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Influence of plant elicitors on PRSV incidence and yield of Papaya (*Carica papaya* L.) cv. Red Lady

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Abstract
The experiment was carried out at Horticultural Research Station, Anantharajupeta, Annamayya district, A.P with the application plant elicitors like salicylic acid with different concentrations (50 ppm, 100 ppm and 150 ppm) and jasmonic acid with different concentrations (50 µM, 100 µM and 150 µM) sprayed one time at 45 Days After planting and two times at 45&120 Days After Planting and control (no spray). From this, it was recorded that the lowest per cent disease index (PDI) values with increasing concentration of salicylic acid and jasmonic acid applied twice enhanced the tolerance in plants to PRSV upto 240 DAT. Treatment with salicylic acid @ 50, 100, 150 ppm applied twice and treatment with jasmonic acid @ 50, 100, 150 µM applied twice imparted higher tolerance to PRSV with lowest PDI values over control in both the years 15-16 and 16-17 and in pooled mean upto 240 DAT and the above treatments are statistically comparable with each other. Whereas 100 per cent disease incidence was registered in control in both the years at 240 DAT. Significantly more number of fruits per plant was recorded in T_8 (S.A @ 100 ppm at 45 DAT and 120 DAT) (60.37) which was on a par with T_9 (S.A @ 150 ppm at 45 DAT and 120 DAT) (59.29) and T_7 (57.94).Whereas,T_9 recorded highest yield per hectare (116.06 tons ha^{-1}) which was comparable with T_8 (114.83 tons ha^{-1})and control (T_{13}) recorded the lowest yield per hectare (77.85 tons ha^{-1}).

Keywords: PRSV, salicylic acid, jasmonic acid, elicitors, papaya

Introduction
Papaya (*Carica papaya* L.) belongs to the family Caricaceae. In India, in an area of 1,36,100 ha papaya is grown with production and productivity of 6.10 million MT and 44.9 tha^{-1}respectively (Indiastat, 2016-17) [10]. As papaya has high yield potential and attractive market prices, the area is on continuously raising. Butt Here are lot of production problems *viz* mealybug infestation, fungal diseases, ring spot virus (PRSV) and leaf curl virus. Among these the major threat to its production is papaya ring spot virus (PRSV) which was reported first in1995 (Byadgi *et al.,* 1995) [2] from south India. The productivity of papaya can be enhanced by 50 percent by control of the ring spot virus (Shikamany, 2004) [17]. Conventional breeding for production of resistance lines is very difficult as resistance to this virus does not exist in *Carica papaya* (Cook and Zettler, 1970; Wang *et al.* 1978) [7, 20]. In Hawaii, transgenic cultivars like 'UHR ain bow' or 'UH Sun Up' which resistant to PRSV are commercially cultivated (Nishina *et al.*, 1998) [12]. However, in Europe and Japan consumers were objected these fruits. Other control methods for PRSV, including growing barrier crops bajra or jowar or corn, quarantine, roguing and intercropping are only temporary solution to the PRSV problem (Wang *et al.*,1987; Yeh and Gonsalves, 1994) [21, 23]. When virus infects at young stage plants remain stunted and an economical crop may not produced. Therefore, it is desirable to explore other possible ways to enhance the production and productivity of papaya by using cost-effective techniques. In this study an attempt was made by using the approach of natural plant elicitors which induce resistance to the plants against different pathogens and have positive impact on yield. Plant elicitors like Salicylic acid (SA) and Jasmonic acid (JA) are mainly used in plant regulation against resistance to different pathogens (Farousk and Osman, 2011) [9]. In particular, salicylic acid possess ability which enhances systemic acquired resistance (SAR) against pathogens and plays an important role in the plant growth and development (Farousk and Osman, 2011) [9]. Jasmonic acid also plays major role in response to wounding plays an important role in the regulation of plant growth and development plants.

When insects attacked the plants, they release jasmonates, which in turn increases the activity of protease inhibitors, among many other anti-herbivore defence compounds.

Materials and Methods

The experiment was carried out at Horticultural Research Station, Anantharajupeta, Annamayya district, A.P. The experiment was laid out with thirteen treatments and three replications in a randomized block design. The details of the treatments are the application of plant elicitors like salicylic acid with different concentrations @ 50 ppm (T_1), 100 ppm (T_2), 150 ppm (T_3) spraying once at 45 Days After Planting (DAP) and also jasmonic acid with different concentrations @ 50 µ M (T_4), 100 µ M (T_5), 150 µ M (T_6) sprayed at 45 DAP and same elicitors applied twice *i.e* spraying of Salicylic acid @ 50 ppm (T_7), 100 ppm (T_8), 150 ppm (T_9) at 45 DAP and 120 DAP and spraying of jasmonic acid@ 50 µ M (T_{10}), 100 µ M (T_{11}), 150 µ M (T_{12}) at 45 DAP and 120 DAP and control (T_{13}).

