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The Pharma Innovation

ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2023; 12(7): 839-841

www.thepharmajournal.com
Received: 15-05-2023
Accepted: 27-06-2023

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Effect of foliar application of water soluble fertilizers and micronutrients on economics of cultivation of vegetable pea

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Abstract
The present investigation entitled "Effect of foliar application of water soluble fertilizers and micronutrients on quality parameters of vegetable pea (*Pisum sativum* L.)" was conducted at the Horticultural Research cum Instructional Farm, IGKV, Raipur (C.G.) during the year 2020-21 and 2021-22 in *Rabi* season. The experiment was comprised of with eleven treatments which were laid out in Randomize Block Design with three replications. Economic analysis revealed that the cost of cultivation, gross profit and net profit was recorded maximum under treatment T_{10}: recommended NPK + foliar spray of IIHR micronutrient mixture @0.25% before and after flowering + foliar spray of NPK@ 2% before and after flowering but benefit: cost ratio was recorded maximum in $T_{7:}$ Recommended NPK + Foliar spray of IIHR micronutrient mixture @0.25% before flowering + foliar spray of NPK@ 1% before flowering.

Keywords: foliar, soluble fertilizers, economics, micronutrients, *Pisum sativum* L.

Introduction
Garden pea (*Pisum sativum* L.) is one of the most important pulse crops among the various grain legumes grown in India and second most important legume crop of the world (Pawar *et al.* 2017) [9]. According to Vavilov (1951) [12], it is native to Mediterranean region of Southern Europe & Western Asia; belong to the family Leguminaceae (Sub. family Papilionaceae) is cool season nutritive vegetable crop. This legume contain high percentage of digestible protein (7.2 g), carbohydrates (15.8 g), vitamin A (139 I.U.), vitamin C (9 mg), magnesium (34 mg), phosphorus (139 mg) and essential amino acids per 100 g of edible portion (Gopalan *et al*. 2007) [5]. It can be consumed either fresh, canned, pulse, frozen or in dehydrated forms. This crop and it's by products can also be used as fodder. It is used as green manure as well (Makasheva, 1983) [7].

In world major green pea cultivated countries China, India, United States of America, France, Egypt, Pakistan, Peru, Algeria, United Kingdom Russian and Federation. In India, the pea occupies 575 thousand hectares with production of 5855 thousand tonnes (Anon., 2021a) [1]. Major pea cultivated states is Uttar Pradesh, Jharkhand, Punjab, West Bengal, Haryana, Andhra Pradesh, Bihar, Uttarakhand, Madhya Pradesh, and Himachal Pradesh, where it is grown for both vegetable and pulse purposes and is a highly remunerative crop (Singh *et al*., 2005) [10]. In Chhattisgarh, the area under pea cultivation is 8.68 thousand hectares with production of 117.55 thousand tonnes (Anon., 2021b) [2]. Major pea cultivated district in Chhattisgarh is Rajnandgaon, Sarguja, Surajpur, Korea and Raigarh.

The plant nutrition is one of the most important factors responsible for the proper growth and development of the plants. The imbalanced and inadequate fertilizers use and coupled with low efficiency of chemical fertilizers declined tremendously under intensive cultivation in recent years. Variation in nutrients supply is a natural phenomenon and some of them may be sufficient where others deficient. The methods of nutrient application play an important role in supplying the nutrients to the plants. Soil application is most common method to supply essential nutrients to plants. In this case applied nutrients are absorbed by plant roots but the efficacy of fertilizers applied in soil being low due to various losses and fixations. Foliar nutrition is designed to eliminate the above problems (Chaurasia *et al*., 2005; Fageria *et al*., 2009) [3, 4]. With regard to the historical origin of foliar nutrition or foliar feeding, it has been documented as early as 1844.

Foliar fertilization, recently, has been widely used and accepted as an essential part of crop production like horticultural crops. This method of application has mainly been used where nutrients are required in only small amounts or when a quick plant response to fertilizer is desired (Kolota and Osinska, 1999) [6]. Foliar feeding with macro and micronutrients are more effective in terms of attaining maximum yield and reduction in losses, when plant crops are cultivated in micronutrient deficient soils, they possess low micronutrients content and consequently low bioavailability (Manea *et al*., 2019) [8]. Micronutrients are usually required in minute quantities, nevertheless are vital to the growth of plant. Application of micronutrients is less expensive but can give higher profits than other nutrients (Solanki *et al*., 2010) [11]. So keeping above facts its urgent need to identify the most appropriate combination of foliar feeding macro and micronutrients and its effects to increase yield as well as economic of pea cultivation under conditions of Chhattisgarh for higher production and for commercial applications to the farmers of this region. Hence, looking to the above facts, the present investigation entitled effect of foliar application of water soluble fertilizers and micronutrients on economics of cultivation of vegetable pea is being proposed.

