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Management of taro leaf blight disease caused by *Phytophthora colocasiae* Racib

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ABSTRACT
Taro (Colocasia esculenta (L.) Schott. is an important tuber crop of coastal areas of Andhra Pradesh, India. It is a rich source of carbohydrate, protein, minerals and vitamins. Leaf blight of taro (Phytophthora colocasiae Raciborski) is a major biotic stress in the cultivation of taro during monsoon and is widely spread in India. A field trial was conducted to manage the during Kharif, 2012-13 to evaluate the effect of seed treatment and soil application of bioagents and fungicide, foliar sprays and integration of components for the management of taro blight (Phytophthora colocasiae Racib.). The data on per cent disease index was collected at 90 days after planting and data on yield (t ha-1) was recorded at the time of harvest. The results revealed that all the treatments significantly decreasing the disease incidence and significantly increasing the yield. The treatment T5 (T1 - Seed treatment (10 gm /kg seed) and soil application of Trichoderma viride (T1 isolate) @ 2 kg ha-1 at the time of planting + Foliar application of mancozeb@ 2.0%) gave significant reduction of disease parameter and increase cormel yield
Key words: Phytophthora, fungicides, bioagents, disease management

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INTRODUCTION

Taro,(*Colocasia esculenta* (L.) Schott) a tropical aroid is an important staple crop in the developing countries especially in Africa and South East Asian countries. It is widely cultivated in South Africa, Asia, Oceania, Central Africa, West Indies and the islands of the Caribbean and Central America (Chandra, 1984). Leaf blight caused by *Phytophthora colocasiae* Raciborski is the most important disease of Taro and was recorded for the first time by Butler and Kulkarni (1913) in India. Leaf blight has become a limiting factor for production in all taro growing areas in India moderate to severe form causing 25% to 50% yield loss every year (Misra, 2007). Leaf blight disease is prevalent in almost all the major taro growing districts of Andhra Pradesh with varying intensities on different varieties causing yield loss of 10-55 per cent (Laxmi *et al.* 2012). The disease appears with the onset of monsoon and spreads the entire field during rainy season through zoospores and sporangia and gives blighted appearance. Fungicides are primarily used for control of the disease. However, the waxy layer on the surface of the leaf and incessant rainfall during crop growth period make the fungicidal application less effective (Misra, 1999). Moreover, chemical control of this disease is not affordable for marginal and substantial level farmers. Therefore, attempts for management of this disease by using of tolerant cultivar with fungicides along with potential biological control agents were made and results are presented.

MATERIALS AND METHODS

A field experiment was conducted during *Kharif*, 2012 at Vegetable Research station, S.K.L.T.S. Horticulture University, ARI, Rajendranagar, Hyderabad in randomized block design with 8 treatments and replicated thrice. Taro variety Satamukhi susceptible to *Phytophthora* leaf blight was planted on June

25th, 2012. The treatments were imposed at the time of planting and recommended agronomic practices were followed throughout the experiment. Each treatment plots had a size of 3.6 x 3.0 m having five rows and single row have ten plants. Disease observations were recorded at weekly interval, starting with the first appearance of disease, the disease was scored on 0-5 scale (AICRP, 2008). The disease incidence, percent disease intensity, percent reduction over control was calculated as per standard procedure.

Treatments

T_1	-	Seed treatment and soil application of *Trichoderma viride* (commercial) at the time of planting.
T_2	-	Seed treatment and soil application of *Pseudomonas fluorescens* (commercial) at the time of planting
T_3	-	Seed treatment and soil application with potential bio agent (*Trichoderma* sp. 1) at the time of planting
T_4	-	Foliar application of mancozeb
T_5	-	T_1 (Seed treatment and soil application of *Trichoderma viride* (commercial) at the time of planting) + T_4 (Foliar application of mancozeb)
T_6	-	T_2 (Seed treatment and soil application of *Pseudomonas fluorescens* (commercial) at the time of planting) + T_4 (Foliar application of mancozeb)
T_7	-	T_3 (Seed treatment and soil application with potential bio agent (*Trichoderma* sp. 1) at the time of planting) + T_4 (Foliar application of mancozeb)
T_8	-	Water spray (control)

RESULTS AND DISCUSSIONS

All the treatments were significant in reducing the disease index and increasing the yield except T_2 (Seed treatment and soil application of *Pseudomonas fluorescens* (commercial) at the time of planting) which was not significant.