Per cent of disease incidence: This was the percentage calculated by plants infected to total number of plants (Annon, 2016) [1].

$$\text{Percent disease incidence} = \frac{\text{Number of infected plants}}{\text{Total number of plants}} \times 100$$

Percentage of disease incidence was calculated as per the score sheet shown below at an interval of 30 days after imposing of the treatments.

Table 1: The score sheet of Papaya ringspot virus type papaya (PRSV-P)

S. No.	Symptom	Score
1	No symptom	0
2	Mild mosaic or oily spots/streaks on petioles or stem or ring spot on fruits	1
3	Mild mosaic + oily spots/streaks on petioles or stem or ring spot on fruits	3
4	oily spots/streaks on petioles or stem or ring spot on fruits + severe mosaic or blistering on leaves or leaf deformation	5
5	oily spots/streaks on petioles or stem or ring spot on fruits + Severe mosaic or blistering on leaves or leaf deformation + severe leaf reduction or mild fruit deformation with ring spot	7
6	Oily spots/streaks on petioles or stem or shoe string formation or severe fruit deformation with ring spot or stunted plant	9

Per cent disease index was calculated based on the formula suggested by (Chalak and Hasbanis, 2017) [5] and (Annon, 2016) [1].

$$PDI = \frac{\sum xi}{N \times \max \text{ rating}}$$

Where,
PDI = Per cent Disease Index
Xi = Sum of score of all infected plants
N = Total Numbers of plants

Five plants of each replication were selected randomly and tagged. Harvesting of fruits was done by three pickings. Average yield for all treatments was worked out by summing up of number of fruits harvested and its weight by three pickings.

Results and Discussion

PRSV Disease Incidence

The results obtained on the influence of plant elicitors on PRSV disease incidence percent disease index (PRSV) and percent of disease incidence was presented and discussed under this sub head.

Percent disease index (PRSV) and Per cent disease incidence

Percent of disease index was calculated based on disease scale of PRSV of papaya ring spot virus of papaya.

From the percent disease index values (Table 2), it was evident that the incidence of PRSV is less severe in first year compare to second year. The plant elicitors application exerted influence in the PRSV incidence with low percent disease index value upto 240 days of transplanting when compared to control in both the years. The lowest percent disease index (PDI)values with foliar application of salicylic acid and jasmonic acid twice with increasing concentration enhanced the tolerance in plants to PRSV upto 240 DAT. Treatment with salicylic acid @ 50, 100, 150 ppm applied twice and treatment with jasmonic acid @ 50, 100, 150µM applied twice imparted higher tolerance to PRSV with lowest PDI values over control in pooled mean and two years upto 240 DAT and the above treatments are statistically comparable with each other. Whereas maximum PDI values were registered in control in both the years. However, at 270 DAT all plants are infected with PRSV indicates that salicylic acid and jasmonic acid were unable to sustain the tolerance to PRSV after 240 days. Similar trend was observed in per cent disease incidence (Table 2). Treatment with salicylic acid @ 50, 100, 150 ppm applied twice and treatment with jasmonic acid @ 50, 100, 150 µM applied twice imparted higher tolerance to PRSV with lowest percent of disease incidence values over control in pooled mean upto 240 DAT and the above treatments were statistically comparable with each other. Whereas PRSV 100 per cent incidence was registered in control in both the years at 240 DAT (Table 2), this indicates that these plant elicitors were unable to sustain the tolerance to PRSV after 240 days with the sprays given at 45 and 120 DAT.

When pathogens attacks the plants they protect by defence with active and passive mechanisms. Elicitors like jasmonic acid and salicylic acid induces production of phytoalexins i.e antimicrobial metabolites, synthesis of pathogen related proteins, reinforcement of cell wall lignifications and production of reactive oxygen species (ROS). Salicylic acid also causes resistance in plants by enhancing of anti microbial activity in mango, citrus and pear against some pathogens (Shaat and Galal, 2004, Cao *et al.*, 2006., Zainuri *et al.*, 2001) [16, 3, 20] and also other interesting character is it induces systemic acquired resistance which in turn cause resistance to a variety of fungal, bacterial and viral pathogens. Induced resistance means activation of latent resistance mechanisms in plants (Ross, 1961) [15].

