Journal of Entomology and Zoology Studies

Available online at www.entomoljournal.com

E-ISSN: 2320-7078
P-ISSN: 2349-6800
JEZS 2019; 7(3): 1570-1573

Received: 26-03-2019
Accepted: 29-04-2019

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Management of yellow mosaic virus in blackgram through agronomic practices

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Abstract
Field experiment was conducted to study the potential agronomic practices in two successive years to have dependable technology for field level management of yellow mosaic viral disease (YMVD) of Blackgram. The basic objective behind the experiment was to come out deliverables which is not only capable to effectively check the disease but vis-a-vis residue free and sustainable. The experiment included blackgram with agronomic practices such as growing of border crops with sorghum, maize, pearl millet and inter crops of sorghum, maize and pearl millet in the ratio of 5:1 and also the insecticide application treatment and control as comparison. Among all the treatments tested the treatment with chemical application for management of whitefly recorded lowest disease incidence and realized highest yield. Whereas among the different agronomic practices, T_5 and T_6 (growing maize, pearl millet as a border row) recorded the highest values of growth parameters like Plant height (cm), No. of pods plant^{-1}, yield and also the economic returns. Among the agronomic practices the treatments T_5 (23.27 and 20.27) and T_6 (23.13 and 20.0.27) recorded highest number of pods during the year 2017-18 and 2018-19 respectively. The treatments of blackgram with maize and pearl millet as a border recorded cost benefit ratio of 1.48 and 1.39 during 2017-18 and 1.42, 1.26 in the year 2018-19.

Keywords: Mosaic virus, agronomic practices, blackgram

Introduction

Blackgram (*Vignamungo*) belongs to the family Fabaceae and subfamily Papilionoideae, is one of the most important pulse crops in tropical and subtropical region. The crop is Asiatic in origin was introduced at early 18th century in South China, Indo China and Java. It is now widespread throughout the Tropics and is found from sea level up to an altitude of 1850 m in the Himalayas (Mogotsi, 2006) [5]. Blackgram production is mainly (90%) situated in Asia: India is the largest producer with more than 50% of world production but consumes almost its entire production and China produces large amounts of mungbeans, which represents 19% of its legume production (Lambrides *et al*., 2006) [4]. It is the second important pulse crop of India in terms of area and production next to pigeon pea. It contains 24.5% protein and 59.9% carbohydrate, 75 mg calcium, 8.5 mg iron and 49 mg B-carotene per 100 gm of split dual (Bakr *et al.,* 2004) [2]. India is the world's largest producer of urdbean and is being grown in about 32.46 lakh ha with a production of 19.59 lakh tonnes and productivity of 604 kg/ha (Anon., 2017) [1]. Major black gram growing states are Andhra Pradesh, Bihar, Karnataka, Maharashtra, Madhya Pradesh, Orissa, Rajasthan, Tamil Nadu, Uttar Pradesh and West Bengal (Anon., 2017) [1].

The main reason for low productivity is the susceptibility of the crop to insects, weeds and diseases caused by fungus, virus and bacteria. Among these, the viruses are the most important group of plant pathogens affecting the production of the crop. They cause severe diseases and economic losses in blackgram and reducing seed yield and quality (Obaiah *et al.,* 2014) [7]. Plant viral diseases cause serious economic losses in many pulse crops by reducing seed yield and quality (Schreinemahers *et al.,* 2015) [9]. Among the various viral diseases, the yellow mosaic disease caused by *Mungbean yellow mosaic virus* (MYMV) is the most serious disease and major bottle neck for the production of blackgram. This disease is popularly known as "Yellow plague of kharif pulses" is currently spread over different agriculture zones of India including southern dry zone of Andhra Pradesh.

The disease is special attention because of severity and ability to cause huge yield loss depending upon the variety and stage of the crop (Nene, 1972) [6]. Although, techniques for management of yellow mosaic disease comprises use of resistant varieties, vector management, management of collateral hosts of viruses and alteration in cultural practices are not found sufficient individually to manage the disease significantly. So far there are no management strategies directly aimed at virus, use of insecticides is the only option remains left to combat with disease through vector management. Therefore, there is need to develop a better management practices which involves more of agronomic practices. In this context, the present study was undertaken on different aspects using different practices for management of yellow mosaic virus in blackgram.

Materials and Methods

A field experiment was conducted during summer, 2017-18 and *Kharif*, 2018-19 at Agricultural Research Station, Jangamaheshwarapuram, Gurazala, and Guntur for the management of YMV in blackgram. The experiment was replicated three times with each plot size of 80 m^2 and a with spacing 30 cm x 10 cm in randomized complete block design (RCBD). LBG-623 YMV susceptible variety was taken. The plants were always kept under careful observation. Necessary intercultural operations were done through the cropping season for proper growth and development of the experimental plants. The experiment included eight treatments (T_1=Blackgram: Sorghum (5:1), T_2= Blackgram: Maize (5:1), T_3=Blackgram: Pearl millet (5:1), T_4= Sorghum as a border row (3 rows), T_5= Maize as a border row (3 rows), T_6= Pearl millet as a border row (3 rows), T_7= Check (Chemical Control), T_8= No measures to control YMV).

