

Original Research Article

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## Effect of Foliar Application of Acetyl Salicylic Acid and Ascorbic Acid on Yield and Yield Attributes of Garden Pea (*Pisum sativum* L.) cv. Bonneville

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### ABSTRACT

#### Keywords

Acetyl Salicylic Acid, Ascorbic Acid, Garden pea, Yield, Yield attributes.

#### Article Info

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The present investigation was carried out at Horticulture Instructional Farm, CP College of Agriculture, SD Agricultural University, Sardarkrushinagar, Gujarat to find out the effect of foliar application of acetyl salicylic acid and ascorbic acid on growth and yield of garden pea (*Pisum sativum* L.) cv. Bonneville. Plants were sprayed with treatments viz. control, NAA (25 and 50 ppm), GA<sub>3</sub> (50 and 100 ppm), 2, 4-D (5 and 10 ppm), acetyl salicylic acid (100 ppm and 200 ppm), ascorbic acid (100 and 200 ppm) at 30 days after sowing. The results revealed that the antioxidant acetyl salicylic acid 200 ppm effectively increased the number of pods, weight of pods, number of grains per pod and length of pod whereas ascorbic acid 200 ppm has given best results for thickness of pod, test weight, yield per plot and yield per hectare.

### Introduction

The growing of vegetable is the most intensive, profitable and most remunerative and also may be adopted with small holders with profitable and gaining business. Apart from this, vegetables have an excellent dietary value and may be known as protective foods as they contain nutrients and play important role during physiology of human digestion. India is a thickly populated country and most of the residents of this country are vegetarian. The population being increased without check is the main handicap in our progress, with the results of that food shortage, malnutrition and poverty occurs. The solution for control of these problems partly may be only the major

source of adoption of intensive cultivation of vegetable crops. Several kinds of vegetables are grown in India, out of them vegetable pea is one of the most important leguminous vegetable, having much more protein than others vegetables. Amongst pulse crops, Pea (*Pisum sativum* L.) is a popular pulse crop with vernacular name 'Matar'. It belongs to the family Leguminosae. It is second important food legume of the world. Pea is native of South West Asia and is widely grown in temperate countries. Pea is highly nutritive containing high percentage of digestible protein along with carbohydrates (15.8 g), Vitamin A (139 I.U.), Vitamin C (9

mg), magnesium (34 mg) and phosphorus (139 mg) per 100 g of edible portion.

To see the malnutrition and protein deficient diet and low yield of pea, it is necessary to increase pea production per unit area to meet the requirement of increasing population of our nation. Besides, good agronomic practices like growing high yielding varieties, providing proper spacing, irrigation, use of fertilizers, optimum sowing time and some advanced crop improvement techniques like application of antioxidants and appropriate plant protection measures ought to be essentially followed in order to increase the productivity.

Increasing the production of peas green pods and dry seeds with high quality could be achieved through using the foliar application of antioxidants, i.e. Ascorbic Acid (AA), Salicylic Acid (SA). Ascorbic acid as an abundant component of plants functions as an antioxidant and an enzyme cofactor. It participates in a variety of processes including photosynthesis, cell wall growth and cell expansion, resistance to environmental stresses and synthesis of ethylene, gibberellins, anthocyanine and hydroxyl proline. SA is assigned diverse regulatory roles in the metabolism of plants. SA has direct involvement in plant growth, thermogenesis, flower induction and uptake of ions. It affects ethylene biosynthesis, stomatal movement and also reverses the effects of ABA on leaf abscission. Enhancement of the level of chlorophyll, photosynthetic rate and modifying the activity of some of the important enzymes are other roles assigned to SA.

## **Materials and Methods**

The present investigation were executed at Horticulture Instructional Farm, CP College of Agriculture, Sardarkrushinagar Dantiwada

Agricultural University, Sardarkrushinagar, Gujarat during the year 2013 with eleven treatments *viz.* NAA (25 and 50 ppm), GA<sub>3</sub> (50 and 100 ppm), 2, 4-D (5 and 10 ppm) and antioxidants acetyl salicylic acid (100 and 200 ppm) and ascorbic acid (100 and 200 ppm) along with control (water) sprayed after 30 days after sowing of pea variety Bonneville. The experiment was laid out in a randomized block design with four replications. To raise the crop recommended package of practices was followed.

The crop was sown in November 2013 during Rabi season. The effect of different treatments was studied and data recorded on yield and yield attributes of the crop on ten randomly selected plants. The mean data were subjected to statistical analysis following analysis of variance technique (Nigam and Gupta 1979).

## **Results and Discussion**

### **Number of pods per plant**

Maximum number of pods per plant (5.82) was recorded with the treatment application of acetyl salicylic acid 200 ppm and was found to be superior over ascorbic acid concentrations. Minimum number of pods per plant was recorded with the treatment application of control. The results have been given in the table 1.

