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MANAGEMENT OF LEAF BLIGHT OF CHRYSANTHEMUM WITH COMPOST TEAS

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ABSTRACT

Chrysanthemum (*Chrysanthemum morifolium* Ramil*)* is an important flower crop, being affected by leaf blight caused by *Alternaria alternata* (Fries) Keissler, a serious disease affecting the flower yield. The present studies were carried out to derive a management strategy with compost teas. The compost teas Vermicompost (CT-1), Vermicompost + *Pseudomonas fluorescens*1% (CT-2), Vermicompost + *Trichoderma viride*1% (CT-3), Dung75% + Paddy Straw25% (CT-4), Dung75% + Paddy Straw25% + *Pseudomonas fluorescens*1% (CT-5), Dung75% + Paddy Straw25% +*Trichoderma viride*1% (CT-6), Dung75% + Neem Powder20% + Fish meal5% (CT-7), Dung75% + Neem Powder20% + Fish meal5% + *Pseudomonas fluorescens*1% (CT-8) and Dung75% + Neem Powder20% + Fish meal5% + *Trichoderma viride*1% (CT-9) were tested against the mycelia growth and spore germination of pathogen, and against disease under field conditions. Compost teas that were sterilized by filtration were prefixed with 'S' where ever necessary. Compost teas were effective in inhibiting the mycelia growth and spore germination. In single spray treatment the percent disease index varied from 9% (CT-8) to 21.34% (CT-4), in two spray treatments 8.69% (SCT-6) to 13.34% (CT-7) and in 3 sprays treatment 4.67% (CT-6) to 11.2% (SCT-1). Treatments CT-6 (4.67%), SCT-5 (4.75%) SCT-6 (6.45%), SCT-7 (5.85%) was superior to fungicide Iprodione 25% + Carbendazim 25%. The treatment CT-6 was most effective to increase the flower yield.

Keywords: *Alternaria alternata*, Leaf blight, Chrysanthemum, Compost teas, Control, Management.

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INTRODUCTION

Chrysanthemum (*Chrysanthemum morifolium* Ramil*)* is an important flower crop, which is commercially cultivated worldwide. Leaf blight of Chrysanthemum caused by *A. alternata* (Fries) Keissler is a serious disease of the crop in India affecting quality of flowers and reducing yield.

Among the non chemical means of disease management, bio control methods, use of compost teas as prophylactic protectants for disease management are becoming an important area of research. Over the last two decades, reports on possibility of use of compost water extracts for control of foliar diseases are being published. Extracts are prepared by mixing compost and water and incubating the resulting slurry with or with out agitation for several days. Compost teas are otherwise known as compost teas. They can be sprayed on crop to coat leaf surfaces, and so that they provide resistance to infection from pathogens (Grobe, 1998). Compost teas show multiple modes of activity in suppressing plant diseases such as, suppression of spore germination, induced resistance, antibiosis and competition. Compost tea (Bess, 2000) is used to suppress various fruit and vegetable diseases (Quarles, 2001; Hoitink et al., 1997). Compost teas are very beneficial in plant disease management and they can be included in the integrated disease management strategies of field and horticultural crops (Orlikowski and Wolski, 2000 and Quarles, 2001). Scheuerell and Mahaffee (2002) reported that a variety of plant foliar as well as soil borne diseases suppressed by application of non aerated compost tea while few organic extracts were with limited control options. In view of the advantages of compost teas and the importance of Chrysanthemum, the present study was conducted to derive a management strategy for management of leaf blight of Chrysanthemum.

MATERIALS AND METHODS

Isolation, purification and proving pathogenecity of the pathogen

Diseased leaves showing typical symptoms were collected from Chrysanthemum plants grown at All India Coordinated Research Project on Floriculture, ARI, Rajendranagar, Hyderabad. The pathogen was isolated, purified on Potato Dextrose Agar (PDA) medium and identified as *Alternaria alternata* (Fries) Kiessler. The pathogenecity of *Alternaria alternata* was proved by artificial inoculations.

