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RESEARCH ARTICLE

EFFECT OF PLANT GROWTH REGULATORS ON ECONOMICS OF GARDEN PEA IN VARANASI CONDITIONS

Rajesh Choudhary[1,2]*, B.K. Singh[1], Yoesh Kumar Sharma[2] and S.K. Jat

[1]*Department of Horticulture, Institute of Agricultural Sciences, B.H.U., Varanasi*
[2] *Department of Horticulture, RARI–Durgapura, SKNAU, Jobner*
[3]*Department of Plant protection CH&F Jhalawar, Agriculture University, Kota*

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Abstract: A field experiment was conducted during winter season 2017-2018 to study the effect of different plant growth regulators (Salicylic acid, NAA and GA3) on economics of garden pea. The plant growth regulators were applied as foliar application at three intervals (30, 45 and 90 DAS). The foliar application of NAA @ 40 ppm observed maximum gross returns (392975.00 Rs/ha), net returns (327580.00 Rs/ha) and benefit cost ratio (5.01:1). These results are conclusive that foliar spraying NAA @ 40 ppm may positively increase economics of garden pea.

Keywords: Garden pea, Plant growth regulators, Salicylic acid, GA3, NAA

INTRODUCTION

Garden pea (*Pisum sativum* var. *hortense* L.) is an important vegetable crop grown for fresh market and canning all over the world. It is contain maximum percentage of digestible protein, minerals and vitamins.

It is grown commercially in the northern Indian plains as a winter crop, and it is a significant off-season vegetable crop in India's northwestern Himalayan region (Sharma et al. 2014). The maximum garden pea produced states in India, Uttar Pradesh, West Bengal, Madhya Pradesh, Bihar and Gujarat. The garden pea is recognized as one of the most significant food sources in the world due to its high levels of digestible protein and carbs (Hussein *et al*., 2006).

Garden pea superrich in proteins (5.4g/100g), carbohydrates (14.5g/100g), fibre (5.1g/100g), sugar (6g/100g), sodium (5g/100m), potassium (242/100g), iron (1.5 mg/100g), vitamin A (36 ug/100 g), vitamin C (40 mg/100 g), zinc (1.2mg/100g) and other minerals.

The plant growth regulators (PGRs) playa important role in the cultivation of garden pea because their low quantity stimulates or quantitatively changes the growth and development to crop.

Gibberellic acid (GA) is a PGR that is considered the most important biologically active regulating plant stem in higher plants. It enhance bolting and flowering by stimulating both cell division and elongation, increasing cell wall extensibility and stimulating cell division and elongation (Verma and Verma 2010).

The application of NAA stimulates cell expansion and proliferation through enhancing DNA synthesis in the cell. The plant's juvenile stage was decreased as a result of increased photosynthesis and respiration, as well as increased CO2 fixation (Murugan *et al*., 2020).

Salicylic acid (SA) is a phenolic reactive compound, messenger or signaling molecule and growth regulator that stimulates plant growth and performance under various stresses. It promotes plants in responding with a variety of stresses by increasing antioxidant capacity and decreasing ROS over production. It also plays an essential role in regulating plant physiology and biochemistry (Choudhary *et al*., 2016).

The aim of this experiment is to find an optimal concentration of PGRs to use as a foliar spray profitability of garden pea.

MATERIALS AND METHODS

The experiment was conducted at Vegetable Research Farm, Institute of Agricultural Sciences, B.H.U., Varanasi (Uttar Pradesh) during the winter season 2017- 2018 , to find out the role of foliar application of Salicylic acid @100,150 and 200ppm, NAA@20,30,and40ppmand GA_3@40, 80 and 120 ppm on garden pea pea plant (*Pisum sativum* L.).

The experimental area is located at 25°31'N latitude and 83°03'E longitude and 123.23 meters above from sea level. The climate of research area is tropical and subtropical with maximum variation in the summer

*Corresponding Author

and winter temperature. The soil of research trail was light sandy loam with pH value of 6.5, available nitrogen (227kgha^{-1}), available phosphorus (19.6kgha-1) and potassium (202kgha^{-1}).The experiment was laid out in randomized block design (RBD) with three replications and 10 treatments combination such as T_1 –distilled water, T_2-Salicylic acid @100ppm,T_3-Salicylic acid@150,T_4-Salicylic acid @200ppm, T_5-NAA @20ppm, T_6-NAA @30ppm, T_7-NAA @40ppm, T_8-GA_3 @40ppm, T_9-GA_3 @80ppm and T_{10}-GA_3 @120 ppmat 30,45 and 90 days after sowing. The seed of the garden pea cultivar Azad pea-3 was purchased from the Indian Institute of Vegetable Research in Varanasi (ICAR-IIVR). Before to planting, the research area was ploughing, well leveled and each plot given the appropriate amount of nutrients. The seed of crop is planted through the dibbling method in well-prepared raised beds (4 X 3 m) at a depth of 4-5 cm and distance between row to row and plant to plant (30X10cm).