Another reason of reduction of PRSV incidence with elicitors might be due to more accumulation of pathogen related

proteins *viz.*, chitinase and β-1-3 glucanase (Qiu *et al.* 2003) [13] and also activation of enzymes of plant defence *viz.*, superoxide dismutase, peroxidase and polyphenol oxidase (Zhang *et al.* 2009) [26].

Chen and Klessing (1991) [6] identified a protein in tobacco leaf that binds Salicylic acid. They have purified this SA-binding protein through conventional chromatography. Unexpectedly, sequencing of SABP revealed that it is an enzyme which protects the cell from oxidative burst by Convertion of H_2O_2 to H_2O and O_2. Zafar *et al.* (2012) [24] also controlled of blue and green moulds in sweet orange by application of methyl jasmonate and salicylic acid. It was also reported that compared to jasmonic acid, Salicylic acid showed completely inhibited sporulation, direct fungitoxic effects like reduced colony lesion diameter, spore germination and spore mass density of pathogen. In our study also foliar application of salicylic acid two times at 45 DAT and 120 DAT or application of jasmonic acid treatments at 45 DAT and also at 120 DAT reduced the percentage of disease incidence and percent disease index compared to control. Rios *et al.* (2014) [14] also mentioned that significant reduction of malondialdihyde concentration and which lead to, an indicative of oxidative damage to leaf cells in wheat by spraying with jasmonic acid. The methyl jasmonate caused the resistance by production of phytoalexin lead to reduction of PRSV (Droby *et al.*, 1999) [8].

The reduction of PRSV by jasmonic acid might also be due to the altered polyamine metabolism by enhancing the activities of plant defence related enzymes *viz.*, phenyl ammonia lyase, peroxidase, and poly phenol oxidase (Walters, *et al.*,2002) [19]. It was also observed that, application of jasmonic acid induces the β-1-3 glucanase and chitinase which are plant defence genes which are hydrolyse the fungal cell walls, indicating that these β-1-3 glucanase and chitinase are involved in plant defence against fungal infection in loquat, grape berry and tomato (Zhu and Tian, 2012, Cao *et al.*, 2009, and Wang *et al.*, 2015) [27, 4, 22].

Yield parameters

The data on Yield parameters were significantly influenced by the application of diffent doses of elicitors. It was observed that T_9 recorded highest number of marketable fruits (46.90) which was at par with T_8 (45.20) (Table 3). The lowest number of marketable fruits were recorded with T_{13} (30.14). In the present study, the pronounced influence of plant elicitors was observed on fruits per plant. The number of fruits per plant was increased by application of salicylic acid twice at 45 DAT and 120 DAT. It might be due to inhibition of biosynthesis of ethylene, which in turn reduced the abscission of fruits (Leslie and Romani, 1986) [11].

The treatment T_9 recorded highest yield per hectare (tons) (116.06 tons ha^{-1}) which was at par with T_8 (114.83 tons ha^{-1}) (Table 4). The lowest yields were recorded in control (T_{13}) (77.85 tons ha^{-1}). The increase of yield by spraying of salicylic acid might be due to accumulation of chlorophyll and higher rubisco activity (Slaymaker *et al.*, 2002) [18]. This in turn increased the photosynthetic rate and more translocation of photo assimilates to fruits.

Table 2: Effect of salicylic acid and jasmonic acid on percent disease index (PDI) of papaya ring spot virus in papaya