Preparation of compost and compost teas

The composts were prepared from substrates like Vermicompost (CT-1), Vermicompost + *Pseudomonas fluorescens* 1% (CT-2), Vermicompost

+*Trichoderma viride* 1% (CT-3), Dung 75% + Paddy Straw 25% (CT-4), Dung75% + Paddy Straw 25% + *Pseudomonas fluorescens* 1% (CT-5), Dung75% + Paddy Straw 25% +*Trichoderma viride*1% (CT-6), Dung 75% + Neem Powder 20% + Fish meal 5% (CT-7), Dung 75% + Neem Powder 20% + Fish meal 5% + *Pseudomonas fluorescens*1% (CT-8) and Dung 75% + Neem Powder 20% + Fish meal 5% + *Trichoderma viride*1% (CT-9). The ingredients were thoroughly mixed and filled in plastic containers and wetted by sprinkling enough water to trigger the decomposition process. The containers were tightly covered with black polythene sheet and were allowed 60 days for decomposition. The composts were remixed manually after 30 days and sprinkled with water to maintain moisture for better decomposition, and left for another 30 days to get the ripe compost. The compost teas were prepared using a procedure adapted by Steve Diver (2002) with modifications. The teas were filter sterilized and the standard teas were collected into the pre sterilized conical flasks aseptically.

Determination of properties of compost teas

Chemical properties of crude and sterilized compost teas like pH and electrical conductivity (EC) were determined. The properties were recorded with help of pH meter ELICO L1610 model and EC meter ELICO CM 180 model.

Effect of compost teas on mycelial growth

The effect of crude and sterilized compost teas on the mycelial growth of the *A. alternata* was tested following Poisoned food technique using potato dextrose broth (Nene and Thaplial, 2002). The teas were mixed with the potato dextrose broth in conical flasks at a concentration of 25% and labeled accordingly. Each flask was inoculated with 6 mm diameter mycelia discs of the pathogen and incubated at 26 ± 2^0C for 10 days. The effect of the material on in vitro mycelia growth was determined by recording the dry weight of the mycelium in each treatment. Percent inhibition of mycelial growth was computed using the formula I =C-T/CX100. Where, I= Percent inhibition; C= Dry weight of mycelium under control; T= Dry weight of mycelium in treatment.

Effect of compost teas on spore germination

The effect of crude and sterilized compost teas on spore germination of *A. alternata* was studied fo llowing slide germination technique (Reddik and Wallace, 1910). Compost teas at 25% concentration were prepared using sterile distilled water. The spore suspension was prepared from 7 day old culture with a density of 20 spores per microscopic field (10X). In each cavity of the depression slide 0.05 ml of compost tea was placed with the help of one milli liter pipette and allowed to dry. Then 0.05 ml of spore suspension was placed in each cavity and covered with a cover slip. The slides were placed in Petriplates lined with moist blotter papers and incubated for 12 hours at 26 ± 2°C. Control was maintained using sterilized distilled water. The percent inhibition was recorded using the formula. I =C-T/CX100. I= Percent inhibition; C= Spores germinated in control; T= Spores germinated in under a treatment.

Effect of compost teas in disease management

Effect of compost teas in mitigating the leaf blight was tested under field conditions producing artificial epiphytotic conditions. Chrysanthemum cv Raichur cuttings were collected from farmers field and transplanted and maintained under field conditions. Plants were inoculated 45 days after planting with $100X10^3$ spores/ml spore suspension of *A. alternate* and were covered with polythene sheet for 12 hours to build up the high relative humidity in crop canopy for providing favorable condition for infection.

The standard crude and sterilized compost teas of 25% concentration were prepared using sterile distilled water. These teas were sprayed on to the plants at 24 hours after inoculation with the pathogen. Three different spray schedules were followed viz. (1) Plants were sprayed once, one day after pathogen inoculation. (2) Plants were sprayed twice, first spray after one day and second spray after four days of pathogen inoculation. (3) Plants were sprayed three times, first spray after one day, second spray after four days and third spray after seven days of inoculation.

