



Integrated Management Module For Management Of Black Gram (*Vigna Mungo*) Diseases In Assam

Pranab Dutta¹, Arti Kumari², Gaurav Phookan³, Bishal Saikia⁴, M. S. Rao⁵ and Pradip Bhowmick⁶

^{1,2,3, 4 &6}Department of Plant Pathology, Assam Agricultural University, Jorhat-785013, Assam

⁵Retd. Principal Scientist, IIHR, Bangalore, Karnataka

¹Present address: School of Crop Protection, College of Post Graduate Studies in Agricultural Sciences, Central Agricultural University, Umiam, Meghalaya-793103

¹e-mail: pranabdutta74@gmail.com

ABSTRACT

A field experiment was conducted at the experimental farm, Department of Horticulture, Assam Agricultural University, Jorhat, Assam to formulate an Integrated Pest Management module for management of diseases of black gram (*vignamungo*) in Assam conditions. Six different treatment combinations were tested viz., T1: Control (Incorporation of dhaincha, *Sesbania bispinosa*), T2: T1 + *Trichoderma viride* incorporation, T3: T2 + seed treatment with All Rounder (*ArkaKrishi*), T4: T3 + *T. viride* enriched vermicompost application @ 5 tonnes/ha, T5: T4 + application of neem pesticides, T6: T5 + seed treatment with *Rhizobium*. Observations were recorded on percent disease incidence for major diseases of black gram viz., Web blight, *Cercospora* leaf spot, viral infections. Also, Percent pest infestation was recorded for major pest of blackgram i.e. *Aphid* and leaf folder. Plant growth parameters and total yield of the crop were also recorded. Results revealed that the minimum disease incidence and pest infestation was observed on application of treatment T6 i.e., application of dhaincha + *T. viride*+ seed treatment with All Rounder+*T. viride* enriched vermicompost+ neem based pesticides+ seed treatment with *Rhizobium*. Also, the plant growth parameters i.e. pod length, number of seeds per pod, plant height and total yield of black gram was found highest in treatment T6. Thus, the treatment T6 provided effective disease and pest management with increased plant health and total yield.

Key words: Black gram, Dhaincha, *Trichoderma viride*, *Rhizobium*.

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INTRODUCTION

Black gram (*Vigna mungo*; Family: Fabaceae) commonly known as Urad dal or black lentil is an important pulse crop grown in the Indian subcontinent. Its centre of origin is North Eastern India – Myanmar region of Asia. In Assam, Black gram occupies a significant position in terms of area coverage, total production and productivity. Among all the pulse crops grown in Assam, Black gram occupies first position in terms of area of cultivation with 37,412 ha which covers 32.5% total pulse area. In terms of total production, it ranks first with 19,056 MT which is 31% of total pulse production in Assam [2] although, the total production of black gram in Assam is much below the production at national level. In Assam, black gram is grown twice in a year. It is grown either as a summer crop or as a kharif crop. Non significant production of Black gram in Assam may be attributed to the combined effect of numerous factors viz., Incidence of diseases and pest, non availability of high yielding varieties for agroclimatic condition prevailing in Assam. One of the major constraint in realizing the potential yield of black gram is the occurrence of various diseases and pests. Black gram is known to be infected by a number of fungi viz., *Rhizoctonia solani*, *Cercospora canescens*, viruses, insects and nematodes which reduces the quantity and quality of production. Integrated Pest Management module can be an effective tool in management of diseases and pest with greater reduction in the use of synthetic pesticides for the greater benefit of farming community. Adoption of Integrated Pest Management approaches offers scope for maintaining health of soil as well as the health of infected plants. The present study aims at developing an Integrated Pest Management module for major diseases and pest of blackgram.

MATERIAL AND METHODS

The field experiment was conducted at experimental farm, Department of Horticulture, Assam Agricultural University, Jorhat, Assam, which is situated at 26°44'N, 94°10'E and 91 m above mean sea level. The soil was sandy loam in texture, well drained with P^H5. The experiment was laid out in RBD design with three replications. Seven different treatment combinations were tried for development of IPM module *viz.* T₁: Control (Incorporation of dhaincha), T₂: T₁ + *Trichoderma viride* incorporation, T₃: T₂ + seed treatment with All Rounder (ARKA KRISHI), T₄: T₃ + *T. viride* enriched vermicompost application @ 5 tonnes/ha, T₅ : T₄+ application of neem based pesticides, T₆: T₅ + seed treatment with Rhizobium. The assessed variety of blackgram was a local landrace and was sown in an area of 2.5 X 2.5 m² with recommended seed rate and spacing.

Percent disease incidence were recorded for major diseases of blackgram *viz.* web blight, cercospora leaf spot, viral infections at an interval of 45 and 60 days after sowing. Pest infestation was recorded at 30 and 45 days after sowing for pests *viz.* Leaf folder, Aphid.

For assessment of plant parameters, observations were recorded for Pod length, Number of seeds per pod, Plant height and total yield at 70 and 100 days after sowing.

RESULTS AND DISCUSSION

The present study had revealed that the treatment T₆ followed by T₅ had a profound effect on the crop black gram right from yield to management of pest as well as diseases. The results for percent disease incidence revealed that lowest disease incidence occurred in treatment T₆ and T₂ with disease incidence of major diseases *viz.* web blight disease (6.66%,10%), Cercospora leaf spot (16.66%, 3.3%), viral infection(0.00%, 0.00%) with potash deficiency (10%, 10%) respectively which was recorded after 60 days of sowing. Also, percent pest infestation was found to be lowest in treatment T₅ and T₆ for major pests of black gram *viz.* aphid (10%,10%) & leaf folder (60%,83%) respectively which was recorded after 45 days of sowing. The effect of different treatments on plant growth parameters was recorded and found highest in treatment T₆ with Pod length (5.20 cm), Number of seeds per pod(11), Plant height (23 cm) and yield (0.0372 q/ha).