The observations were recorded on cost of cultivation, gross return, net return and B: C ratio. The data obtained from various parameters during experiment were analyzed by the method of analysis of variance as described by (Gomez and Gomez, 1984).

RESULTS AND DISCUSSION

The data related to economics have been presented in Fig.1, 2, 3 & 4. The cost of cultivation of garden pea varied from Rs.65180toRs.75980 per ha. The maximum cost of cultivation was observed with treatment T_{10} and minimum at T_1 treatment. The maximum gross return was found Rs. 392975 with treatment T_7 and minimum (Rs.245100) was observed in control. The foliar application of NAA @ 40 ppm recorded maximum net return and B: Cratio (Rs.327580 and 5.01, respectively) followed by treatment T_6 (NAA @ 30 ppm) and T_5 (NAA @ 20 ppm) over control. The increase in the value of gross returns, net returns and benefit cost ratio at T_7 treatment could be attributed to higher yield due to foliar application of optimum amount of plant growth regulators at different intervals.

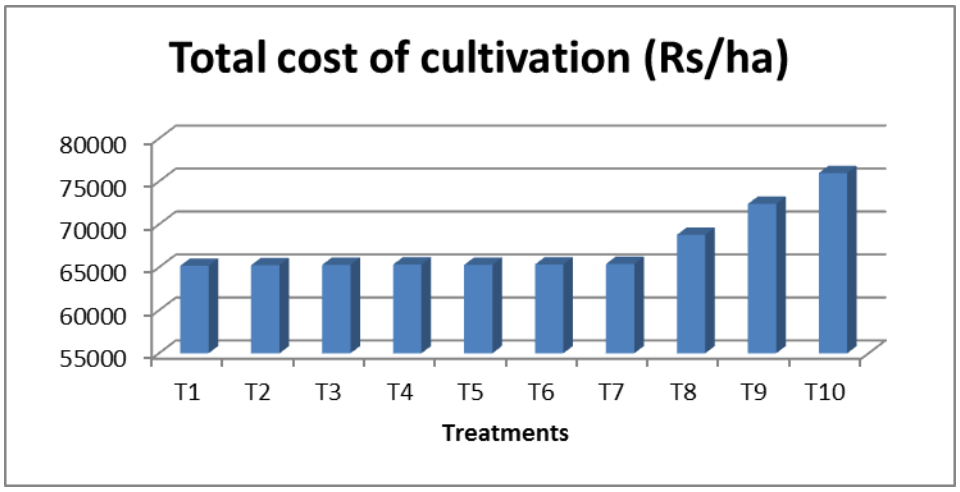

Fig. 1: Effect of plant growth regulators on total cost of cultivation

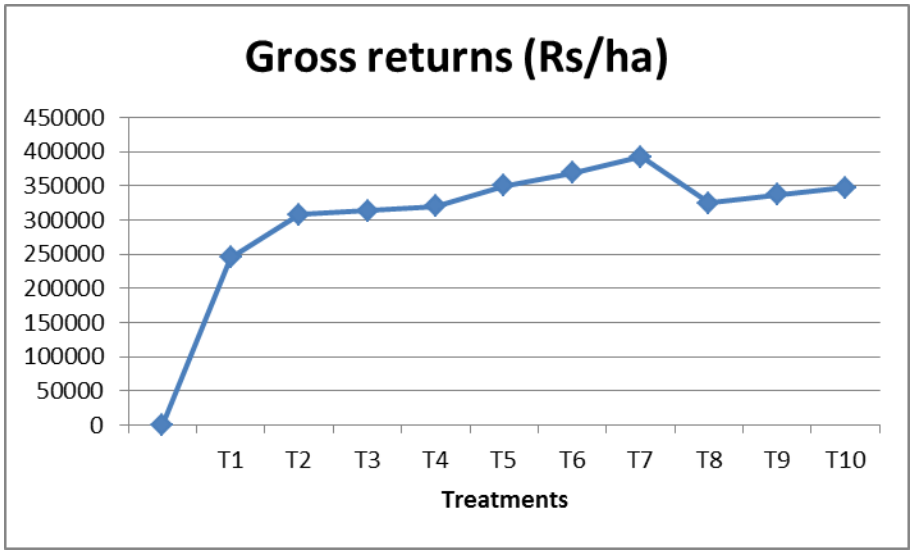

Fig. 2: Effect of plant growth regulators on gross returns

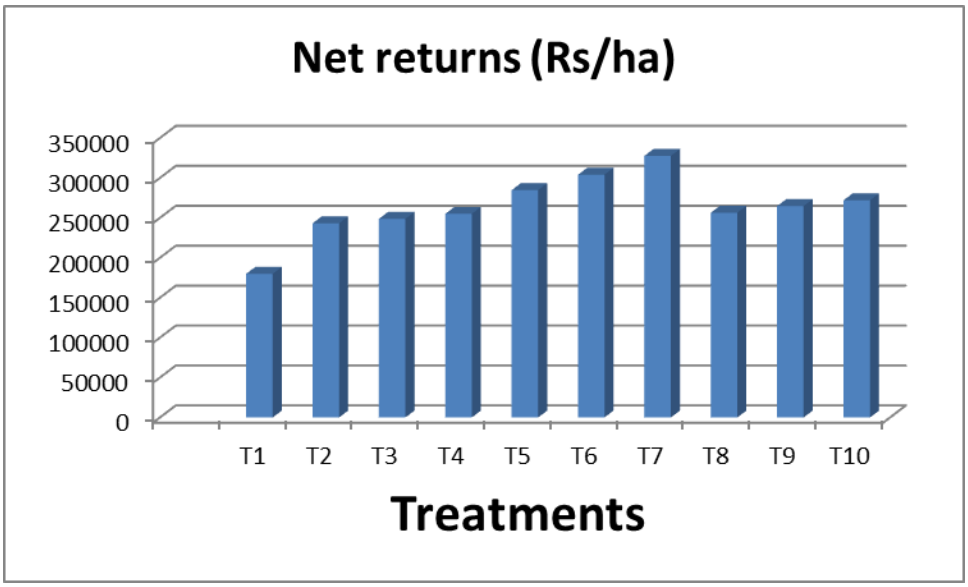

Fig. 3: Effect of plant growth regulators on net returns

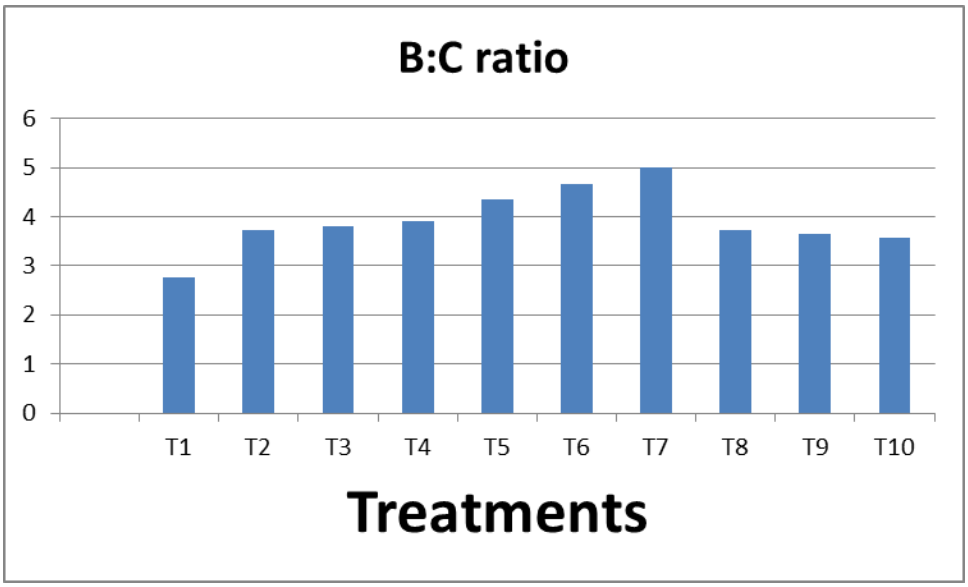

Fig. 4: Effect of plant growth regulators on benefit-cost ratio

CONCLUSION

Based on experiment, it may conclude that application of NAA @ 40 ppm provide improved profit in garden pea.

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