After spraying with the compost teas, treated plants were observed for the development of disease symptoms. On 15th day after inoculation percent disease index was calculated for each treatment based on 0-5 scale (Mayee and Datar, 1986)., where 0 = <1% leaf area infected; 1 = 1-5% leaf area infected; 2 = 6-20% leaf area infected; 3 = 21-40% leaf area infected; 4 = 41-70% leaf area infected and 5 = >75% leaf area infected.

Effect of compost tea on flower yield

The effective treatment from the previous experiment was selected to find out its effect on flower yield. Yields of healthy plants, diseased plants developed through artificial inoculations, inoculated plants sprayed with compost tea, healthy plants sprayed with compost tea were compared. Compost tea extracted from Dung 75% +Paddy Straw 25% + *Trichoderma viride* 1% at 25% concentration was sprayed thrice one, four and seven days after inoculation with the spore suspension of *A. alternata.* Five replications and five plants per replications were maintained in isolation for each treatment and the yield was recorded in g/25 plants. Flowers were harvested 6 times at weekly intervals. The PDI was calculated on the basis of a 0-5 scale as suggested by Mayee and Dataar (1986). Inoculated plants sprayed with conidial suspension of *A. alternata* served as check. The yield increase was determined based on yield of inoculated check and expressed in percentage.

RESULTS

Properties of compost teas

The pH in different crude compost teas varied from 6.15 to 7.25. Sterilization by autoclaving caused significant increase in pH of compost teas CT-1 and CT-6 compared to crude teas. Sterilization by filtration caused an increase in pH in CT-1 (6.74) and CT-6 (7.2) where as the property was reduced in CT-4 due to sterilization (Table 1).

The EC of crude compost teas varied from 6.08 ds m^{-2} to 9.63 ds m^{-2}. Sterilization by autoclaving caused an increase of EC in CT-3 and CT-9. Sterilization by filtration also significantly increased EC in CT-2 and CT-5 where as a significant reduction in EC was resulted in CT-3, CT-6, CT-7 and CT-9 compared to crude teas (Table 1).

Effect of compost teas on *in vitro* mycelial growth

Inhibition of *in vitro* mycelial growth of *A. alternata* in check fungicide Quintal 0.1% (Iprodione 25% + Carbendazim25%) was significantly higher over all the treatments with compost tea. Among the treatments with crude compost teas the percent inhibition varied from 8.34 to 51.39. All treatments with compost tea were significantly superior over CT-2 (13.26) and CT-5 (8.34). The effect of compost teas on mycelia growth was significantly different. Among the crude compost teas, CT-3 caused the maximum mycelia growth inhibition (51.39%) followed by CT-6 (43.75%) inhibition. CT-5 showed only 8.3% growth inhibition over control (Table 2).

Autoclaving of compost teas significantly reduced the percent growth inhibition of *A. alternata*. The mycelial growth varied from 1.38% (CT-5) to 43% (CT-6). In autoclaved compost teas also CT-3 was superior with 43.16% inhibition, which is on par with CT-6 (43.06%). Similar to crude compost teas CT-5 sterilized compost teas showed least inhibition of 1.38% (Table 2).

Sterilization by filtration significantly reduced the efficacy of compost teas to inhibit mycelial growth compared to crude extract except in CT-6, CT-7 and CT-9. The percentage of inhibition in mycelial growth varied from 1.25% (CT-5) to 50% (CT-6) (Table 2).

Effect of compost teas on spore germination

The percent inhibition of spore germination of *A. alternata* in fungicide Check Quintal 0.1% (Iprodione 25% + Carbendazim25%) was significantly higher over all the compost teas. Among the crude compost teas the percent inhibition of conidial germination varied from 8.0% (CT-2) to 94.92% (CT-7). Among the crude compost teas the efficacy of CT-7 was significantly higher compared to other compost teas, which was followed by CT-9 (Table 3).

Autoclaving of compost teas significantly reduced the percent inhibition on the spore germination of *A. alternata* in CT-1, CT-4, CT-5, CT-7, CT-8 and CT-9. Sterilization of compost teas by filtration significantly reduced the percent inhibition of the spore germination of the fungus over crude and autoclaved compost teas except in CT-2. The percentage inhibition of spore germination varied from 4.47% to 62.68% (Table 3).