Randomly ten plants were taken from each treatment based on visual observation recorded disease incidence%. Based on these ten plant mean values for YMV incidence from three replications was given at every 7 days interval from sowing to 70 DAS *i.e* till the crop attains maturity. Plant height, Yield attributing characters (No. of pods per plant, No. of seeds per pod, test weight) and Yield (kg/ha) were recorded at the time of harvesting. The percentage of Disease incidence (%) for each plant is recorded based on visual observation (Percent Disease incidence (PDI) =% of Plant part infected compared total plant. The experimental data was analysed by using Two-way ANOVA with CD at 5%.

Results and Discussion

Among all the treatments, highest plant height was recorded in the treatment T_5: Maize as a border row (52.67 cm) followed by T_6: Pearl millet as a border row (47.00), T_7: Chemical Control (45.73 cm) and least plant height were recorded in untreated control (23.47 cm) during the year 2017-18. Similar results were observed during the year 2018-19 where T_5: Maize as a border row recorded plant height of 48.70 cm followed by T_6 and T_7 and were on par with each other (Table 1 & 2).

Plant dry matter production was recorded in different treatments during the study period and highest dry matter production was recorded in T_5: blackgram sown with maize as border crop as 31.80 g/plant during 2017-18 and 29.73 g/plant in 2018-19. The treatment T_5 was on par with T_6: Pearl millet as a border row (28.80, 29.26) and T_7: Chemical Control (26.33, 24.34) during the years 2017-18 and 2018-19 years respectively and there was no significant difference among the treatments (Table 1 & 2). Lowest dry matter production per plant was observed in the treatment T_8 where management practices has not been taken up.

Number of pods per plant varied among the treatments and during the year 2017-18 highest number of pods was observed in T_7 where the chemical control have been imposed. Among the agronomic practices the treatments T_5 (23.27 and 20.27) and T_6 (23.13 and 20.0.27) recorded highest number of pods during the year 2017-18 and 2018-19, respectively. As the number of pods among the treatments varied and differed significantly but the test weight (1000 seed weight) not differed statistically. The above findings are in accordance with Ghosh *et al.*, (2009) [3] who reported that Imidachloprid and Thiomethaxam were more effective in reducing yellow mosaic disease incidence and white fly population as compared to other conventional insecticides.

Percent disease incidence of YMV was recorded at weekly interval up to harvesting in all treatments. Among the treatments the lowest disease incidence was observed in the insecticide treatment at all the days of observation with mean disease incidence of 9.30% during 2017-18 and 0.97% in 2018-19. Blackgram sown with border crops of maize and pearlmillet recorded the mean disease incidence of 12.85 and 12.78 respectively during 2017-18 and similar results were observed in the year 2018-19 (Table 3 & 4). Untreated control recorded highest disease incidence during both years of study. Raghupathi and Sabitha (1994) investigated the effect of different barrier crops on the incidence of soybean Yellow mosaic virus and whitefly. Maize and pearl millet as barrier crops for soybean reduced the incidence of yellow mosaic disease by 9.88 and 9.81%, respectively. Further, Sreekant *et al*. (2004) [11] who conducted field experiments in *kharif* season on mungbean cv. K851 intercropping with pigeon pea, maize, sorghum, pearl millet, castor bean and cotton along with sole crop of mungbean. It was reported in reduction of thrips and whiteflies in mung bean intercropped with pearl millet during both the seasons.

The seed yield among the treatments in agronomics practices, was highest in T_5 - blackgram with maize as border row (616.67 kg/ha) followed by the treatment T_6 - blackgram with pearlmillet as border row (593.33 kg/ha). Similar results were observed in the consecutive year also wherein the treatment T_5 and T_6 recorded yields of 635.83 and 561.18 kg/ha respectively and were on par with each other. The treatment where the insecticides were applied for the management of whitefly recorded highest yields in both the years and lowest yields was observed in untreated control. The benefit cost ratio was also found to be highest in the chemical sprayed treatment in both 2017-18 (1.58) and 2018-19 (1.66). Whereas, the treatments of blackgram with maize and pearl millet as border row recorded benefit cost ratio of 1.48 and 1.39 during 2017-18 and 1.42, 1.26 during 2018-19 (Table 1&2). Singh *et al.* (2018) [10] studied the effect of barrier crops in managing viral diseases of pulse crops and reported that maximum protection by barriers depended on many factors such as vigour, thickness and height of barriers, environmental factors like the wind velocity and wind direction and growth of the crop. These barriers were fast growing and taller than mungbean and thus acts as hindrance in movement of whiteflies and reduced the disease incidence with increased yield. Hence, from the above study it is concluded that among different agronomic practices evaluated, growing maize and pearl millet in blackgram as a border row recorded the highest values of growth parameters like Plant height (cm), No. of pods $plant^{-1}$, yield and also the economic returns among the agronomic management practices.