Materials and Method

The present experiment was conducted at Horticultural Research cum Instructional Farm, Indira Gandhi Krishi Vishwavidyalaya, Raipur (Chhattisgarh) during *Rabi* season of year 2020-21 and 2021-22 with vegetable pea cultivar Arkel. The experiment was comprised of 11 treatment combination Recommended dose of NPK fertilizers and foliar application of macro and micro nutrients with one control. These treatments combination with their symbols are given in Table 1. The schedules of different pre and post-sowing cultural operations carried out timely during the crop season. The economic analysis *viz*., gross profit, net profit and b:c ratio were calculated.

Table 1: Treatments combination with their symbols.

S. No.	Symbols	Treatments
1.	T_1	Recommended NPK + Foliar spray of NPK @ 1% before flowering
2.	T_2	Recommended NPK + Foliar spray of NPK @ 2% before flowering
3.	T_3	Recommended NPK + Foliar spray of NPK @ 1% before and after flowering
4.	T_4	Recommended NPK + Foliar spray of NPK @ 2% before and after flowering
5.	T_5	Recommended NPK + Foliar spray of IIHR micronutrient mixture @0.25% before flowering
6.	T_6	Recommended NPK + Foliar spray of IIHR micronutrient mixture @0.25% before and after flowering
7.	T_7	Recommended NPK + Foliar spray of IIHR micronutrient mixture @0.25% before flowering + foliar spray of NPK@ 1% before flowering
8.	T_8	Recommended NPK + Foliar spray of IIHR micronutrient mixture @0.25% before flowering + foliar spray of NPK@ 2% before flowering
9.	T_9	Recommended NPK + Foliar spray of IIHR micronutrient mixture @0.25% before and after flowering + foliar spray of NPK@ 1% before and after flowering
10.	T_{10}	Recommended NPK + Foliar spray of IIHR micronutrient mixture @0.25% before and after flowering + foliar spray of NPK@ 2% before and after flowering
11.	T_{11}	Control (Recommended NPK)

Results and Discussion

The data on cost of cultivation, gross returns, net returns and benefit: cost ratios as influenced by foliar application of water soluble fertilizers and micronutrient in vegetable pea. The economics of vegetable pea cultivation under the present investigation were calculated using the prevailing cost of inputs and market rate of the produce during the respective years are shown in Table 2 (a & b).

1. **Cost of cultivation (Rs ha^{-1}):** The data showed that the cost of cultivation of vegetable pea is maximum under treatment T_{10} (50643. 59 and 51882.45 Rs ha^{-1}) followed by T_8 (43976.89 and 45215.75 Rs ha^{-1}) and T_9 (43976.89 and 45215.75 Rs ha^{-1}) in first year and second year, respectively. However, the cost of cultivation was recorded minimum under control treatment T_{11} (37310.29 and 38549.15 Rs ha^{-1}) in first year and second year, respectively.
2. **Gross profit (Rs ha^{-1}):** The data revealed that the gross profit is highest under treatment T_{10} (196950.00 and 194850.00 Rs ha^{-1}) followed by T_8 (187875.00 and 181275.00 Rs ha^{-1}) and T_9 (184950.00 and 174075.00 Rs ha^{-1}) in first year and second year, respectively. However, the gross profit was recorded lowest under control treatment T_{11} (106800.00 and 93075.00 Rs ha^{-1}) in first year and second year, respectively.
3. **Net profit (Rs ha^{-1}):** The data showed that the net profit is highest under treatment T_{10} (146306.41 and 142967.55 Rs ha^{-1}) followed by T_8 (143898.11 and 136059.25 Rs ha^{-1}) in first year and second year, respectively. However, the net profit was recorded lowest under control treatment T_{11} (69489.71 and 54525.85 Rs ha^{-1}) in first year and second year, respectively.
4. **Benefit: cost ratio:** The data showed that the benefit: cost ratio is maximum under treatment T_7 (3.32 and 3.16) followed by T_8 (3.27 and 3.01) and T_9 (3.21 and 3.01) in first year and second year, respectively. However, the gross profit was recorded minimum under control treatment T_{11} (1.86 and 1.41) in first year and second year, respectively.

Table 2 a): Effect of foliar application of water soluble fertilizers and micronutrients on economics of vegetable pea (during the year 2020-21).

Treatments	Total cost of cultivation (Rs./ha)	Gross profit (Rs./ha)	Net profit (Rs./ha)	B:C Ratio
T_1: Recommended NPK + Foliar spray of NPK @ 1% before flowering	38643.59	121800.00	83156.41	2.15
T_2: Recommended NPK + Foliar spray of NPK @ 2% before flowering	39976.89	141750.00	101773.11	2.55
T_3: Recommended NPK + Foliar spray of NPK @ 1% before and after flowering	39976.89	129300.00	89323.11	2.23
T_4: Recommended NPK + Foliar spray of NPK @ 2% before and after flowering	42643.59	152850.00	110206.41	2.58
T_5: Recommended NPK + Foliar spray of IIHR micronutrient mixture @0.25% before flowering	39310.29	158475.00	119164.71	3.03
T_6: Recommended NPK + Foliar spray of IIHR micronutrient mixture @0.25% before and after flowering	41310.29	169650.00	128339.71	3.11
T_7: Recommended NPK + Foliar spray of IIHR micronutrient mixture @0.25% before flowering + foliar spray of NPK@ 1% before flowering	40643.59	175425.00	134781.41	3.32
T_8: Recommended NPK + Foliar spray of IIHR micronutrient mixture @0.25% before flowering + foliar spray of NPK@ 2% before flowering	43976.89	187875.00	143898.11	3.27
T_9: Recommended NPK + Foliar spray of IIHR micronutrient mixture @0.25% before and after flowering + foliar spray of NPK@ 1% before and after flowering	43976.89	184950.00	140973.11	3.21
T_{10}: Recommended NPK + Foliar spray of IIHR micronutrient mixture @0.25% before and after flowering + foliar spray of NPK@ 2% before and after flowering	50643.59	196950.00	146306.41	2.89
T_{11}: Control (Recommended NPK)	37310.29	106800.00	69489.71	1.86