Similar results were also reported by Akram (2007) in broad bean, Amal and Amira (2007) in common bean, Amal and Amira (2009) in pea.

### **Weight of pods per plant (g)**

Among the various concentrations of the ascorbic acid and acetyl salicylic acid studied maximum weight of pods per plant (34.95 g) was recorded with the treatment applications of acetyl salicylic acid 200 ppm and was

found to be superior over ascorbic acid concentrations. Minimum weight of pods per plant was recorded with the treatment application of control. The results have been given in the table 3.

Similar results were also reported by Akram (2007) in broad bean, Amal and Amira (2007) in common bean, Amal and Amira (2009) in pea. Anitha *et al.*, (1999) in pea, Azooz *et al.*, (2011) in broad bean, Nour *et al.*, (2012) in broad bean.

### Yield/Plot (kg)

Maximum yield per plot (2.024 kg) was recorded with the treatment application of ascorbic acid 200 ppm and was found to be superior over acetyl salicylic acid concentrations. Minimum yield per plot was recorded with the treatment application of control. The results have been given in the table 3. Similar results were also reported by Akram (2007) in broad bean, Amal and Amira (2007) in common bean, Amal and Amira (2009) in pea. Anitha *et al.*, (1999) in pea, Azooz *et al.*, (2011) in broad bean, Nour *et al.*, (2012) in broad bean.

### Yield/Hectare (q)

Maximum yield per hectare (86.49 q) was recorded with the treatment application of ascorbic acid 200 ppm and was found to be superior over acetyl salicylic acid concentrations. Minimum yield per plot was recorded with the treatment application of control. The results have been given in the table 3. Similar results were also reported by Akram (2007) in broad bean, Amal and Amira (2007) in common bean, Amal and Amira (2009) in pea. Anitha *et al.*, (1999) in pea, Azooz *et al.*, (2011) in broad bean, Nour *et al.*, (2012) in broad bean.

### Number of grains per pod

Maximum number of grains per pod (7.65) was recorded with the treatment application of acetyl salicylic acid 200 ppm and was found to be superior over ascorbic acid concentrations. Minimum number of grains per pod was recorded with the treatment application of control. The results have been given in the table 2.

**Table.1** Effect of foliar application of Acetyl Salicylic Acid and Ascorbic Acid on number of pods per plant, weight of pods per plant, yield per plot and yield per hectare of garden pea (*Pisum sativum* L.) cv. Bonneville

Treatments	Number of pods/plant	Weight of pods/plant (g)	Yield / Plot (kg)	Yield / Hectare (q)
Control	5.05	29.50	1.715	73.29
NAA 25 ppm	5.27	31.45	1.855	79.27
NAA 50 ppm	5.30	31.65	1.865	79.70
GA <sub>3</sub> 50 ppm	5.35	33.33	2.031	86.79
GA <sub>3</sub> 100 ppm	5.67	34.92	2.094	89.48
2,4-D 5 ppm	7.00	43.12	2.668	114.01
2,4-D 10 ppm	5.32	32.47	1.922	82.13
Acetyl Salicylic acid 100 ppm	5.40	32.40	1.918	81.96
Acetyl Salicylic acid 200 ppm	5.82	34.95	1.971	84.23
Ascorbic acid 100 ppm	5.60	34.07	1.982	84.70
Ascorbic acid 200 ppm	5.70	34.15	2.024	86.49
S.Em. $\pm$	0.17	1.19	0.06	2.82
CD at 5 %	0.50	3.44	0.19	8.17

**Table.2** Effect of foliar application of Acetyl Salicylic Acid and Ascorbic Acid on number of grains per pod, length of pod, thickness of pod and test weight of garden pea (*Pisum sativum* L.) cv. Bonneville

Treatments	Number of grains/pod	Length of pod (cm)	Thickness of pod (mm)	Test weight (g)
Control	7.11	7.78	10.31	142.25
NAA 25 ppm	7.31	8.07	10.42	145.50
NAA 50 ppm	7.37	8.12	10.55	146.75
GA <sub>3</sub> 50 ppm	7.76	8.39	10.85	148.00
GA <sub>3</sub> 100 ppm	7.92	8.48	10.91	149.50
2,4-D 5 ppm	7.28	8.12	10.54	149.75
2,4-D 10 ppm	7.25	8.03	10.46	149.25
Acetyl Salicylic acid 100 ppm	7.50	8.12	10.50	145.75
Acetyl Salicylic acid 200 ppm	7.65	8.31	10.53	146.50
Ascorbic acid 100 ppm	7.55	8.15	10.61	145.75
Ascorbic acid 200 ppm	7.63	8.17	10.63	147.25
S.Em. $\pm$	0.11	0.11	0.16	2.45
CD at 5 %	0.33	0.34	0.48	7.10

Similar results were also reported by Akram (2007) in broad bean, Amal and Amira (2007) in common bean, Amal and Amira (2009) in pea.