Table. Effect of different treatments on per cent disease incidence of leaf blight caused by *Phytophthora colocasiae* and yield of Taro under field conditions during *Kharif*, 2012

Treatment No.	Treatments	Per cent disease incidence	Per cent reduction over control	Yield (Tones ha^{-1})
T_1	Seed treatment and soil application of *T. viride* (commercial) at the time of planting	60.3 (50.9)*	18.0	22.6
T_2	Seed treatment and soil application of *P. fluorescens* (commercial) at the time of planting	68.2 (55.7)	7.3	19.6
T_3	Seed treatment and soil application of potential bioagent *Trichoderma* sp. 1 at the time of planting	65.4 (53.9)	11.2	20.6
T_4	Foliar application of mancozeb	51.6 (45.9)	29.8	23.9
T_5	T1 - Seed treatment and soil application of *T. viride* (commercial) at the time of planting + T4 - Foliar application of mancozeb	36.8 (37.3)	50.0	28.3
T_6	T2 - Seed treatment and soil application of *P. fluorescens* (commercial) at the time of planting + T4- Foliar application of mancozeb	47 (43.2)	36.1	24.4
T_7	T3 - Seed treatment and soil application of potential bioagent *Trichoderma* sp. 1 at the time of planting + T4 - Foliar application of mancozeb	42.3 (40.5)	42.5	25.1
T_8	Water spray – control	73.6 (59.1)	-	16.4
	CD (P = 0.05)	7.64		4.93
	SEm±	2.49		5.97
	CV (%)	8.91		12.45

Treatment T_5 (T_1 - Seed treatment and soil application of *Trichoderma viride* (commercial) at the time of planting + T_4 Foliar application of mancozeb) was highly significant in reducing the disease incidence by 50 per cent over control followed by T_7 (T_3 - Seed treatment and soil application with potential bio agent (*Trichoderma* sp. 1) at the time of planting + T_4 - Foliar application of mancozeb) which reduced the disease by 42.5 per cent. The treatment T_6 (T_2 - Seed treatment and soil application of *Pseudomonas fluorescens* (commercial) at the time of planting + T_4 - Foliar application of mancozeb) reduced the disease by 36 per cent followed by T_4 (29.8%), T_1 (18%) and T_3 (11.2%). Treatment T_2 could reduce the disease incidence by 7.3 per cent and was non significant when compared to other treatments.

Similarly all the treatments were significant in increasing the yield except T_3 and T_2 which were not significant. Highest significant yield was obtained in treatment T_5 with 28.3 t ha^{-1} followed by T_7 (25.1%), T_6 (24.4 t ha^{-1}) and T_4 (23.9 t ha^{-1}) which were almost on par with each other. Treatment T_1 recorded an yield 22.6 t ha^{-1} and the other two treatments T_3 (20.6 t ha^{-1}) and T_2 (19.6 t ha^{-1}) though non significant recorded lowest yield. The treatment T5 recorded per cent disease incidence of 36.8 with significant increase in yield of 28.1 t ha^{-1} when compared to control.

Similar results were obtained by Singh et al (2005) who conducted a field experiment on the effect of antagonists and fungitoxicant application on leaf blight of yam. The severity of leaf blight was significantly reduced due to corm treatment with antagonist and fungitoxicants and ranged between 27.85 - 56.70 per cent. The severity in check was 99.33 whereas the severity in the treated plots ranged 43.00 per cent to 71.66 per cent.

Singh *et al*. (2005) found that the mixture of *Trichoderma harzianum* + *Pseudomonas fluorescens* resulted in maximum reduction of the disease.

Ashok Bhattacharyya and Saikia, (1996) conducted field experiments during 1990–91 at Jorhat, Assam, India, to study the effect of fungicides in controlling leaf blight caused by *Phytophthora colocasiae* in *Colocasia esculenta* revealed that 0.2% Metalaxyl and Mancozeb was the most effective treatment, followed by 0.2% Captafol, Bordeaux mixture and 0.25% Mancozeb. A significant increase in yield was recorded for all treatments over the untreated control. Bordeaux mixture gave the highest incremental cost-benefit ratio over the control (1:30.3).

CONCLUSION

Disease management of Taro leaf blight with different treatments indicated that with the decrease in per cent disease incidence there was an increase in yield. The treatment T_5 recorded per cent disease incidence of 36.8 with significant increase in yield of 28.1 t ha^{-1} when compared to control.

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