Efficacy of compost teas in disease management

Under control, the percent disease index (PDI) of Alternaria blight of chrysanthemum was 33.34, 34.0 and 38.34 after 1st, 2nd and 3rd spray, respectively. Treatments with fungicide (Iprodione 25%+ C Arbendazim 25%) and all of the treatments with compost teas significantly reduced the PDI values over control. When crude compost teas were sprayed the PDI was reduced to 9.0, 21.34, 9.38, 13.34 and 4.67- 9.3 over control showing the lowest PDI under CT-8, CT-1 and CT-6 and the highest under CT-6, CT-7 and CT-9 after 1st, 2nd and 3rd spray respectively (Table 4).

When sterilized (filtration) compost teas were applied the efficacy was more or less similar to crude compost teas. In first spray, PDI ranged 10.00-19.34 showing the minimum PDI under SCT-6 and the maximum under SCT-9.

In two sprays, the PDI varied from 8.69 (SCT-6) to 13.34 (CT-7). Efficacy of SCT-6, SCT-3, SCT-7, CT-1, CT-8 and SCT-8 was significantly superior over the fungicide check. In three sprays the PDI of Alternaria blight of chrysanthemum varied from 4.67 (CT-6) to 11.2(SCT-1). The efficacy of treatment CT-6 (4.67), SCT-5 (4.75), SCT-6 (6.45), SCT-7(5.85) was also significantly superior to fungicidal check.

Effect of compost tea on flower yield

The treatment CT-6 (Dung 75% + Paddy straw 25% + *Trichoderma viride* 1%) was found the most effective to reduce severity of Alternaria blight in the previous field experiment applied three times at 1, 4 and 7 days after inoculation with conidial suspension *A. alternata*. It was found inoculation and subsequently spray of chrysanthemum plants with CT-6 gave significantly higher yield (1395 g) showing 3.26% yield increase of over uninoculated check. The flower yield recorded in inoculated and unsprayed plants was significantly lower (950 g) compared to uninoculated control (1351.67 g). The percent reduction of flower yield in diseased plants was up to 29.68% (Table 5).

DISCUSSION

Results of the present study indicate that the compost teas are considerably effective in inhibiting the mycelial growth and spore germination of *Alternaria alternata*. Treatments CT-6 (45.6%) and CT-3 (46.33%) were highly effective in reducing the mycelial growth; whereas CT5 (3.66%) was least effective. Whereas CT7 (76.44%), CT8 (69.29%) and CT9 (67.84%) were superior in inhibiting the spore germination. El Marsy et al. (2002) recorded the effectiveness of compost teas to inhibit mycelial growth of different fungi. Singh et al. (2003) reported the effectiveness of compost teas to inhibit spore germination of various pathogens like *Venturia inaequalis*, *Myrothecium* sp, *Fusarium oxysporum, Alternaria* sp, *Botrytis cinerea* in different crops. The findings of the present investigations are in agreement with findings of Brinton and Trankner (2002) who reported the inhibition of spore germination as one of the possible mode of actions of compost teas.

Spray of crude compost teas as well as filter sterilized compost teas are found effective to reduce the percent disease index of Alternaria leaf blight of chrysanthemum. There was no remarkable variation reduction of PDI at single spray and double sprays with CT-1, CT-5 and CT-8. Similarly in case of CT-4 the differences between 2 sprays and 3 sprays were not significant. Wickramaarachchi et al. (2003) assessed and reported the possibility of inducing resistance in tomato against *Alternaria solani* using foliar spraying of compost water extracts. A significant reduction in the incidence of early blight caused by *A. solani* was observed in tomato

Under field conditions, CT-2, CT-1, CT-9 and CT-8 in crude form and SCT-3, SCT-6, SCT-4 and SCT-7 in sterilized form show effectiveness against *A. alternata* and Alternaria blight of chrysanthemum (Table 5). Efficacy of CT-5 and SCT-5 show more or less similar effectiveness to reduce percent disease index. Similar findings have also been reported by other investigators. Cronin et al. (1996) reported that extracts filtered with 0.1µm pore sized membranes were most effective in reducing the apple scab compared to autoclaved extracts in field conditions. Zhang et al. (1998) reported that anaerobically fermented aqueous extracts of spent mushroom compost maintained its inhibitive properties after filter sterilization as well as after autoclaving. However, there are reports indicating the loss of effectiveness after passing through membrane filtration. Mc Quilken et al. (1994) reported that the compost extracts obtained from manure straw composts, lost their ability on filter sterilization and autoclaving.

