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Effect of graded dose of sulphur, iron and molybdenum along with recommended dose of N.P.K on yield attributes and economics of pea (*Pisum sativum*)

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Abstract

Input-output data on farm trails of three most popular pea varieties of eastern Uttar Pradesh cultivated under different inorganic nutrient combination were collected during 2002-05 from the experimental field of the Indian Institute of vegetable Research Varanasi, The highest yield and benefit ratio per unit input ratio was found when the crop was cultivated under under recommended dose of NPK with S@20 kg/ha plus Fe and Mo @ 50ppm foliar spray. A return ratio of 3.6 rupees per rupee invested was realized in fresh vegetable pea and pea seeds under this package, which accounted a net profite of 63-to131.4%. Maximum net return and cost benefit ratio 1: 3.4 was realized in Arkel when market as fresh vegetable. Maximum net return and cost benefit ratio was obtained when pea grain was marketed.

Keywords: Sulphur, iron, molybdenum, N.P.K, economics, *Pisum sativum*

Introduction

Pea (*Pisum sativum* L) is one of the important vegetable crops grown all over the world. It contains high percentage of digestible proteins, carbohydrates, sugar, Vitamins and minerals and hence is considered vital for country like India where majority of the people are vegetarian. The increasing demand of vegetable pea in eastern Uttar Pradesh has lead to a mega scale cultivation of the crop for the last couple of years. The growers' preference mostly restricted in three varieties viz. Arkel, Azad P-1 and Azad P-3. An attempt has been made in this paper to test the effect of graded dose of sulphur iron and molybdenum along with recommended dose of N.P.K. on yield and cost benefit ratio.

The green pod supply in this area where majority of the vegetarian population. As result these sell at a high Premium bringing lucrative returns to the growers. The lands holdings in U.P are very large area but low production there is needed to enhance the pod production of pea. Cultural practices based on the Scientific research play a vital role in enhancing the green pod yield per unite area for maximum yield, optimum plant population is a must along with judicious use of macro, secondary and micro nutrient. Keeping these facts in view the present studies were planned to study the effect of seed rate under different combination of N.P.K.S. Fe and Mo on grain and green pod production of pea.

The production of vegetable peas adapted to commercial purpose. Then knowledge of nutrient requirements for become increasing yield for less expended to become a significant proportion of crop production neither more use of fertilizer gain less profit. Therefore use of any fertilizers care mind effect was synergistic but no antagonistic.

Thus the present investigation was undertaken view to find out the effect of graded dose of sulphur iron and molybdenum along with recommended dose of N.P.K. on yield and cost benefit ratio.

Materials & Method

A field experiment was conducted to evaluate the impact of sulphate, molybdate and iron along with recommended dose of NPK application on yield and biochemical constituents of vegetable pea seeds at Indian Institute of Vegetable Research. Varanasi (U.P).

The soil used for the basic properties of the soil were as fallows pH 7.6, EC 0.41 dSm⁻¹, available N 270 kg ha⁻¹, P₂O₅ 18 kg ha⁻¹ and K₂O 180 kg ha⁻¹ sulphur 10 kg ha⁻¹, organic carbon

0.38% and (Ca+2 + Mg+2) 6.42 meq/100 g soil and Just before sowing.

The treatment combination viz., T₁ (N₀, P₀, K₀ kg/ha), T₂ (N₃₀, P₆₀, K₈₀ kg/ha), T₃ (N₃₀, P₆₀, K₈₀ + S₂₀ kg/ha), T₄ (N₃₀, P₆₀, K₈₀ + S₄₀ kg/ha), T₅ (N₃₀, P₆₀, K₈₀ + Fe 10kg/ha T₆ (N₃₀, P₆₀, K₈₀ + Fe @ 100 ppm spray (15, 30, and 45 days after sowing), T₇ (N₃₀, P₆₀, K₈₀ + Fe 10kg/ha+ S₂₀kg/ha) T₈ (N₃₀, P₆₀, K₈₀ + Fe @ 50 ppm spray) T₉ (N₃₀, P₆₀, K₈₀ + S₂₀ kg/ha + Fe @ 100 ppm spray) T₁₀ (N₃₀, P₆₀, K₈₀ + S₂₀ kg/ha + Fe @ 50 ppm spray) T₁₁ (N₃₀, P₆₀, K₈₀ + Fe 10kg/ha) T₁₂ (N₃₀, P₆₀, K₈₀ + S₂₀ kg/ha + Mo @ 50 ppm spray (15, 30 and 45 days after sowing).

Nitrogen, Phosphorus, Potash and Sulphur applied as basal dose through, Urea, DAP, murate of potash and sulphur respectively, whenever micronutrient iron and molybdenum through ferrous

sulphatase and sodium heptamolybdate @ 50,100ppm spraying of crop at fifteen days interval.

Were evaluated in split plot design with three replication. The size of each plot was 5m². The crop was planted in 16 November 2002-2003 to 2003-2004 and recommended Agronomic practices and plant protection measures were followed. The crop was irrigated at active growth stage and pod initiation stage. Observation of fresh pod yield at physiological maturity.

Pea fruits were harvested at breaker stage from each subplot and marketable fruits only weighed for yield determination. In addition to yield and yield contributing traits, the data were also recorded on marketable yield and price fetched by the crop. The costs of cultivations in general (table-1) vis-à-vis net returns and cost: benefit ratios were worked out for all the varieties (table 2).

