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Effect of phosphorus fertilization on yield attributes and yield of table pea (*Pisum sativum* var. hortense) varieties in light textured soil of Western U.P.

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Abstract
A filed experiment was conducted at HRC, SVPUA&T, Meerut to find out effect of phosphorus levels on different varieties of table pea. On the basis of results highest values of yield attributes and pod yield was recorded with 60 kg P_2O_5/ha. Among the different varieties Yield attributes *viz* total number of pods, seeds per pod were influenced significantly with different varieties. The highest values of all these characters were recorded with Pant matar-2 followed by Azad pea-1 and Arkel.

Keywords: Phosphorus fertilization, table pea, Varieties, Yield attributes, Pod yield

Introduction
Vegetable in India considered to become an important component in the diet of Indian people, as majority of them are vegetarian. They are valued for their high carbohydrate, vitamin, mineral and fibre contents. Vegetables make up a significant proportion of the diet of most of the people and the production of vegetables is a significant factor in ensuring that people have an adequate intake of many essential vitamins. Among the legumes vegetables, garden pea (*Pisum sativum* L. var. hortense) in more popular vegetable and it is largely cultivated throughout the world for fresh and processed forms. In India, pea is commercially growth for its green pods in Rabi season in the plains of northern India while in hilly areas it is successfully grown during summer season. India is the highest vegetable pea producing country in the world. The share of peas 2.3% in the total production of vegetables. Among the states of India, Uttar Pradesh ranks first in the production of vegetable pea, which alone produces (61.75%) more than half of the total production of pea. Besides this West Bengal, Bihar and Orissa in North India and Tamil Nadu and Karnataka in South India are the other leading vegetable producing states in the country. In last one decade, there has been considerable progress in enhancing the productivity of vegetables which is presently 17.2 tonnes per hectare. Phosphorus in the source of metabolic energy and it helps in formation of nodules, root development, better nitrogen and carbon fixation, enhancement of yield and quality attributes. Besides above, the phosphorus application in legumes in of great significance on account of its involvement in metabolic processes and enzymatic reactions responsible for growth and development of plant. Many physiological characters such as leaf area index which contribute to yield are directly influenced by phosphorus. It is thus, evident that phosphorus application in directly involved in the nutrition of pulses and controls the growth and yield bearing mechanism (Gill *et al.*, 2000) [2]. Keeping this background in mind present investigation is designed to find out "Effect of phosphorus fertilization on yield attributed and yield of table pea (*Pisum sativum* var. hortense) varieties in light textured soil of Western U.P.

Materials and Methods
The present experiment was carried out at Horticultural Research Centre (HRC) of Sardar Vallabhbhai Patel University of Agriculture and Technology, Meerut (29°4' N, 77°46' E, 237 m above sea level). The soil of experimental site was sandy loam in nature having organic carbon 0.34%, Av Nitrogen 192 kg/ha, Av. Phosphors 16 kg/ha, Av. Potash 208 kg/ha with an pH of 7.3. The experiment was laid out in factorial RBD with three replications. The treatment consisted of three varieties (Pant Matar-1 Azad Pea-1and Arkel) and four levels of phosphorus (0, 30, 60 & 90 kg P_2O_5/ha. Other agronomical operations were followed as per standard recommendation for the crop.

Results and discussion

Effect of Phosphorus

Phosphorus application did not affect the plant height at any of crop stage. Differential response of phosphorus can be attributed to its uptake efficiency and its utilization which is greatly influenced by environmental factors (Abbas *et al* (1994) [1]. It is evident from the data that height increase rapidly with advance age and reached maximum at harvest under all treatments but varieties and phosphorus levels failed to influence the plant height at any stage of growth. Increasing levels of phosphorus from O to 60 kg P_2O_5/ha resulted in significantly increase in branches per plant. The increasing level of phosphorus up to 60 kg P_2O_5/ha significantly increased the branches per plant i.e. 3.5 showing an increased of 37.8 and 23.67 per cent over those of 0 and 30 kg P_2O_5/ha, respectively. phosphorus is important in root development and translocation of photosynthates and being constituent of nuclic acid, phyton and phospholipid its application increases different growth parameters (Srivastava and Ahlawat 1995) [18]. Improved nutrient supply through various phosphorus treatments increased the number of pods per plant significantly over control treatment. The maximum number of pods per plant was recorded under 60 kg P_2O_5/kg and minimum under control treatment. The differences in the number of pods per plant treatments 60kg P_2O_5/ha and 90kg P_2O_5/ha perform significantly greater number of pods as compared to 0kg P_2O_5/ha and 30kg P_2O_5/ha treatments. Treatments 30kg P_2O_5/ha and 90kg P_2O_5/ha were at par with each other, however, they recorded significantly greater number of pods over 0kg P_2O_5/ha treatment which recorded least average number of pods per plant, respectively. The application of Phosphorus up to 90 kg P_2O_5/ha resulted in significant higher total pod weight per plant. However, the difference between 30 and 60 kg P_2O_5/ha were non-significant. The level of 90 kg P_2O_5/ha enhanced the total pod weight by 52.7, 14.5 and 10.9 per cent over 0, 30 and 60 kg P_2O_5/ha, respectively. Different phosphorus levels failed to bring any significant difference in length of pod and weight of grain per pod, however highest length of pod and weight of grains per pod were recorded with 60 and 90 kg P_2O_5/ha. The differences in number of grains per pod among the treatments 60kg P_2O_5/ha and 90 kg P_2O_5/ha were non-significant. The maximum number of grains per pod and the minimum were recorded under 60kg P_2O_5/ha and 0kg P_2O_5/ha, respectively. However, an increased of 62 and 24.8 percent were obtained with 60 kg P_2O_5/ha over 0 kg P_2O_5/ha, and 30 kg P_2O_5/ha, respectively. Phosphorus application significantly increased the pod yield with successive increment in levels from 0 to 60 kg P_2O_5/ha. Further increase in P levels to 90 kg P_2O_5/ha did not show significant effect over 60 kg P_2O_5/ha. The highest pod yield (50.48 q/ha) was recorded with 90 kg P_2O_5/ha which was 95.3, 30.6 and 1.1 percent higher over 0, 30, 60 kg P_2O_5/ha, respectively. The improvement in plant growth by phosphorus application is due to higher photosynthetic activity and translocation of photosynthates to sink, which consequently resulted to better development of yield attributes. The trend observed for yield attributes perpetuated to build up the final outcome in terms of seed yield. Further, the same fertility level also facilitated a greater economic sink capacity as the yield had a highly significant correlation with yield attributes. Same trends o results were also reported by Gupta *et al.,* (2000) [3] and Shukla *et al*., (2006) [7].