The disease reduced the flower yield up to 29.68%. Along with the disease suppression the compost tea CT-6 (Dung 75% + Paddy straw 25% + *Trichoderma viride* 1%) significantly increased the flower yield of chrysanthemum even in presence of disease (Table 5). Initially the compost teas were used as liquid fertilizers as they contain readily available soluble nutrients (Steve Diver, 2002). On the other hand they are able to reduce disease incidence. Reduction of disease incidence in turn avoids the loss of photosynthetic activity and yield reduction. Moreover the compost teas contain many growth promoting bacteria and fungi that increases the population of beneficial microorganisms on plant surface and improves the growth and development of the crop plants. These factors enable the yield increase upon spraying of compost teas for disease management.

CONCLUSION

Based on findings of the present investigation it may be concluded that the compost teas are promising in the management of Alternaria leaf blight of chrysanthemum and in increasing the flower yields.

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Table 1. Effect of sterilization on the pH and electrical conductivity of compost teas

S.No	Compost tea	pH				Electrical conductivity (ds/m^2)			
		Crude compost teas	Sterilized compost teas		Mean	Crude Compost teas	Sterilized compost teas		Mean
			Autoclaving	Filtration			Autoclaving	Filtration	
1	CT-1	6.6	6.78	6.74	6.5	9.60	9.62	9.62	9.61
2	CT-2	7.13	7.05	7.08	7.09	8.84	8.87	9.11	8.94
3	CT-3	6.61	6.64	6.67	6.64	9.63	9.93	9.48	9.68
4	CT-4	6.15	6.05	6.02	6.07	8.53	8.60	8.49	8.54
5	CT-5	7.12	7.02	7.14	7.09	8.52	8.68	8.68	8.63
6	CT-6	6.8	6.95	7.20	6.98	6.08	6.05	5.91	6.01
7	CT-7	7.24	7.15	7.17	7.19	6.99	6.50	6.53	6.67
8	CT-8	7.25	7.21	7.30	7.25	6.32	6.39	6.29	6.33
9	CT-9	7.13	7.09	7.16	7.13	6.46	6.55	5.70	6.24
	Mean	6.83	6.88	6.94		7.89	7.91	7.76	

	Comparison of pH		Comparison of EC	
Factors	C.D.(0.05)	SE m±	C.D. .(0.05)	SE m±
Compost teas	0.057	0.02	0.07	0.026
Sterilization	0.098	0.035	0.13	0.045
Interaction	0.17	0.06	0.22	0.078

CT1: Vermicompost; CT2: Vermicompost + *Pseudomonas fluorescens* 1 %; CT3: Vermicompost + *Trichoderma viride*1 % ; CT4: Dung 75% + Paddy Straw 25%; CT5: Dung 75% + Paddy Straw 25% + *Pseudomonas fluorescens* 1%; CT6: Dung 75% + Paddy Straw 25% + *Trichoderma viride*1% ; CT7: Dung 75% + Neem Powder 20% + Fish meal 5%; CT8: Dung 75% + Neem Powder 20% + Fish meal 5% + *Pseudomonas fluorescens*1%; CT9: Dung75% + Neem Powder 20% + Fish meal 5% + *Trichoderma viride*1%

