Journal of Farm Sciences **1(1)**: 14-18, 2011

Influence of integrated use of inorganic and organic sources of nutrients on growth and production of pea

UDAY SHARMA AND JITENDER KUMAR CHAUHAN*

***Directorate of Extension Education**
Krishi Vigyan Kendra, Chamba
Dr Y S Parmar University of Horticulture and Forestry
Nauni, Solan 173 230 Himachal Pradesh

ABSTRACT

The experiment conducted on pea, taking two levels of chemical fertilizers, farm yard manure and vermicompost, and dual inoculation with biofertilizers in different combinations, revealed that the integrated nutrient management was the best option for the maximum yield and quality produce. The biofertilizers, both Azotobacter and PSB, played a major role in increasing the nutrient availability to the plants, which in turn was reflected through the quality of the produce and yield maximization. The biofertilizers, however, showed better responses when applied in conjunction with the organic manures, since the manures provided a favorable environment for the activity of these micro organisms. Amongst the organic manures tried, the vermicompost proved to be a suitable alternative to the FYM owing to its higher nutrient content and other associated properties.

Key words: Pea, vermicompost, biofertilizers, Azotobacter, PCB.

INTRODUCTION

Garden pea (*Pisum sativum* L) is one of the foremost important versatile legume crop which is highly nutritious due to its important bio-chemical attributes viz protein content, protein quality (having good amount of essential amino acids such as lysine, methionine, leucine etc which are not synthesized by the human body), minerals, oils and sugar content. In North Indian hills, it is the most important off-season vegetable grown both as summer and autumn crop and thereby making the availability of green pods from March onwards till October end when these are not available in the plains. In India, it occupies an area of 313.5 thousand hectares with a production of 25.6 lakh tons, whereas, in Himachal Pradesh pea is grown in an area of 17,400 ha with a production of 2,03,000 metric tons bulk of which is produced during the summer season (Anon 2008).

To raise production on a sustainable basis, increased use of organic manures, biofertilizers, vermicompost,

management of nutrients through inter/ mixed cropping is must both in rainfed and irrigated farming systems. Presently, organic sources of nutrients are preferred to synthetic chemicals but there is apprehension that the adequate quantity of organic material for the purpose may not be available. Therefore, there is a need for standardizing the mixed use of organic and inorganic sources of nutrition in order to increase the productivity and improving the soil health. The nitrogen fixers like pea have also reported increased yield through integrated use of chemical fertilizers and biofertilizers (Rajput and Kushwah 2005).

MATERIAL AND METHODS

The pea crop of variety, Azad P 1 was sown in the month of February 2008 at a distance of 25 x 15 cm. The treatments comprised of 100 and 75 per cent of the recommended doses of NPK in different combinations with FYM, vermicompost and biofertilizers (Azotobacter + PSB), replicated thrice in a randomized block design. The other cultural practices were kept uniform for all the treatments. The observations were recorded on various plant characters viz plant height, root length, pod length, pod weight, number of grains per pod, green pod yield and NPK content. The plant height and pod length were measured with a measuring tape. Root length was taken with a root length scanner, while 20 pods per plant were taken for averaging the observations on pod weight and number of grains per pod. The leaf samples were collected during first bloom and were dried in hot air at 65±5°C for 72 h. Thereafter, for nitrogen samples were digested in sulphuric acid and estimated by Microkjeldahl method. For leaf P and K, the samples were digested in di-acid (Nitric-Perchloric acid). Leaf P was determined by Vanadomolybdate yellow colour method on Spectrophotometer while leaf K in the extract was measured with Flame Photometer. The data for two seasons was pooled for final statistical analysis as per the method suggested by (Gomez and Gomez 1984).

RESULTS AND DISCUSSION

The data on the effect of manures and biofertilizers on peas show that the leaf nitrogen content varied from 1.98 to 2.55 per cent with a mean value of 2.33 per cent. The maximum leaf N was recorded in the treatment combination of recommended doses of fertilizers along with FYM and biofertilizers (T3) (Table 1), whereas, the minimum leaf N of 1.98 per cent was recorded in the pure organic treatment of FYM+vermicompost+biofertilizers. The results show that the maximum value was significantly higher than the other treatments, thus showing a marked response to the application of biofertilizers.