Table 1a: Effect of graded dose of Sulphur, Iron and Molybdenum along with recommended dose of N.P.K on yield attributes and economics of pea

Treatment.	Cost of cultivation	Yield g/ha		Gross return		Net return		Return/ rupee invested	
		Grain	Fresh	Grain	Fresh	Grain	Fresh	Grain	Fresh
T1	11180	6.5	48.3	32550	33810	21370	22630	1.9	2.1
T2	13648	9.9	68.7	49350	48090	35702	34442	2.6	2.5
T3	14948	10.7	85.3	53685	59710	38737	44762	2.6	3.0
T4	17548	10.8	91.3	54045	63910	36497	46362	2.1	2.6
T5	14548	9.8	80.7	48760	56490	34212	41942	2.4	2.9
T6	14580	9.4	79.8	47130	55860	32550	41280	2.2	2.8
T7	15548	9.9	80.7	49305	56490	33757	40942	2.2	2.6
T8	14220	10.1	84.9	49995	59430	35775	45210	2.5	3.2
T9	15448	10.6	87.7	52985	61390	37537	45942	2.4	3.0
T10	15348	10.9	90.1	54860	63070	39512	47722	2.6	3.1
T11	15848	10.6	93.4	53105	65380	37257	49532	2.4	3.1
T12	14148	11.5	95	57440	66500	43292	52352	3.1	3.6
LSD=0.5		0.92	7.6						

Result and Discussion

Fresh pod and Grain yield

Fresh pod and grain yield was significantly higher as compared to control. Treatment T₁₁, T₉, T₃, T₂ were found significantly superior compared to rest of the treatment at par to recommended dose of NPK. The application of sulphur @ 20 kg/ha and Mo @ 50 ppm on foliar spray along with recommended dose of NPK. Yielded maximum grain and fresh pod yield (1148.8 kg/ha which was 76.3% and 102 q/ha 166.3%) respectively higher yield as compared to control treatment.

Greater availability of nutrients lead to increased assimilation of photosynthates per unit leaf area resulting in more plant vigor, which ultimately gave higher yield. Tripathi and Mishra (1997) [7] Kumawat and Khongarot (2002) [2] Singh *et al* (2002) [4] Prasad and Prasad (2003) [3] Chitdeshwari and Poongothai (2004) [1].

Legumes are known to respond favorable to application of Fe and Mo on yield of pea because Fe and Mo may be influencing the nitrogenase and hydrogenase enzyme activity. The 'Azofer' and Azoferm i.e. Fe and Fe Mo protein constituents, are influenced by the application of Fe&Mo foliar spray along with

S and recommended dose of NPK. Higher nitrogenase activity led by Mo/Fe application enhanced N-Fixation which in turn had positive effect on photosynthetic organs and rate resulted on great increase in yield, (Srivastava and Ahlawat, 1995 Srivastava *et al.* 1998) [5, 6].

Sulphur and molybdenum gave the maximum yield which play a role on synthesis of chlorophyll, active center of some enzyme and affects various metabolic process which ultimately help in growth and development of plants. The synergistic relation between Mo and S also added an edge for higher yield Singh *et al.* (2002) [4].

The maximum net return and cost benefit ratio was found rupees fifty two thousand three hundred fifty two and (1:3.6) respectively under treatment T₁₂ followed by T₁₁ (forty nine five hundred thirty two and cost benefit ratio 1:3.6) in case of fresh pod sailing. Whenever maximum net return and cost benefit ratio forty three thousand nine hundred twenty two and (1:3.1) obtained under treatment T₁₁ in case of dry seed sailing. It may be concluded over all treatment tested found the fresh pod sailing is more profitable compared to grain sailing.

Table 2: Genotypic variation of economics impact

Cultivar	Cost of cultivation	Yield (q/ha)		Gross return		Net return		Return/ rupee invested	
		Grain	Fresh pod	Grain	Fresh pod	Grain	Fresh pod	Grain	Fresh pod
Arkel	13648	8.5	75.9	42290	60720	28642	47072	2.1	3.4
AP-1	13648	11.3	85.2	56500	59640	42852	45952	3.1	3.3
AP-3	13648	9.42	74.9	47095	52430	33447	38790	2.5	2.8
LSD _{0.05}		0.58	7.4						

The grain and fresh pod yield was significantly higher in Azad P-1 followed by Azad P-3 and Arkel. All the three varieties were differ in contrast to flowering, fruiting and seed (yield). Genotype Arkel performance first flowering and fruiting in nature its early maturity fresh pod of vegetable (15-20days before) and its sailing to market for vegetable purpose and obtained more market prize fallowed by AP3 and AP1. Genotype AP1 and AP3 gets more production of grain and fresh pod yield other than Arkel & because late flowering and fruiting in nature then let maturity of fresh pod which is let sailing for vegetable consumption of market for humans beings then obtained poor market prize in comparison to Arkel. Cultivar AP1 more fresh pod and grain yield in comparison to AP3 and provide Arkel. But market prize obtained lower in contrast to Arkel and AP3.

The grain yield was significantly higher AP1 fallowed AP3 and Arkel. Because of grain yield was significantly higher in AP1 level of seed its value significantly higher fallowed by AP3 and Arkel in this place AP1 acquire higher place fallowed by AP3 and Arkel.

Variety Evaluation data indicated significantly lowers Arkel of grain and fresh pod yield compared Azad P-1 and Azad P-3. The maximum net return of rupees and cost benefit ratio of fifty seven thousand two hundred fifty two rupees and cost benefit ratio (1:4.2) evaluated by Arkel at par Azad P3 compared to Azad P1 (1:3.9) in case of fresh pod sailing. Whenever the maximum net return and cost benefit ratio of rupees fourty seven thousand seven hundred sixty seven rupees and cost benefit ratio was realized by (1:3.4C: B ratio) respectively found in Azad P1 followed by Azad P3 (1:2.5) in case of dry seed sailing.

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