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Short Communication

Integrated management of *Colletotrichum lindemuthianum*, the incitant of anthracnose in Cowpea

Manas Ranjan Satpathy[1] and Surjya Kanta Beura[2*]

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Cowpea is an important food legume and an essential component of cropping systems of the dry regions of the tropics covering parts of Asia, Middle East, Southern Europe, Africa, Southern USA, Central and Southern America. Legumes (poor man's meat) play an important role in human nutrition since they are rich sources of protein, calories, minerals and vitamins. Especially for the lower income group population, the cowpea is a better alternative source for protein, minerals, ash, etc. as compared to other legumes (Deshpande, 1992). Dry cowpea seed is very rich in protein (23-33%), and is a good compliment to the staple cereals, starchy roots and tubers of most African diets. The total carbohydrate content of the seed ranges between 56-68%, while the percentage of fat ranges from 1.4-2.7%. Cowpeas are one of the best natural sources of Folic acid. Cowpea diseases induced by different pathogens and among the fungal diseases, anthracnose is one of the most dreaded diseases which is incited by *Colletotrichum lindemuthianum* (Sacc. & Magn.) Scribber, perfect stage - *Glomerella lindemuthianum* Shear. Anthracnose cause economic losses in tropical regions of Africa, Latin America and Asia where conditions are wet and humid for the main part of the growing season (Latunde-Dada, 1990). The loss of about 50% of the cowpea productivity due to anthracnose has been a major bottleneck in its cultivation. In order to study the synergistic effect of seed treatment with fungicides and bio-control agent, soil drenching with bio-control agent and foliar spray with fungicide on control of anthracnose disease, field trials were conducted with variety Utkal Manika for three consecutive seasons of 2007- 2009 at the farmer's field, Bhubaneswar. T_1 = Seed treatment with Vitavax Power(2.0%), T_2 = Seed treatment with Sanjeevani (6gm/Kg), T_3 = T_1 + Spraying with Difenconazole (0.05%), T_4 = T_2 + Spraying with Difenconazole (0.05%) T_5 = T_1 + Soil application with Sanjeevani (2Kg / ac), T_6 = T_2 + Soil application with Sanjeevani (2Kg / ac), T_7 = Spraying with Difenconazole (0.05%), T_8 = Soil application with Sanjeevani (2Kg / ac), T_9 = Control

The seed treatment was done 24 hours before sowing. First foliar spraying and soil drenching were applied on 25th day after germination, then subsequent spray and soil drenching were applied at 10 days intervals. Utkal Manika is a cowpea variety released by the All India Coordinated Research Project on Vegetable Crops, O.U.A.T., Bhubaneswar, Odisha. Sanjeevani is *Trichoderma viride* based bio-fungicide available commercially in solid formulation, which is highly effective in controlling some devastating crop diseases. It is marketed by International Panacea Limited, Cannaught Circus, New Delhi-110001

Dosage for seed treatment – 6gm of Sanjeevani per Kg of seed. For soil drenching in main fields, 2 Kg Sanjeevani was mixed with 25 Kg farm yard manure (FYM) thoroughly and drenched for one acre of land. Standard agronomical practices were followed. The plants were artificially inoculated on 18th day of sowing by spraying with spore suspension ($5x10^5$ spores/ml) of *C. lindemuthianum* to build up high inoculum density in the field. Observations in terms of per cent disease incidence were recorded in the 0-5 scale (Singh *et al.*,1990) just one day prior to each spraying and after 7 days of last spraying. The incidence of anthracnose and cumulative cowpea green pod yield was worked out.

Per cent Disease Incidence (PDI):

$$PDI = \frac{\text{Sum of all numerical ratings}}{\text{Total number of observations X maximum disease rating}} \times 100$$

[1]Department of Botany, D.D. (Autonomous) College, Keonjhar-758001
[2]Department of Plant Pathology, College Agriculture, O.U.A.T., Bhubaneswar-753003

Table 1: Effect of Seed treatment, soil application with bio-control agent and foliar spray of fungicides on disease incidence, green pod yield and economics.

