



Comparative Effect of Different Treatments in Field Pea (*Pisum sativum* L.)

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

A field study was conducted to investigate the various treatments that effect on growth and yield of field pea in RBD (Randomized block design) at Sam Higginbottom University of Agriculture Technology and Science, Prayagraj, Uttar Pradesh during march to May in 2020. The trail consists of 13 treatments combinations. The field pea varieties were used were IPF429. The treatments included T₀- control, T₁,T₂,T₃,-Gibberellic acid, T₄,T₅,T₆- Neem leaf extract, T₇,T₈,T₉- ZnSo₄, T₁₀T₁₁T₁₂- Naphthalene acetic acid(NAA). All Ten parameters treated with Ga₃ shows good results in Yield and shows maximum in field emergence, plant height, Days to 50% flowering, Number of pods, Seed yield per plot, Biological Yield and Harvest index. T₀ (Un primed) shows lowest of all treatments. Hence, priming with Gibberellic acid could recommended for pre sowing treatment for field pea.

Keywords: *Neem leaf extract; GA3; NAA; ZnSo4; RBD; field pea.*

1. INTRODUCTION

Field pea is scientifically called as *Pisum sativum* and chromosomal number is (2n=14). Pea is one of the leading vegetable crop in world of the

temperate and sub-tropical areas [1-6]. It is a nutritious protein crop that contain 1.8 g fat, 62.1 g carbohydrates, 22.5 g protein, 4.8 mg of iron. It is grown under sandy loamy soil with pH 5.5 to 6.5.Green peas used as consuming purpose and

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dried peas used as sowing. Uttar Pradesh stand first in field pea production and followed by Punjab in India. It also plays an major role in sustainable farming system due to its fossil energy besides ability to symbiotically fix atmospheric nitrogen [7-12].

In India, Total pulse production is 25.23 M tonnes (2017-18) total area under pea production is 9.01 lakh ha and total production of 8.49 lakh tons were recorded. In India Uttar Pradesh ranked first both in area and production (37.90% and 41.58%) followed by Madhya Pradesh (38.67% and 32.98%) and Jharkhand (3.80% and 4.85%). In case of productivity Rajasthan holds first rank (1867 kg/ha) followed by Punjab (1297 kg/ha) and Jharkhand (1203 kg/ha). The lowest production was observed in Maharashtra (390 kg/ha) followed by Chhattisgarh (437 kg/ha). (Source: Annual statistical report 2016-17). Introduction Page 2 in Uttar Pradesh, Jalaun district contributes highest in terms of area and production by 21% and 29% respectively to the state total area and production of field pea. Again, Lalitpur stands at the second position in the area (18%) and production (19%) share to the state total, followed by Jhansi. Mahoba, Hamirpur, and Azamgarh etc. Pulses are referred to as poor man's meat, as they are major sources of protein and compliment the stable cereals in the diet with essential nutrients. They occupy pivotal position particularly in developing countries like India, where most of the population is vegetarian. Pea belong to the family Leguminosae. They provide 22-24 per cent protein and the seeds are considered easily digestible and the increasing demand of protein rich raw material for animal feed or intermediary product for human nutrition, there is raising interest in these crops as a protein source (Santalla, M. et al., 2001).

Seed treatment act as major role in before sowing by applying various treatments to seed, seed enhance in growth and yield of pea [10-15]. It prevents spread of diseases to plant to plant and protects from seed diseases. It also improves germination rate and protects from storage insect.

2. MATERIALS AND METHODS

The study was conducted during season in the year 2020-2021 at, Department of Genetics and Plant Breeding, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj, Uttar Pradesh (U.P). U.P region contain high humidity in summer and cool in

winter that temperature ranges from 2-7^oc with average rainfall of 1015.5 mm annually. The treatments contain T₀- control, T₁- Gibberellic acid 50ppm for 10hrs, T₂- Gibberellic acid 75ppm for 10hrs, T₃- Gibberellic acid 100ppm for 10hrs, T₄- Neem leaf extract 5% for 8hrs, T₅- Neem leaf extract 5% for 10 hrs, T₆- Neem leaf extract 5% for 12hrs, T₇-ZnSo₄ 3% for 10 hrs, T₈-ZnSo₄ 5% for 10hrs, T₉-ZnSo₄ 7% for 10hrs, T₁₀-Naphthalene acetic acid (NAA) 50 ppm for 10 hrs, T₁₁-Naphthalene acetic acid (NAA) 75 ppm for 10hrs, T₁₂-Naphthalene acetic acid (NAA) 100 ppm for 10 hrs which were factorially laid by randomized block design with three replications. A plot size of 9m² containing 3 rows from each plot. the row-to-row distance is 30cm and plant to plant is 10cm and 3cm depth. The five plants are selected and collected in each plot and used to take data on field emergence, plant height, 50% flowering, number of pods, seed yield, biological yield and harvest index.

3. RESULTS AND DISCUSSION

The results are provided in the below table indicate that the significant effect of various treatments on growth and yield of field pea under various parameters.