Pest and disease suppression with better plant growth and yield in treatment T₆ may be attributed to the combined effect of indigenous biocontrol agents, effect of neem and overall integrated management of the field. Incorporation of dhaincha one month prior to sowing adds organic matter to soil with relatively more Nitrogen, low C:N ratio and behaves almost like nitrogenous fertilizers [3]. This helps to increase crop yield keeping the use of fertilizers at low level. Green manure like dhaincha during decomposition releases nutrients and involve in recycling of NPK in integrated plant nutrient systems. Incorporation of dhainchamay also facilitate the reduction of soil borne diseases, weeds and pests.

Biological control agent, *Trichoderma viride* possess profound mycoparasitic abilities, allowing this fungi to not only parasite, but also prey on other fungi [6, 7]. *Trichoderma* spp. colonise roots of plants endophytically and improves plant growth and health, even helping to delay the onset of heat stresses and prevent the attack of pathogens [5].

T. viride enriched vermicompost contains a mixture of undigested organic wastes, microbes, vitamins, enzymes, hormones like auxin, and gibberellins. Hormones and enzymes are believed to stimulate plant growth and discourage plant pathogens. It also enriches the soil with useful microorganisms which add different enzymes like phosphatase and cellulase to the soil thus enhances germination, plant growth and crop yield.

Incorporation of neem based pesticides acts as insect repellent, insect feeding inhibitor and pest reproduction controller due to presence of Azadirachtin, belonging to the class tetranortriterpenoids [4]. Seed treatment with Rhizobium are known to increase plant growth through soil enrichment by N-fixation, phosphate solubilisation, siderophore production and phytohormone production [1]. Rhizobium influences the production of cellulases, proteases, lipases and B-1,3 glucanase and enhances plant defense by triggering induced system resistance through lipopolysaccharides, flagella, homoserine lactones, acetone and butanediol against pest and pathogens. Also, it contains useful variation for tolerating abiotic stresses like extremes of temperature, pH, salinity, drought etc.

All the above mentioned traits may have collectively contributed to the pest and disease suppression with increased plant health and yield. Thus, Treatment T₆ was found to be the desired Integrated Pest Management module for management of diseases of black gram in Assam conditions.

Table 1: Pest infestation record (%) in different treatments of black gram

Treatments		Pest			
		30 days after sowing		45 days after sowing	
		Leaf folder	Aphid	Leaf folder	Aphid
T1	Control (Incorporation of dhaincha)	13.33	10.00	83.33	56.66
T2	T1 + <i>Trichoderma viride</i> incorporation	13.33	0.00	93.33	66.66
T3	T2 + seed treatment with All Rounder (ARKA KRISHI)	13.33	3.33	76.66	60.00
T4	T3 + <i>T. viride</i> enriched vermicompost application @ 5 tonnes/ ha	13.33	6.66	93.33	50.00
T5	T4 + neem based application of neem pesticides	10.00	0.00	60.00	10.00
T6	T5 + seed treatment with <i>Rhizobium</i>	13.33	0.00	83.33	10.00
	SEd (\pm)	0.78	0.98	1.53	1.78
	CD (p=0.05)	1.56	2.10	2.34	3.25

Table 2: Disease incidence record (%) in different treatments of black gram

Treatments		Disease							
		Web blight disease		Cercospora leaf spot		Viral infection		Potash deficiency	
		45 DAS	60 DAS	45 DAS	60 DAS	45 DAS	60 DAS	45 DAS	60 DAS
T1	Control (Incorporation of dhaincha)	0.00	13.33	6.66	16.66	0.00	0.00	6.66	36.66
T2	T1 + <i>Trichoderma viride</i> incorporation	3.33	10.00	0.00	3.33	0.00	0.00	0.00	10.00
T3	T2 + seed treatment with All Rounder (ARKA KRISHI)	23.33	43.33	40.00	40.00	0.00	10.00	0.00	0.00
T4	T3 + <i>T. viride</i> enriched vermicompost application @ 5 tonnes/ ha	0.00	10.00	16.66	23.33	0.00	0.00	0.00	6.66
T5	T4 + neem based application of neem pesticides	3.33	23.33	43.33	56.66	3.33	23.33	0.00	10.00
T6	T5 + seed treatment with <i>Rhizobium</i>	0.00	6.66	3.33	16.66	0.00	0.00	0.00	10.00
	SEd (\pm)	1.34	2.45	2.65	1.87	-	1.22	-	1.65
	CD (p=0.05)	2.56	4.87	5.34	3.78	-	4.20	-	3.24

Table 3: Plant parameters and yield recorded from different treatments of black gram

Treatments		Pod length (cm)	No. Of seeds per pod	Plant height (cm)	Yield (q/ha) 100 DAS
T1	Control (Incorporation of dhaincha)	4.50	8.00	19.00	0.0221
T2	T1 + <i>Trichoderma viride</i> incorporation	4.50	8.00	17.50	0.0205
T3	T2 + seed treatment with All Rounder (ARKA KRISHI)	4.90	8.00	17.00	0.0142
T4	T3 + <i>T. viride</i> enriched vermicompost application @ 5 tonnes/ ha	5.00	8.00	20.00	0.0377
T5	T4 + neem based application of neem pesticides	5.00	9.00	22.00	0.0337
T6	T5 + seed treatment with <i>Rhizobium</i>	5.20	11.00	23.00	0.0372
	SEd (\pm)	0.45	0.32	0.89	0.006
	CD (p=0.05)	0.94	0.68	1.78	0.012

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