uttar Pradesh). Which is situated about 11km to the south west of Agra city on Agra Bharatpur Road. Field experiment was carried out for two consecutive years to assess the effect of phosphorus, sulphur and zinc on Nitrogen, Phosphorus, Sulphur, and Zinc composition in Mustard Seed. experiment was conducted in Rabi 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 year.

At the initial time of sowing the values of organic carbon, available Nitrogen, Available Phosphorus, Available Potash and Available sulphur

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Kg per ha in the soil were presented in Table 1.

The experiment was conducted in split plot design with three replication, three levels of phosphorus, three levels of sulphur, three levels of zinc, 27 treatment combination and 81 plots were used to conduct this study.

*Details of treatments*

1. Phosphorus levels (kg/ha): (i) 0 (Kg $P_2O_5$ $ha^{-1}$) (ii) 30 (Kg $P_2O_5$ $ha^{-1}$) (iii) 60 (Kg $P_2O_5$ $ha^{-1}$)
2. Levels of Sulphur (kg/ha): (i) 0 (Kg S $ha^{-1}$) (ii) 20 (Kg S $ha^{-1}$) (iii) 40 (Kg S $ha^{-1}$)
3. Levels of Zinc (kg/ha): (i) 0 (Kg $ha^{-1}$) (ii) 5 (Kg $ha^{-1}$) (iii) 10 (Kg $ha^{-1}$)

Table 1: Organic carbon and available content of N, P, K and S at

| Component | Content |
|---|---|
| Organic carbon (%) | 0.42 |
| Available Nitrogen (kg $ha^{-1}$) | 171.30 |
| Available Phosphorus (kg $ha^{-1}$) | 18.90 |
| Available potash (kg $ha^{-1}$) | 212.20 |
| Available sulphur | 8.10 |

## Results and Discussion

*Nitrogen content in seed*

The data present in Table 2 Clearly shows that phosphorus, sulphur plays an important role in the nutrient content of Mustard. Among the three levels of phosphorus 0, 30 and 60 kg $P_2O_5$ $ha^{-1}$ and 60 kg phosphorus produced higher nitrogen content in seed , result supported by Singh and Singh (2013). However , a numerical increase was seen in this regard from (control) $P_0$ to $P_1$ (30 kg $P_2O_5$) and $P_2$ (60 kg $P_2O_5$ ). The sulphur produced influence on nitrogen content of seed and Zinc application also have not affected nitrogen content in mustard seed.

*Phosphorus content in seed*

It is proved form the table-2 that clearly phosphorus application effected phosphorus content per cent in mustard seed significantly .The phosphorus content was increased as the levels of phosphorus application increased 60 kg $P_2O_5$. However , higher level of phosphorus (60 kg $P_2O_5$ ) was noted to be statistically superior over $P_0$ (control ) in both the year . 60 kg phosphorus per hectare produced numerically maximum phosphorus content in seed during both the years of experimentation and similar observation were also reported by Mhadkar and saraf (1988), Jaswal et

Table 2: Nitrogen, Zinc , Phosphorus and sulphur content % in seed as Effected by various treatments

| Treatments | N content (%) in seed | | Zn Content in seed (mg $kg^{-1}$) | | P content (%) in seed | | S content % in seed | |
|---|---|---|---|---|---|---|---|---|
| | First year | Second year | First year | Second year | First year | Second year | First year | Second year |
| Phosphorus Levels | | | | | | | | |
| $P_0$ | 3.14 | 3.29 | 44.51 | 44.39 | 0.56 | 0.58 | 0.46 | 0.48 |
| $P_1$ | 3.33 | 3.48 | 44.97 | 44.97 | 0.62 | 0.64 | 0.50 | 0.53 |
| $P_2$ | 3.54 | 3.70 | 45.37 | 45.39 | 0.66 | 0.68 | 0.52 | 0.54 |
| CD at 5% | NS | NS | NS | NS | 0.09 | 0.09 | 0.036 | 0.036 |
| Sulphur Levels | | | | | | | | |
| $S_0$ | 3.29 | 3.44 | 46.87 | 46.59 | 0.61 | 0.63 | 0.46 | 0.48 |
| $S_1$ | 3.34 | 3.49 | 45.13 | 45.04 | 0.62 | 0.62 | 0.49 | 0.51 |
| $S_2$ | 3.39 | 3.55 | 43.42 | 43.50 | 0.62 | 0.62 | 0.53 | 0.53 |
| CD at 5% | NS | NS | NS | NS | NS | NS | 0.031 | 0.36 |
| Zinc Levels | | | | | | | | |
| $Zn_0$ | 3.33 | 3.48 | 42.84 | 42.94 | 0.62 | 0.64 | 0.49 | 0.59 |
| $Zn_1$ | 3.34 | 3.49 | 45.09 | 45.08 | 0.62 | 0.64 | 049 | 0.59 |
| $Zn_2$ | 3.35 | 3.51 | 46.94 | 46.90 | 0.61 | 0.63 | 048 | 0.50 |
| CD at 5% | NS | NS | 0.961 | 0.978 | NS | NS | NS | NS |

al. (1986). While zinc application showed reverse result. Sulphur application at higher dose ($S_2$) 40 kg sulphur $ha^{-1}$ also produced higher phosphorus content in the seed over $S_0$ and $S_1$ in both the year of experimentation.

*Sulphur content in seeds*

The table indicates that 30 kg level application of phosphorus at showed significantly sulphur content per cent in the seed of mustard .However , 60kg phosphorus produced maximum and was significant from control plot and at par with 30 kg sulphur or 30 kg ,60 kg phosphorus Influence on sulphur content in mustard . Sulphur produced significantly impact on sulphur content of seed. The response was observed up to 40 kg hectare level of sulphur application which produced higher sulphur content over its lower level $S_0$ and $S_1$ levels and Zinc application decreased the sulphur content in seeds of Mustard, result supported by Singh and Singh (1990).

*Zinc Content in Seed*

The table indicates application of zinc produced significant differences in zinc content in mustard seed $Zn_2$ Level of zinc application produced mean levels 9.40 and 4.08 per cent more content over $Zn_0$ and $Zn_1$ levels of zinc application .same trend was observed during both the year , similar reported by Sakal, et.al.(1981) and Dwivedi, et.al (2002). Study of phosphorus application was found non – significant for phosphorus levels. Though, numerical increase is appeared but there was no significant difference. In case of sulphur application produced reverse trend zinc content in mustard seed.

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