Table 2 b): Effect of foliar application of water soluble fertilizers and micronutrients on economics of vegetable pea (during the year 2021-22).

Treatments	Total cost of cultivation (Rs./ha)	Gross profit (Rs./ha)	Net profit (Rs./ha)	B:C Ratio
T_1: Recommended NPK + Foliar spray of NPK @ 1% before flowering	39882.45	114000.00	74117.55	1.86
T_2: Recommended NPK + Foliar spray of NPK @ 2% before flowering	41215.75	129750.00	88534.25	2.15
T_3: Recommended NPK + Foliar spray of NPK @ 1% before and after flowering	41215.75	121800.00	80584.25	1.96
T_4: Recommended NPK + Foliar spray of NPK @ 2% before and after flowering	43882.45	126975.00	83092.55	1.89
T_5: Recommended NPK + Foliar spray of IIHR micronutrient mixture @0.25% before flowering	40549.15	138075.00	97525.85	2.41
T_6: Recommended NPK + Foliar spray of IIHR micronutrient mixture @0.25% before and after flowering	42549.15	156300.00	113750.85	2.67
T_7: Recommended NPK + Foliar spray of IIHR micronutrient mixture @0.25% before flowering + foliar spray of NPK@ 1% before flowering	41882.45	174225.00	132342.55	3.16
T_8: Recommended NPK + Foliar spray of IIHR micronutrient mixture @0.25% before flowering + foliar spray of NPK@ 2% before flowering	45215.75	181275.00	136059.25	3.01
T_9: Recommended NPK + Foliar spray of IIHR micronutrient mixture @0.25% before and after flowering + foliar spray of NPK@ 1% before and after flowering	45215.75	174075.00	128859.25	2.85
T_{10}: Recommended NPK + Foliar spray of IIHR micronutrient mixture @0.25% before and after flowering + foliar spray of NPK@ 2% before and after flowering	51882.45	194850.00	142967.55	2.76
T_{11}: Control (Recommended NPK)	38549.15	93075.00	54525.85	1.41

References

1. Anonymous. Horticultural Statistics at a Glance. Horticulture Statistics Division, Department of Agriculture, Co-operation & Farmers Welfare, Ministry of Agriculture and Farmers Welfare, Government of India; c2021a.
2. Anumynous. Department of Horticulture and Farm Forestry, Government of Chhattisgarh; c2021b.
3. Chaurasia SNS, Singh KP, Rai M. Effect of foliar application of water soluble fertilizers on growth, yield and quality of tomato (*Lycopersicon esculentum* L.). Sri Lankan J. Agric. Sci. 2005;42:66-70.
4. Fageria NK. The use of nutrients in crop plants. CRC Press, Boca Raton; c2009.
5. Gopalan C, Rama SBV, Balasubramanian SC. Nutritive Value of Indian Foods. Revised edition. National Institute of Nutrition, Indian Council of Medical Research, Hyderabad, India. 2007, 50.
6. Kolota E, Osinska M. Efficiency of foliar nutrition of field vegetables grown at different nitrogen rates. In International Conference on Environmental Problems Associated with Nitrogen Fertilisation of Field Grown Vegetable Crops. 1999;563:87-91.
7. Makasheva RK. The Pea. Translated from Russian by B.R. Sharma. Oxonian Press, New Delhi, India, 1983, 267.
8. Manea AI, AL-Bayati HJ, AL-Taey DKA. Impact of yeast extract, zinc sulphate and organic fertilizers spraying on potato growth and yield. Res. on Crops. 2019;20(1):95-100.
9. Pawar Y, Verma LR, Verma P, Joshi HN, More SG, Dabhi JS. Influences of integrated use of organic and inorganic sources of nutrients on growth, flowering and yield of garden pea (*Pisum sativum* L.) cv. Bonneville. Legume Research. 2017;40(1):117–124.
10. Singh C, Singh P, Singh R. Modern technique of raising field crops. Ox and Public Co. Pvt. Ltd., New Delhi, India, Second Edition, 2005, 220.
11. Solanki VPS, Singh SP, Singh OV, Singh V. Differential response of vegetable crops to zinc fertilization in alluvial soils. Indian Journal of Agricultural Sciences. 2010;80(12):1054-1057.
12. Vavilov NI. The origin, variation, immunity and breeding of cultivated plants. L.W.W. 1951;72(6):482.