

Original Research Article

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

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ABSTRACT

Keywords

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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), GA₃ (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 vine length of pea at 45 and 60 days after sowing, length of internode and number of nodes at last picking, weight of pods per plant whereas ascorbic acid 200 ppm has given best results for yield per plot and yield per hectare.

Introduction

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), GA₃ (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 vine length, length of internodes, number of nodes, weight of pods, yield per plot and yield per hectare 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

Vine length at 30, 45 and 60 DAS (cm)

Among the various concentrations of the ascorbic acid and acetyl salicylic acid studied maximum vine length (49.36 cm and 74.71 cm) was recorded with the treatment applications of acetyl salicylic acid 200 ppm and ascorbic acid 200 ppm respectively whereas at 30 days the data recorded was found to be non-significant. Minimum vine length was recorded with the treatment application of control at 45 and 60 days. 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.

Length of internode at 30 days and at last harvesting (cm)

Maximum length of internode at last harvesting (5.24 cm) was recorded with the treatment application of acetyl salicylic acid 200 ppm and was found to be superior over ascorbic acid concentrations. Minimum length of internode was recorded with the treatment application of control. The length of internode at 30 days after sowing was found to be non-significant. 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.

Number of Nodes at 30 days and at last harvesting

Maximum number of nodes at last harvesting (21.67) 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 nodes was recorded with the treatment application of control. The number of nodes at 30 days after sowing was found to be non-significant. 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.

Weight of pods per plant

Among the various concentrations of the ascorbic acid and acetyl salicylic acid studied maximum weight of pods per plant was recorded with (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.

Table.1 Effect of foliar application of acetyl salicylic acid and ascorbic acid on vine length of garden pea (*Pisum sativum* L.) cv. Bonneville at 30, 45 and 60 DAS

Treatments	Vine Length (cm)		
	30 Days	45 Days	60 Days
Control	22.48	45.74	71.05
NAA 25 ppm	22.88	48.23	74.16
NAA 50 ppm	22.91	48.28	76.48
GA ₃ 50 ppm	22.23	55.73	87.07
GA ₃ 100 ppm	22.29	58.36	88.41
2,4-D 5 ppm	22.77	47.46	73.82
2,4-D 10 ppm	22.50	46.03	73.31
Acetyl Salicylic acid 100 ppm	22.78	45.89	71.73
Acetyl Salicylic acid 200 ppm	22.95	49.36	73.79
Ascorbic acid 100 ppm	22.61	45.83	72.03
Ascorbic acid 200 ppm	22.80	47.42	74.71
S.Em. ±	0.38	0.69	1.22
CD at 5 %	NS	2.00	3.55

Table.2 Effect of foliar application of acetyl salicylic acid and ascorbic acid on length of internodes and number of nodes of garden pea (*Pisum sativum* L.) cv. Bonneville at 30 days and last harvesting

Treatments	Length of Internode (cm)		Number of Nodes	
	30 Days	Last Harvesting	30 Days	Last Harvesting
Control	2.83	4.57	9.32	20.42
NAA 25 ppm	2.86	4.72	9.40	20.50
NAA 50 ppm	2.87	4.90	9.37	20.67
GA ₃ 50 ppm	2.89	5.51	9.67	21.95
GA ₃ 100 ppm	2.87	5.54	9.55	23.10
2,4-D 5 ppm	2.85	4.81	9.70	21.05
2,4-D 10 ppm	2.84	4.61	9.65	20.49
Acetyl Salicylic acid 100 ppm	2.89	4.99	9.40	21.27
Acetyl Salicylic acid 200 ppm	2.89	5.24	8.95	21.67
Ascorbic acid 100 ppm	2.87	4.77	8.92	20.47
Ascorbic acid 200 ppm	2.85	4.88	9.05	20.90
S.Em. ±	0.06	0.13	0.14	0.37
CD at 5 %	NS	0.39	NS	1.08

Table.3 Effect of foliar application of acetyl salicylic acid and ascorbic acid on weight of pods per plant, yield per plot and yield per hectare of garden pea (*Pisum sativum* L.) cv. Bonneville at 30 days and last harvesting

Treatments	Weight of pods (g)	Yield / Plot (kg)	Yield / Hectare (q)
Control	29.50	1.715	73.29
NAA 25 ppm	31.45	1.855	79.27
NAA 50 ppm	31.65	1.865	79.70
GA ₃ 50 ppm	33.33	2.031	86.79
GA ₃ 100 ppm	34.92	2.094	89.48
2,4-D 5 ppm	43.12	2.668	114.01
2,4-D 10 ppm	32.47	1.922	82.13
Acetyl Salicylic acid 100 ppm	32.40	1.918	81.96
Acetyl Salicylic acid 200 ppm	34.95	1.971	84.23
Ascorbic acid 100 ppm	34.07	1.982	84.70
Ascorbic acid 200 ppm	34.15	2.024	86.49
S.Em. ±	1.19	0.06	2.82
CD at 5 %	3.44	0.19	8.17

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.

From the investigations it can be concluded that the antioxidant acetyl salicylic acid 200 ppm effectively increased the vine length of

pea at 45 and 60 days after sowing, length of internode and number of nodes at last picking, weight of pods per plant whereas ascorbic acid 200 ppm has given best results for yield per plot and yield per hectare.

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