Treatments	PDI		Green Pod Yield		Economics				
	Mean	% disease control	Mean	% yield over control	Excess produce over control (Qtl.)	Expenditure over Control (Rs/ha)	Return over Control Gross	Return over Control Net	Cost Benefit Ratio
T_1- Seeds treated with Vitavax power	11.6 (19.91)*	67.4	47.74	83.82	21.6	5880	23760	17880	3.04
T_2- Seeds treated with Sanjeevani	14.4 (22.30)	59.5	43.57	67.77	17.4	5375	19140	13825	2.6
T_3- T_1 + Spraying with difenconazole	2.1 (8.33)	94.1	68.14	162.37	41.7	7843	45870	38027	4.85
T_4- T_2 + Spraying with difenconazole	3.8 (11.24)	89.3	64.58	149.71	38.0	7244	41800	34556	4.77
T_5- T_1 + Soil application with Sanjeevani	5.2 (13.18)	85.3	62.44	140.43	36.0	6975	39600	32625	4.68
T_6- T_2 + Soil application with Sanjeevani	6.1 (14.30)	82.8	55.03	111.89	28.6	6328	31460	25132	3.97
T_7- Spraying with difenconazole	7.0 (15.34)	80.3	60.29	132.15	34.1	6640	37510	30870	4.65
T_8- Soil application with Sanjeevani	9.5 (17.95)	73.3	52.61	102.5	26.4	6120	29040	22920	3.75
T_9- Control	34.5 (35.97)	---	25.97	---	---	---	---	---	---
SEm±	0.777		2.513						
C.D(0.05)	2.330		6.687						

* Figures in parentheses are the transformed angular values

Economics of all the applications were worked out on the basis of the prevailing market price of green pod of cowpea @ Rs. 1100/- per quintal, labour wage @ Rs. 100/- per day per person and cost of fungicides, sanjeevani taking into account. The synergistic effect of seed treatment with chemical and bio-control agent accompanied by soil drenching with bio-control agent and foliar spray with fungicide was studied under field condition. The fungicides and bio-control agent were selected for field experiments based on their performance on laboratory tests.

The results of the field evaluation (Table.1) of seed dressing chemical vitavax power, foliar application chemical difenconazole and one bio-control agent Sanjeevani (*Trichoderma viride*) and their combination revealed that all the treatments included under the study controlled the disease significantly. Seed treatment with vitavax power and foliar spraying with difenconazole recorded the lowest incidence of 2.1% followed by seed treatment with Sanjeevani along with foliar spraying with difenconazole accounting for 94.1% and 89.3% disease control, respectively. The same treatments i.e. T_3 followed by T_4 also registered maximum green pod yield of 68.14q/ha and 64.58q/ha accounting for 162.37% and 149.71% yield over control giving rise to cost benefit ratio of 1:4.85 and 1:4.77, respectively.

Lowest disease incidence was recorded from the plots where seed treatment was done with vitavax power accompanied by spraying with difenconazole. This treatment combination resulted in maximum green pod yield and high cost-benefit ratio. This was followed by seed treatment with sanjeevani and foliar spraying with difenconazole. The result of the present investigation on foliar spray agrees with the findings of Krishnamohan *et al.* (1989) in cotton boll-rot and Biswas (1992) in chilli anthracnose and die back.. Soil drenching with sanjeevani accompanied by seed treatment with vitavax power have been proved effective. It may thus be suggested that seed treatment with vitavax power 24 hours before sowing followed by foliar spraying with difenconazole twice at 10 days intervals starting from 25th day after germination or seed treatment with sanjeevani followed by spraying with difenconazole may be taken up for management of anthracnose disease of cowpea.

References

Deshpande SS (1992) Food legumes in human nutrition: a personal perspective. Reviews in Food Science and Nutrition. 32: 333-363.

Krishnamohan G, Algarsamy G, Jeyaranjan R (1989) Effect of fungicides on the control of cotton boll-rot. Ind J of Myco and Pl Patho. 19(1): 103-104.

Latunde-Dada AO (1990) Assessment of anthracnose disease in some cultivars of cowpea (*Vigna unguiculata*) caused by *Colletotrichum lindemuthianum*. J Phytopatho. 133(3):247-254.

Singh H, Singh J, Kaur S (1990) Resistance sources to fruit rot (*Colletotrichum capsici*) and pepper (*Capsicum annum* L.). J of Res P A U. 27(3): 419-420.