Treatments	150 DAT			180 DAT			210 DAT			240 DAT			270 DAT		
	I Year 2015-16	II Year 2016-17	Pooled data	I Year 2015-16	II Year 2016-17	Pooled data	I Year 2015-16	II Year 2016-17	Pooled data	I Year 2015-16	II Year 2016-17	Pooled data	I Year 2015-16	II Year 2016-17	Pooled data
T_1: Salicylic acid @ 50 ppm at 45 DAT	38.89	40.22	39.56	48.67	50.89	49.78	58.78	61.11	59.94	75.33	79.89	77.61	87.11	89.56	88.33
T_2: Salicylic acid @ 100 ppm at 45 DAT	39.78	39.78	39.78	48.22	51.33	49.78	58.78	60.67	59.72	74.44	77.67	76.06	86.78	88.67	87.72
T_3: Salicylic acid @ 150 ppm at 45 DAT	38.44	38.89	38.67	47.33	49.11	48.22	56.56	57.11	56.83	74.89	78.11	76.50	86.77	87.44	87.11
T_4: Jasmonic acid @ 50 µM at 45 DAT	39.33	42.44	40.89	48.67	51.78	50.22	57.44	60.22	58.83	74.00	78.11	76.06	87.22	88.67	87.94
T_5: Jasmonic acid @ 100 µM at 45 DAT	40.22	41.11	40.67	47.78	52.67	50.22	58.33	62.44	60.39	74.44	79.00	76.72	87.22	88.22	87.72
T_6: Jasmonic acid @ 150 µM at 45 DAT	38.22	39.33	38.78	47.33	46.89	47.11	56.11	59.33	57.72	71.78	78.56	75.17	85.33	88.67	87.00
T_7: Salicylic acid @ 50 ppm at 45 DAT and 120 DAT	35.78	37.56	36.67	43.33	45.67	44.50	52.56	54.89	53.72	67.78	71.00	69.39	86.11	87.11	86.61
T_8: Salicylic acid @ 100 ppm at 45 DAT and 120 DAT	34.89	36.11	35.50	42.00	42.56	42.28	51.67	51.11	51.39	66.89	68.33	67.61	83.11	86.23	84.67
T_9: Salicylic acid @ 150 ppm at 45 DAT and 120 DAT	34.00	37.00	35.50	41.11	42.00	41.56	49.89	48.44	49.17	65.56	67.89	66.72	85.33	85.33	85.33
T_{10}: Jasmonic acid @ 50 µM at 45 DAT and 120 DAT	36.67	40.67	38.67	44.22	47.33	45.78	53.44	51.78	52.61	68.67	74.56	71.61	85.33	86.44	85.89
T_{11}: Jasmonic acid @ 100 µM at 45 DAT and 120 DAT	36.22	43.78	40.00	46.33	49.11	47.72	51.22	52.67	51.94	68.67	72.33	70.50	86.34	85.77	86.06
T_{12}: Jasmonic acid @ 150 µM at 45 DAT and 120 DAT	35.33	39.00	37.17	42.00	44.67	43.33	50.33	53.11	51.72	66.44	70.11	68.28	85.20	85.22	85.21
T_{13}: Control	48.67	50.89	49.78	65.11	68.22	66.67	74.78	77.11	75.94	90.00	87.33	88.67	90.00	90.00	90.00
S.Em. +	1.63	1.04	0.99	1.75	1.88	1.18	1.97	2.37	1.44	1.86	3.07	1.48	1.54	1.22	1.08
C.D. at 5%	4.75	3.03	2.90	5.10	5.47	3.45	5.76	6.92	4.20	5.43	8.96	4.31	NS	NS	NS

DAT: Days after transplanting

Table 3: Effect of salicylic acid and jasmonic acid on per cent of disease incidence of papaya ring spot virus in papaya

