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

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A B S T R A C T

A field study was conducted at Horticulture Instructional Farm, CP College of Agriculture, SD Agricultural University, Sardarkrushi nagar, 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_3 (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 effective for minimum days taken for flowering whereas ascorbic acid 200 ppm has given best results for total number of pickings, minimum days taken for first picking, minimum days taken for last picking, yield per plot and yield per hectare.

Introduction

Amongst pulse crops, Pea *(Pisum sativum* L.) is a popular pulse crop with vernacular name '*Matar*'. It belongs to the family Leguminoceae. It is second important food legume of the world. Pea is native of South West Asia and is widely grown in temperate countries. 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. 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_3 (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 flowering, pickings and yield 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

Days taken for flowering

Among the various concentrations of the ascorbic acid and acetyl salicylic acid studied minimum days taken for flowering (51.35 days) was recorded with the treatment applications of acetyl salicylic acid 200 ppm. Maximum days taken for flowering were recorded with the treatment application of control. The results have been given in the table 1.

Similar results were also reported by Tarchevsky *et al.,* (2011) in pea, Tomader and Rahman (2005) in cowpea, Akram (2007) in broad bean, Amal and Amira (2007) in common bean, Amal and Amira (2009) in pea.

Total number of pickings

Maximum total number of pickings (3.50) was recorded with the treatment application of ascorbic acid 200 ppm and was found to be superior over acetyl salicylic acid concentrations. Minimum total number of pickings 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, Tomader and Rahman (2005) in cowpea.

Days taken for first picking

Minimum days taken for first picking (92.00 days) was recorded with the treatment application of ascorbic acid 200 ppm and was found to be superior over acetyl salicylic acid concentrations. Maximum days taken for first picking were 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.

Days taken for last picking

Minimum days taken for last picking (115.75 days) was recorded with the treatment application of ascorbic acid 200 ppm and was found to be superior over acetyl salicylic acid concentrations. Maximum days taken for last picking were 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 days taken for flowering and total number of pickings of garden pea (*Pisum sativum* L.) cv. Bonneville at 30, 45 and 60 DAS

Treatments	Days taken for Flowering	Total Number of pickings
Control	52.75	2.50
NAA 25 ppm	52.27	2.75
NAA 50 ppm	51.92	3.25
GA_3 50 ppm	49.62	3.00
GA_3 100 ppm	48.97	3.25
2,4-D 5 ppm	50.75	3.25
2,4-D 10 ppm	51.62	3.00
Acetyl Salicylic acid 100 ppm	51.47	2.75
Acetyl Salicylic acid 200 ppm	51.35	3.00
Ascorbic acid 100 ppm	52.42	3.25
Ascorbic acid 200 ppm	51.55	3.50
S.Em. $\pm$	1.04	0.10
CD at 5 %	3.02	NS

Table.2 Effect of foliar application of Acetyl Salicylic Acid and Ascorbic Acid on days taken for first picking and days taken for last picking of garden pea (*Pisum sativum* L.) cv. Bonneville at 30 days and last harvesting

Treatments	Days taken for First Picking	Days taken for Last Picking
Control	105.50	119.00
NAA 25 ppm	101.75	117.75
NAA 50 ppm	100.25	116.75
GA_3 50 ppm	98.00	117.50
GA_3 100 ppm	97.00	117.50
2,4-D 5 ppm	95.50	117.50
2,4-D 10 ppm	101.75	117.50
Acetyl Salicylic acid 100 ppm	102.75	118.75
Acetyl Salicylic acid 200 ppm	100.75	117.50
Ascorbic acid 100 ppm	101.50	116.75
Ascorbic acid 200 ppm	92.00	115.75
S.Em. $\pm$	1.90	1.95
CD at 5 %	NS	NS

Table.3 Effect of foliar application of Acetyl Salicylic Acid and Ascorbic Acid on yield per plot and yield per hectare of garden pea (*Pisum sativum* L.) cv. Bonneville

Treatments	Yield / Plot (kg)	Yield / Hectare (q)
Control	1.715	73.29
NAA 25 ppm	1.855	79.27
NAA 50 ppm	1.865	79.70
GA_3 50 ppm	2.031	86.79
GA_3 100 ppm	2.094	89.48
2,4-D 5 ppm	2.668	114.01
2,4-D 10 ppm	1.922	82.13
Acetyl Salicylic acid 100 ppm	1.918	81.96
Acetyl Salicylic acid 200 ppm	1.971	84.23
Ascorbic acid 100 ppm	1.982	84.70
Ascorbic acid 200 ppm	2.024	86.49
S.Em. $\pm$	0.06	2.82
CD at 5 %	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.

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 effective for minimum days taken for flowering whereas ascorbic acid 200 ppm has given best results for total number of pickings, minimum days taken for first picking, minimum days taken for last picking, yield per plot and yield per hectare.

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