### Length of pod (cm)

Among the various concentrations of the ascorbic acid and acetyl salicylic acid studied maximum length of pod was recorded with (8.31 cm) was recorded with the treatment applications of acetyl salicylic acid 200 ppm and was found to be superior over ascorbic acid concentrations. Minimum length of pod was recorded with the treatment application of control. The results have been given in the table 2. Similar results were also reported by Akram (2007) in broad bean, Amal and Amira (2007) in common bean, Amal and Amira (2009) in pea. Anitha *et al.*, (1999) in pea, Azooz *et al.*, (2011) in broad bean, Nour *et al.*, (2012) in broad bean.

### Thickness of pod (mm)

Maximum thickness of pod (10.63 mm) was recorded with the treatment application of ascorbic acid 200 ppm and was found to be

superior over acetyl salicylic acid concentrations. Minimum thickness of pod was recorded with the treatment application of control. The results have been given in the table 2.

Similar results were also reported by Akram (2007) in broad bean, Amal and Amira (2007) in common bean, Amal and Amira (2009) in pea.

### Test weight based on 100 seeds

Among the various concentrations of the ascorbic acid and acetyl salicylic acid studied maximum test weight based on 100 seeds (147.25 g) was recorded with the treatment applications of ascorbic acid 200 ppm and was found to be superior over acetyl salicylic acid concentrations. Minimum test weight was recorded with the treatment application of control. The results have been given in the table 2.

Similar results were also reported by Akram (2007) in broad bean, Amal and Amira (2007) in common bean, Amal and Amira (2009) in pea. Anitha *et al.*, (1999) in pea, Azooz *et al.*,

(2011) in broad bean, Nour *et al.*, (2012) in broad bean.

From the investigations it can be concluded that the antioxidant acetyl salicylic acid 200 ppm effectively increased the number of pods, weight of pods, number of grains per pod and length of pod whereas ascorbic acid 200 ppm has given best results for thickness of pod, test weight, yield per plot and yield per hectare.

## References

- Akram, A. A. (2007). Protection of broad beans in KSA against adverse effects of ambient ozone using ascorbic acid on growth and yield characteristics. *Proceeding of the second scientific environmental conferr*, Zagazig Uni., 143-152.
- Amal M. El-Shraiy and Amira M. H. (2007). Impact of salicylic acid and paclobutrazol exogenous application on the growth, yield and nodule formation of common bean. *Australian Journal of Basic and Applied Sciences*, 1(4): 834-840
- Amal M. El-Shraiy and Amira, M. H. (2009). Effect of Acetylsalicylic Acid, Indole-3-Butyric Acid and Gibberellic Acid on Plant Growth and Yield of Pea (*Pisum Sativum* L.). *Australian J. Basic and Applied Sci.*, 3(4): 3514-3523.
- Anita, G., Pramod, k., Bhatt, I. C., Dube, S. D. and Chauhan, V. S. (1999). Effect of environmental conditions, salicylic acid and phytohormones on pea leaf blight. *Indian Phytopath*, 52 (3): 270-273.
- Azooz, M. M., Youssef, A. M. and Ahmad, P. (2011). Evaluation of salicylic acid application on growth, osmotic solutes and antioxidant enzyme activities on broad bean seedlings grown under diluted sea water. *International journal of plant physiology and biochemistry*, 3(14), pp. 253-264.
- El-Hak, S. H. G., Ahmed, A. M. and Moustafa, Y. M. M. (2012). Effect of foliar application with two antioxidants and humic acid on growth, yield and yield components of peas (*Pisum sativum* L.). *Journal of horticultural science & ornamental plants*, 4(3): 318-328.
- Mirvat, E. G., Hala, M. S. and Amany, A. R. (2005). Effect of antioxidants on growth, yield and favism causative agents in seeds of *Vicia faba* L. plants grown under reclaimed sandy soil. *Journal of agronomy*, 4(4): 281-287.
- Nigam, A. K. and Gupta, V. K. (1979). Handbook on Analysis of Agricultural Experiments. 1<sup>st</sup> edition, I.A.S.R.I. Publications, New Delhi.
- Nour, K. A. M., Mansour, N. T. S. and Eisa, G. S. A. (2012). Effect of some antioxidants on some physiological and anatomical characters of snap bean plants under sandy soil conditions. *New York Science Journal*, 5(5):1- 9.

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