Treatments	150 DAT			180 DAT			210 DAT			240 DAT			270 DAT		
	I Year 2015-16	II Year 2016-17	Pooled data	I Year 2015-16	II Year 2016-17	Pooled data	I Year 2015-16	II Year 2016-17	Pooled data	I Year 2015-16	II Year 2016-17	Pooled data	I Year 2015-16	II Year 2016-17	Pooled data
T_1: Salicylic acid @ 50 ppm at 45 DAT	51.11	53.33	52.22	55.56	57.78	56.67	64.44	66.67	65.56	88.89	91.11	90.00	100.00	100.00	100.00
T_2: Salicylic acid @ 100 ppm at 45 DAT	53.33	51.11	52.22	57.78	55.56	56.67	64.44	62.22	63.33	86.67	88.89	87.78	100.00	100.00	100.00
T_3: Salicylic acid @ 150 ppm at 45 DAT	46.67	48.89	47.78	53.33	55.56	54.44	62.22	64.44	63.33	84.44	86.67	85.56	100.00	100.00	100.00
T_4: Jasmonic acid @ 50 µM at 45 DAT	51.11	53.33	52.22	60.00	57.78	58.89	68.89	71.11	70.00	91.11	93.33	92.22	100.00	100.00	100.00
T_5: Jasmonic acid @ 100 µM at 45 DAT	55.56	53.33	54.44	57.78	55.56	56.67	66.67	66.67	66.67	88.89	91.11	90.00	100.00	100.00	100.00
T_6: Jasmonic acid @ 150 µM at 45 DAT	48.89	51.11	50.00	55.56	55.56	55.56	64.44	68.89	66.67	86.67	88.89	87.78	100.00	100.00	100.00
T_7: Salicylic acid @ 50 ppm at 45 DAT and 120 DAT	46.67	48.89	47.78	51.11	53.33	52.22	60.00	62.22	61.11	80.00	82.22	81.11	100.00	100.00	100.00
T_8: Salicylic acid @ 100 ppm at 45 DAT and 120 DAT	44.44	46.67	45.56	48.89	48.89	48.89	53.33	57.78	55.56	77.78	80.00	78.89	100.00	100.00	100.00
T_9: Salicylic acid @ 150 ppm at 45 DAT and 120 DAT	42.22	44.44	43.33	46.67	51.11	48.89	55.56	57.78	56.67	77.78	77.78	77.78	100.00	100.00	100.00
T_{10}: Jasmonic acid @ 50 µM at 45 DAT and 120 DAT	53.33	53.33	53.33	55.56	57.78	56.67	60.00	64.44	62.22	82.22	88.89	85.56	100.00	100.00	100.00
T_{11}: Jasmonic acid @ 100 µM at 45 DAT and 120 DAT	51.11	53.33	52.22	55.56	55.56	55.56	62.22	64.44	63.33	84.44	86.67	85.56	100.00	100.00	100.00
T_{12}: Jasmonic acid @ 150 µM at 45 DAT and 120 DAT	44.44	46.67	45.56	51.11	53.33	52.22	57.78	60.00	58.89	80.00	82.22	81.11	100.00	100.00	100.00
T_{13}:Control	62.22	64.44	63.33	73.33	75.56	74.44	86.67	88.89	87.78	100.00	100.00	100.00	100.00	100.00	100.00
S.Em. +	2.18	2.01	1.19	1.82	1.85	1.28	1.79	1.36	1.35	2.07	1.98	1.46	0.00	0.00	0.00
C.D. at 5%	6.37	5.88	3.48	5.32	5.39	3.72	5.24	3.98	3.94	6.03	5.78	4.27	NS	NS	NS

DAT: Days after transplanting

Table 4: Effect of salicylic acid and jasmonic acid on number of marketable fruits per plant in papaya

Treatments	1st harvest			2nd harvest			3rd harvest		Total number of fruits per plant			
	I Year 2015-16	II Year 2016-17	Pooled data	I Year 2015-16	II Year 2016-17	Pooled data	I Year 2015-16	II Year 2016-17	Pooled data	I Year 2015-16	II Year 2016-17	Pooled data
T_1: Salicylic acid @ 50 ppm at 45 DAT	15.61	14.66	15.14	11.20	11.06	11.13	9.92	9.61	9.76	36.73	35.33	36.03
T_2: Salicylic acid @ 100 ppm at 45 DAT	16.79	15.49	16.14	11.82	11.43	11.62	10.26	9.95	10.11	38.87	36.87	37.87
T_3: Salicylic acid @ 150 ppm at 45 DAT	17.30	16.79	17.05	12.37	12.16	12.26	10.10	9.65	9.88	39.77	38.60	39.19
T_4: Jasmonic acid @ 50 µM at 45 DAT	13.83	14.13	13.98	11.20	11.02	11.11	9.98	10.18	10.08	35.00	35.33	35.17
T_5: Jasmonic acid @ 100 µM at 45 DAT	14.45	14.71	14.58	11.31	11.50	11.40	10.37	10.39	10.38	36.13	36.60	36.37
T_6: Jasmonic acid @ 150 µM at 45 DAT	15.47	15.06	15.27	12.42	11.58	12.00	10.31	10.36	10.34	38.20	37.00	37.60
T_7: Salicylic acid @ 50 ppm at 45 DAT and 120 DAT	18.84	17.60	18.22	13.46	13.00	13.23	9.11	10.00	9.55	41.40	40.60	41.00
T_8: Salicylic acid @ 100 ppm at 45 DAT and 120 DAT	20.25	21.00	20.62	14.69	14.00	14.35	10.26	10.20	10.23	45.20	45.20	45.20
T_9: Salicylic acid @ 150 ppm at 45 DAT and 120 DAT	20.70	20.80	20.75	16.05	15.33	15.69	10.45	10.47	10.46	47.20	46.60	46.90
T_{10}: Jasmonic acid @ 50 µM at 45 DAT and 120 DAT	14.71	14.82	14.77	11.26	11.80	11.53	10.35	10.25	10.30	36.33	36.87	36.60
T_{11}: Jasmonic acid @ 100 µM at 45 DAT and 120 DAT	15.42	15.99	15.70	11.72	12.68	12.20	10.19	10.34	10.26	37.33	39.00	38.17
T_{12}: Jasmonic acid @ 150 µM at 45 DAT and 120 DAT	16.35	15.77	16.06	12.81	12.27	12.54	10.24	9.96	10.10	39.40	38.00	38.70
T_{13}: Control	12.01	11.65	11.83	9.86	9.14	9.50	8.93	8.70	8.81	30.80	29.48	30.14
S.Em. +	0.60	0.58	0.42	0.64	0.62	0.69	1.29	1.57	1.30	1.59	1.47	1.24
C.D. at 5%	1.74	1.68	1.23	1.86	1.81	2.00	NS	NS	NS	4.64	4.29	3.62