Effect of Varieties

Improved plant type play an important role in raising yield potential of a crop. Plant height was not significantly influenced by varieties, however the maximum plant height was attained by Pant matar-2 followed by Azad Pea-1 and Arkel. Non significant differences among the varieties were due to their genetic characteristics. The maximum number of branches per plant was recorded with variety Pant Matar-2 which was significantly superior over Azad Pea-1 and Arkel. Pant Mater-2 showed highest number of branches per plant (3.41) which exhibited an increase of 11.43 and 24.0 per cent over those recorded of Azad Pea-1 and Arkel, respectively. Among the varieties, Pant mater-2 and Arkel maintained significantly greater number of pods per plant as compared to Azad Pea-1.Pant mater-2 registered an increased of 15.36 and 11.96 percent in total number of pods per plant over Azad pea-1 and Arkel, respectively. Different varieties fail to bring any difference in total pod weight, length of pod and weight of grain per pod however highest values of these character was recorded with Pant matar -2. Varietal differences with respect to the number of grains per pod were found to be significant. Tripathi *et al*. (1996) [9] reported that varieties did not differ significantly in pod weight and weight of grain per pod. Arkel recorded significantly lower number of grains per pod than Pant mater-2 (6.35) and Azad Pea-1(6.12). Variety Pant mater-2 was at par with Azad Pea-1 and increased over Arkel were 17.3 and 12.3 per cent with Pant mater-2 and Azad Pea-1, respectively. Among varieties Pant mater-2 registered highest pod yield 45.35 q/ha which was significantly superior over rest of the test varieties. Increase in pod yield with Pant mater-2 was 9.8 and 22.5 per cent higher over Azad Pea-1 and Arkel, respectively. Yield in function of complex inter relationship of its components which are determined from the growth rhythm in vegetative phase and from its subsequent reflection in reproductive phase. Better vegetative growth associated with higher yield attribute resulted in higher pod yield. These findings are in agreement with those of IIPR (2000) [4]. Higher yields with different genotypes were also reported by Kumar *et al*., (1998) [5]; Prasad *et al.,* (1997) [6].

Table 1: Growth, Yield attributes and pod yield as influenced by varieties and phosphorus levels.

Treatment	Plant height (cm) at 60DAS	No. of branches at flowering stage	Total number of Pods	Weight of Pod	Length of Pod	Weight of grain per pod (g)	Number of grain per pod	Pod yield (q/ha)
Varieties								
Pant Matar-2	29.90	3.41	8.21	5.92	5.89	3.79	6.35	45.35
Azad Pea-1	29.69	3.06	7.25	5.74	5.84	3.75	6.12	41.31
Arkel	30.67	2.75	7.44	5.63	5.79	3.66	5.56	37.03
SEM ±	0.85	0.09	0.18	0.18	0.13	0.012	0.12	1.03
C Dat 5%	NS	0.26	0.50	NS	NS	NS	0.33	2.95
Phosphorus levels (P_2O_5 Kg/ha)								
0	28.03	2.54	6.00	5.40	5.55	3.68	3.66	25.85
30	30.39	2.83	7.41	6.87	5.85	3.74	5.75	38.66

60	30.91	3.50	8.25	7.06	5.99	3.72	6.93	49.94
90	31.02	3.41	7.87	7.72	5.96	3.80	6.70	50.48
SEM ±	0.98	0.10	0.20	0.21	0.15	0.014	0.13	3.41
C D at 5%	NS	0.30	0.58	0.60	NS	NS	0.39	9.97

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