Table 2. Effect of compost teas on mycelial growth of *Alternaria alternata*

S. No	Compost tea	Percent Inhibition of mycelial growth			Mean
		Crude Compost tea	Sterilized Compost tea		
			Autoclaving	Membrane Filtration	
1	Check (Quintal 0.1%)#	100.00(90.00)*	100.00(90.00)*	100.00(90.00)*	100.00(90.00)*
2	CT-1	33.34 (35.25)	29.18 (32.68)	3.47 (10.73)	22.00 (26.22)
3	CT-2	13.26 (21.31)	13.19 (21.25)	5.56 (13.6)	10.67 (18.72)
4	CT-3	51.39 (45.78)	43.16 (41.05)	44.45 (41.79)	46.33 (42.87)
5	CT-4	32.64 (34.82)	11.81 (20.08)	6.95 (15.25)	17.13 (23.39)
6	CT-5	8.34 (16.76)	1.38 (6.75)	1.25 (6.4)	3.66 (9.97)
7	CT-6	43.75 (41.39)	43.06 (40.99)	50.00 (44.98)	45.60 (42.45)
8	CT-7	29.86 (33.10)	10.42 (18.81)	38.19 (38.15)	26.16 (30.02)
9	CT-8	36.12 (36.91)	13.66 (21.66)	11.81 (20.08)	20.53 (26.22)
10	CT-9	34.03 (35.65)	8.34 (16.76)	45.84 (42.6)	29.40 (31.67)
	Mean	31.41 (33.44)	19.37 (24.45)	23.06 (25.95)	

Factors	C.D.	SE(m)
Compost teas	0.72	0.26
Sterilization method	1.24	0.44
Factor (A X B)	2.15	0.76

* : Values in parentheses are angular transformed values; #Quintal: (Iprodione 25%+ Carbendazim 25%)

CT1: Vermicompost; CT2: Vermicompost + *Pseudomonas fluorescens* 1 %; CT3: Vermicompost + *Trichoderma viride*1 % ; CT4: Dung 75% + Paddy Straw 25%; CT5: Dung 75% + Paddy Straw 25% + *Pseudomonas fluorescens* 1%; CT6: Dung 75% + Paddy Straw 25% + *Trichoderma viride*1% ; CT7: Dung 75% + Neem Powder 20% + Fish meal 5%; CT8: Dung 75% + Neem Powder 20% + Fish meal 5% + *Pseudomonas fluorescens*1%; CT9: Dung75% + Neem Powder 20% + Fish meal 5% + *Trichoderma viride*1%

Table 3. Effect of compost teas on spore germination of *Alternaria alternata*

S. No	Compost tea	Percent Inhibition of spore germination			Mean
		Crude Compost teas	Sterilized compost teas		
			Autoclaving	Membrane filtration	
1	Fungicide check (Quintal 0.1%)#	98.83(89.98)*	98.83(89.98)	98.83 (89.98)	98.83(89.98)
2	CT-1	34.47(35.93)	26.54 30.93)	4.47(12.15)	1.83 (26.34)
3	CT-2	8.0 (16.42)	32.18(34.53)	13.57 (21.57)	17.92(24.17)
4	CT-3	12.96 21.05)	12.10(20.34)	9.05 (17.48)	11.37(19.63)
5	CT-4	64.9 (53.83)	33.90(35.59)	22.01 (27.95)	40.29 (39.12)
6	CT-5	37.82(37.88)	29.3 (32.80)	24.30 (29.47)	30.50(33.39)
7	CT-6	23.74(29.12)	30.06 (33.23)	16.93 (24.26)	23.58 (28.87)
8	CT-7	94.92(76.94)	71.72(57.94)	62.68 (52.33)	76.44 (62.40)
9	CT-8	74.14(66.61)	62.1 (52.03)	61.56 (51.67)	69.29 (56.77)
10	CT-9	88.3 (70.06)	58.72(50.01)	56.48 (48.72)	67.84 (56.26)
	Mean	49.9 (45.32)	39.64(38.60)	30.12 (31.74)	

Factors	C.D.	SE(m)
Compost teas	1.31	0.46
Sterilization	2.26	0.8
Interaction	3.92	1.38