DAT: Days after transplanting

Table 5: Effect of salicylic acid and jasmonic acid on number of fruits per plant in papaya cv. Red Lady

Treatments	I Year 2015-16	II Year 2016-17	Pooled data
T_1: Salicylic acid @ 50 ppm at 45 DAT	54.13	53.50	53.82
T_2: Salicylic acid @ 100 ppm at 45 DAT	56.00	56.00	56.00
T_3: Salicylic acid @ 150 ppm at 45 DAT	57.00	58.87	57.94
T_4: Jasmonic acid @ 50 µM at 45 DAT	52.00	51.33	51.67
T_5: Jasmonic acid @ 100 µM at 45 DAT	53.20	52.87	53.04
T_6: Jasmonic acid @ 150 µM at 45 DAT	54.23	53.77	54.00
T_7: Salicylic acid @ 50 ppm at 45 DAT and 120 DAT	58.93	57.47	58.20
T_8: Salicylic acid @ 100 ppm at 45 DAT and 120 DAT	60.33	60.40	60.37
T_9: Salicylic acid @ 150 ppm at 45 DAT and 120 DAT	59.80	58.77	59.29
T_{10}: Jasmonic acid @ 50 µM at 45 DAT and 120 DAT	53.33	52.47	52.90
T_{11}: Jasmonic acid @ 100 µM at 45 DAT and 120 DAT	55.33	54.07	54.70
T_{12}: Jasmonic acid @ 150 µM at 45 DAT and 120 DAT	56.60	54.77	55.69
T_{13}: Control	50.53	50.33	50.43
S.Em. +	1.04	1.32	1.08
C.D. at 5%	3.03	3.86	3.15

DAT: Days after transplanting

Table 6: Effect of pre-harvest spray of salicylic acid and jasmonic acid on yield per hectare (tons) in papaya

Treatments	Yield per hectare (tons)		
	I year 2015-16	II year 2016-17	Pooled data
T_1: Salicylic acid @ 50 ppm at 45 DAT	96.83	96.32	96.58
T_2: Salicylic acid @ 100 ppm at 45 DAT	104.41	100.52	102.46
T_3: Salicylic acid @ 150 ppm at 45 DAT	108.56	109.51	109.04
T_4: Jasmonic acid @ 50 µM at 45 DAT	91.56	95.74	93.65
T_5: Jasmonic acid @ 100 µM at 45 DAT	99.44	97.61	98.52
T_6: Jasmonic acid @ 150 µM at 45 DAT	99.78	98.86	99.32
T_7: Salicylic acid @ 50 ppm at 45 DAT and 120 DAT	111.28	110.92	111.10
T_8: Salicylic acid @ 100 ppm at 45 DAT and 120 DAT	115.37	114.29	114.83
T_9: Salicylic acid @ 150 ppm at 45 DAT and 120 DAT	116.28	115.83	116.06
T_{10}: Jasmonic acid @ 50 µM at 45 DAT and 120 DAT	101.45	100.11	100.78
T_{11}: Jasmonic acid @ 100 µM at 45 DAT and 120 DAT	103.44	101.43	102.44
T_{12}: Jasmonic acid @ 150 µM at 45 DAT and 120 DAT	104.84	104.27	104.55
T_{13}: Control	78.52	77.18	77.85
S.Em. +	1.24	1.44	0.79
C.D. at 5%	3.63	4.21	2.31

DAT: Days after transplanting

Conclusion

Spraying of Salicylic acid @150 ppm twice at 45 DAT and 120 DAT reduced the incidence of PRSV upto 240 DAT and also increased the number of fruits and in turn increased the yield per hectare.

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