Hundred per cent NPK + vermicompost + biofertilizers (T6) gave a maximum P content of 0.28 per cent which

Table1. Effect of manures and biofertilizers on NPK content, plant growth and productivity in pea

Treatment	Leaf N (%)	Leaf P (%)	Leaf K (%)	Plant height (cm)	Root length (cm)	Pod length (cm)	Pod weight (g)	No. of grains per pod	Green pod yield (q/ha)
T1 (100% NPK) Control	2.18	0.21	1.15	53.73	26.83	7.61	6.32	6.30	114.5
T2 (100% NPK+ FYM)	2.33	0.23	1.39	65.58	30.15	8.25	6.81	7.53	135.2
T3 (100% NPK + FYM+ biofertilizers)	2.55	0.27	1.47	69.22	34.32	8.43	6.93	8.04	169.0
T4 (75% NPK + FYM+ biofertilizers	2.28	0.25	1.35	63.36	32.93	8.04	6.88	7.97	147.1
T5 (100% NPK + vermicompost)	2.38	0.22	1.41	66.76	36.37	8.24	7.09	7.85	141.2
T6 (100% NPK + vermicompost + biofertilizers	2.48	0.28	1.51	72.83	39.46	8.49	7.18	7.86	160.9
T7 (75% NPK + vermicompost + biofertilizers)	2.44	0.26	1.44	64.43	36.75	8.27	6.95	7.93	155.0
T8 (FYM + vermicompost + biofertilizers)	1.98	0.24	1.19	61.89	40.25	8.11	6.62	7.22	103.9
Mean	2.33	0.25	1.36	64.73	34.63	8.18	6.85	7.59	140.9
$CD_{0.05}$	0.02	0.02	NS	2.47	1.65	0.27	0.22	0.23	6.72

was statistically at par with T7 (0.26%) and T3 (0.27%). The increase in leaf P in biofertilizers treatments can be attributed to the solubilization of applied and native P by the PSB. The leaf K content did not show any statistically significant difference although the maximum leaf K content of 1.51 per cent was in 100 per cent NPK + vermicompost + biofertilizers (T6) treatment. The

average plant height of peas was found to be 64.73 cm and T6 (100% NPK + vermicompost + biofertilizers) gave the maximum plant height of 72.83 cm which was statistically significant over all the other treatments. The minimum plant height of 53.73 cm was recorded in T1 (100% NPK treatment alone). The root length ranged from 26.83 to 40.25 cm with the maximum root length being recorded for the organic treatment of FYM + vermicompost + biofertilizers (T7).

The average pod length varied significantly with the application of biofertilizers and the maximum pod length of 8.49 cm was recorded in T6 (100% NPK + Vermicompost + Biofertilizers) that was found statistically at par with other treatments except pure chemical (T1), pure organic (T7) and 75% NPK + FYM + Biofertilizer (T3) treatments. The average pod weight ranged from 6.32- 7.18 g treatment T6 (100% NPK + vermicompost + biofertilizers) recorded maximum pod weight which was at par with T5 (100% NPK + Vermicompost) application. The number of grains per pod were maximum in T3 (100% NPK+FYM+Biofertilizers) treated plots and were found to be at par with all other treatments except the pure chemical (T1) and pure organic (T7) treatments and also the 100% NPK + FYM (T2) treated plants. The green pod yield, the primary objective of cultivation, was found to be markedly affected by the application of manures and biofertilizers. The maximum green pod yield of 169.0 q/ha was recorded in T3 (100% NPK + FYM + biofertilizers), whereas, the minimum yield of 103.9 q/ha was recorded in T7 (FYM + vermicompost + biofertilizers) treated plots.

The results showed that the pure chemical and pure organic treatments could not result in comparable yield and quality. The integrated application of chemical fertilizers in conjunction with manures and biofertilizers was the best option. Amongst the manures, the vermicompost gave better results as compared to the FYM due to better nutrient content of the former. The biofertilizers, in the presence of organic manures resulted in both better quality of the produce and higher yield. Negi et al (2007) reported that under the acid soils of cool temperate regions of Uttaranchal, the effectiveness of the biofertilizers was highest when they were used in conjunction with FYM and chemical fertilizers. The integration of biofertilizers along with chemical fertilizers and FYM not only has a positive effect on the yield attributes of pea, but also in the process leads to the highest net returns (Bhattarai et al 2003).

REFERENCES

Anon 2008. Indian Horticulture Database, 2008.

Bhattarai RK, Singh LN and Singh RKK 2003. Effect of integrated nutrient management on yield attributes and economics of pea (*Pisum sativum*). Indian Journal of Agricultural Sciences **73(4)**: 219-220.

Gomez KA and Gomez AA 1984. Statistical procedure for agricultural research. II edition. John Wiley and Sons, New York, Inc, 680p.

Negi S, Dwivedi GK and Singh RV 2007. Integrated nutrient management through biofertilizers, fertilizers, organic manure and lime for vegetable pea in acid inceptisol of cool temperate region of Uttaranchal. Legume Research **30(1)**: 37-40.

Rajput RL and Kushwah SS 2005. Effect of integrated nutrient management on yield of pea (*Pisum sativum*). Legume Research **28(3)**: 231-232.

Received : 11.4.2010 *Accepted : 9.8.2010*