3.1 Field Emergence (%)

In among all the treatments the highest was recorded in gibberellic acid with T₃ treatments. In field emergence (%) the highest was recorded in treatment (T₃-GA3 @ 100 ppm for 10hrs) (94.93) and followed by (T₅- Neem leaf extract 5% for 10 hrs) (90.01).The lowest was recorded in control (T₀) (83.01).

3.2 Plant Height 30(cm)

In among all the treatments the highest was recorded in gibberellic acid with T₃ treatments. In plant height the highest was recorded in treatment (T₃-GA3 @ 100 ppm for 10 hrs) (32.1) and followed by (T₅-neem leaf extract 5% for 10hrs) (30.5).The lowest was recorded in control (T₀) (24.4).

3.3 Plant Height 60(cm)

In among all the treatments the highest was recorded in gibberellic acid with T₃ treatments. In plant height the highest was recorded in treatment (T₃-GA3 @ 100 ppm for 10 hrs) (75.2) and followed by (T₅-neem leaf extract 5% for 10hrs) (72.6).The lowest was recorded in control (T₀) (57.9).

Table 1. Mean performance of field pea

S.no	Treatment	Field Emergence percent	Plant height 30 cm	Plant height 60 cm	Days to 50% Flowering	Number of pods	Seed yield	Biological yield	Harvest index
1	T0	83.01	24.4	57.9	48.9	11.4	140.09	258.48	61.02
2	T1	88.35	25.8	66.2	44.1	12.3	448.74	585.52	61.23
3	T2	86.55	28.1	68.1	44.3	13.4	369.16	490.11	65.2
4	T3	94.93	32.1	75.2	39.8	15.5	691.71	811.33	67.76
5	T4	88.34	27.6	68.4	42.4	13.0	462.99	573.33	62.10
6	T5	90.10	30.5	72.6	42.0	14.1	470.41	590.95	65.25
7	T6	86.50	26.4	72.4	42.3	12.8	450.92	581.72	64.26
8	T7	83.98	28.3	70.2	43.0	13.4	347.21	467.54	64.22
9	T8	85.75	27.7	69.1	44.3	12.4	345.95	458.02	61.98
10	T9	87.97	28.5	66.9	45.4	13.3	394.59	499.98	66.57
11	T10	88.90	28.1	71.1	45.2	13.2	398.21	504.38	64.50
12	T11	84.19	28.2	64.6	45.0	13.7	299.41	415.37	61.40
13	T12	86.79	28.6	69.8	45.3	14.7	366.78	490.49	67.66
	Grand Mean	87.33	28.1	68.6	43.9	13.3	398.93	517.48	64.10
	CD@ 5%	3.63	0.9	4.76	3.06	0.63	218.38	217.38	6.24
	SE(m)	1.23	0.3	1.63	1.05	0.21	74.78	74.44	2.13
	SE(d)	1.74	0.4	2.30	1.48	0.30	105.76	105.28	3.02
	CV	2.45	1.9	4.11	4.13	2.80	32.47	24.91	6.24

3.4 Days to 50% Flowering

In among all the treatments the highest was recorded in gibberellic acid with T₃ treatments. In plant height the highest was recorded in treatment (T₃-GA3 @ 100 ppm for 10 hrs) (39.3) and followed by (T₅-neem leaf extract 5% for 10 hrs) (42.0).The lowest was recorded in control (T₀) (48.9).

3.5 Number of Pods

In among all the treatments the highest was recorded in gibberellic acid with T₃ treatments. In plant height the highest was recorded in treatment (T₃-GA3 @ 100 ppm for 10 hrs) (15.5) and followed by (T₅-neem leaf extract 5% for 10 hrs) (14.1).The lowest was recorded in control (T₀) (11.4).

3.6 Seed Yield

In among all the treatments the highest was recorded in gibberellic acid with T₃ treatments. In plant height the highest was recorded in treatment (T₃-GA3 @ 100 ppm for 10hrs) (691.71) and followed by (T₅-neem leaf extract 5% for 10hrs) (470.41). The lowest was recorded in control (T₀) (140.09).

3.7 Biological Yield

In among all the treatments the highest was recorded in gibberellic acid with T₃ treatments. In plant height the highest was recorded in treatment (T₃-GA3 @ 100 ppm for 10hrs) (811.33) and followed by (T₅-neem leaf extract 5% for 10hrs) (590.95).The lowest was recorded in control (T₀) (258.48).

3.8 Harvest Index

In among all the treatments the highest was recorded in gibberellic acid with T₃ treatments. In plant height the highest was recorded in treatment (T₃-GA3 @ 100 ppm for 10 hrs) (67.76) and followed by (T₅-neem leaf extract 5% for 10 hrs) (65.25).The lowest was recorded in control (T₀) (61.02).

4. CONCLUSION

On the basis of field trail conducted that we found that seed treatment with the application of T₃- GA3 @ 100ppm for 10 hrs was identified as best treatment in field conditions among all treatments and followed by T₅ neem leaf extract

for 5% 10hrs. whereas control (T₀) seeds showed lowest readings among all parameters in field pea Finally we concluded that not only GA3 showed good result but also neem leaf extract showed best result on growth and yield parameters. If we implement Ga3 and neem leaf extract it gives good results in field conditions as well as in lab conditions and it is also eco-friendly to use.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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