* : Values in parentheses are angular transformed values; #Quintal: (Iprodione 25%+ Carbendazim 25%)
CT1: Vermicompost; CT2: Vermicompost + *Pseudomonas fluorescens* 1 %; CT3: Vermicompost + *Trichoderma viride*1 % ; CT4: Dung 75% + Paddy Straw 25%; CT5: Dung 75% + Paddy Straw 25% + *Pseudomonas fluorescens* 1%; CT6: Dung 75% + Paddy Straw 25% + *Trichoderma viride*1% ; CT7: Dung 75% + Neem Powder 20% + Fish meal 5%; CT8: Dung 75% + Neem Powder 20% + Fish meal 5% + *Pseudomonas fluorescens*1%; CT9: Dung75% + Neem Powder 20% + Fish meal 5% + *Trichoderma viride*1%

Table 4. Efficacy of different crude and sterilized (membrane filtration) compost teas on Alternaria leaf blight of Chrysanthemum under field conditions

S.No	Compost tea	Percent Disease Index			Mean
		1spray (One day after inoculation)	2 sprays (One and four day after inoculation)	3 sprays (One, four and seven days after inoculation)	
1	Control	33.34(35.24)*	34.00(35.64)*	38.34(38.23)*	35.23(36.37)*
2	Fungicide check #	11.12 (19.46)	10.32 (18.72)	7.27 (15.63)	9.57 (17.94)
3	CT-1	9.04 (17.49)	9.38 (17.81)	8.00 (16.40)	8.81 (17.24)
4	CT-2	12.00 (20.25)	10.29 (18.69)	7.14 (15.49)	9.81 (18.14)
5	CT-3	19.38 (26.09)	11.34 (19.66)	8.62 (17.06)	13.11 (20.94)
6	CT-4	21.34 (27.49)	10.67 (19.05)	10.34 (18.74)	14.12 (21.76)
7	CT-5	10.53 (18.92)	11.00 (19.35)	7.75 (16.14)	9.76 (18.14)
8	CT-6	13.12 (21.22)	12.00 (20.25)	4.67 (12.48)	9.93 (17.98)
9	CT-7	10.00 (18.42)	13.34 (21.41)	8.50 (16.94)	10.61 (18.92)
10	CT-8	9.00 (17.45)	9.68 (18.11)	8.00 (16.42)	8.89 (17.32)
11	CT-9	14.40 (22.28)	11.58 (19.88)	9.30 (17.73)	11.76 (19.96)
12	SCT-1	13.57 (21.6)	15.00 (22.77)	11.20 (19.53)	13.26 (21.3)
13	SCT-2	13.00 (21.12)	12.67 (20.83)	7.55 (15.94)	11.07 (19.3)
14	SCT-3	12.45 (20.64)	8.7 (17.14)	9.67 (18.10)	10.27 (18.63)
15	SCT-4	14.39 (22.28)	12.00 (20.25)	8.75 (17.19)	11.71 (19.91)
16	SCT-5	12.00 (20.25)	11.76 (20.04)	4.75 (12.58)	9.50 (17.62)
17	SCT-6	10.00 (18.41)	8.69 (17.12)	6.45 (14.70)	8.38 (16.75)
18	SCT-7	11.18 (19.51)	9.09 (17.54)	5.85 (13.99)	8.71 (17.01)
19	SCT-8	10.67 (19.05)	10.00 (18.41)	10.07 (18.49)	10.25 (18.65)
20	SCT-9	19.34 (26.06)	11.85 (20.12)	8.79 (17.23)	13.33 (21.13)
21	Mean	13.99 (21.66)	12.17 (20.14)	9.55 (17.45	

* : Values in parentheses are angular transformed values; #Quintal: (Iprodione 25%+ Carbendazim 25%)

Factors	C.D.	SE(m)
Compost tea	0.33	0.12
Number of sprays	0.86	0.31
Interaction	1.49	0.53

Table 5. Effect compost tea (dung 75%+ paddy straw25% + *Trichoderma viride* 1%) on the yield of chrysanthemum

S.No	Treatment	Percent Disease Index	Yield (g)	Percent increase in yield
1	Inoculated (Control)	26	950.00	-29.68*
2	Uninoculated (healthy)	0	1351.67	-
3	Inoculated and Sprayed with compost tea	4.21	1395.00	3.26
4	Uninoculated, Sprayed with compost tea	0	1358.33	0.52
	CD (0.05)		15.61	
	Sem$\pm$		4.71	

*: '-'Indicates percent reduction of yield