Table 1: Growth, yield and yield attributing characters as influenced by different agronomic management practices during summer, 2017-18

Treatments	Plant height (cm)	Dry matter Production plant^{-1} (g)	No. of pods plant^{-1}	Test weight (1000 seeds)	Seed yield (kg ha^{-1})	Cost of cultivation (Rs. ha^{-1})	Gross returns (Rs.)	Net returns (Rs.)	B:C Ratio (Rs.)
T_1: Blackgram: Sorghum (5:1)	37.00	20.83	18.13	37.48	406.67	22101	36600	14499	0.66
T_2: Blackgram: Maize (5:1)	30.33	17.33	15.53	36.45	356.67	22101	32100	9999	0.45
T_3:Blackgram: Pearl millet (5:1)	33.33	18.67	17.27	36.57	376.67	22101	33900	11799	0.53
T_4: Sorghum as a border row	43.60	23.33	20.27	36.81	436.67	22381	39300	16919	0.76
T_5: Maize as a border row	52.67	31.80	23.27	37.26	616.67	22381	55500	33119	1.48
T_6: Pearl millet as a border row	47.00	28.80	23.13	35.00	593.33	22381	53400	31019	1.39
T_7: Check (Chemical Control)	45.73	26.33	24.60	37.97	678.00	23641	61020	37379	1.58
T_8: No control measures	23.47	13.67	12.53	37.33	273.33	21781	24600	2819	0.13
SEm	3.71	2.23	1.52	3.35	42.51				
CD 5%	11.26	6.76	4.62	10.17	128.94				
CV (%)	16.70	17.10	13.71	NS	16.88				

Table 2: Growth, yield and yield attributing characters as influenced by different agronomic management practices during *Kharif*, 2018-19

Treatments	Plant height (cm)	Dry matter Production plant^{-1} (g)	No. of pods plant^{-1}	Test weight (1000 seeds)	Seed yield (kg ha^{-1})	Cost of cultivation (Rs. ha^{-1})	Gross returns (Rs.)	Net returns (Rs.)	B:C Ratio (Rs.)
T_1: Blackgram: Sorghum (5:1)	34.73	21.52	18.13	37.48	487.18	22101	43830	21729	0.98
T_2: Blackgram: Maize (5:1)	33.00	17.65	16.53	40.79	502.56	22101	45270	23169	1.05
T_3:Blackgram: Pearl millet (5:1)	30.27	21.84	17.60	36.57	466.67	22101	42030	19929	0.90
T_4: Sorghum as a border row	42.80	21.60	18.60	36.81	518.99	22381	46710	24329	1.09
T_5: Maize as a border row	48.70	29.73	20.27	37.26	635.83	23641	57240	33599	1.42
T_6: Pearl millet as a border row	46.30	29.26	22.47	37.97	561.18	22381	50490	28109	1.26
T_7: Check (Chemical Control)	44.13	24.34	23.13	39.33	662.45	22381	59580	37199	1.66
T_8: No control measures	26.80	23.93	15.53	38.22	275.42	21781	24750	2969	0.14
SEm	2.95	2.19	1.54	3.83	39.89				
CD 5%	8.95	6.65	4.67	11.64	121.00				
CV (%)	13.33	15.99	14.40	NS	13.45				

Table 3: YMV incidence recorded during summer, 2017-18

Treatments	Percentage of incidence of YMV in blackgram crop (Weekly interval)										
	7 DAS	14 DAS	21 DAS	28 DAS	35 DAS	42 DAS	49 DAS	56 DAS	63 DAS	70 DAS	Mean
T_1: Blackgram: Sorghum (5:1)	0.00	0.00	0.00	12.45	18.52	24.55	26.17	28.00	29.00	41.50	18.02
T_2: Blackgram: Maize (5:1)	0.00	0.00	0.00	12.78	18.73	22.99	25.83	28.00	45.00	55.00	20.83
T_3: Blackgram: Pearl millet (5:1)	0.00	0.00	0.00	13.01	17.74	25.97	26.00	28.00	49.00	54.00	21.37
T_4: Sorghum as a border row	0.00	0.00	0.00	14.13	20.71	30.76	32.53	33.00	35.00	45.50	21.16
T_5: Maize as a border row	0.00	0.00	0.00	7.25	11.38	16.56	21.30	22.00	24.00	26.00	12.85
T_6: Pearl millet as a border row	0.00	0.00	0.00	7.86	10.34	10.26	22.30	25.00	26.00	26.00	12.78
T_7: Check (Chemical Control)	0.00	0.00	0.00	4.97	6.41	9.55	16.10	17.00	19.00	20.00	9.30
T_8: No control measures	0.00	0.00	0.00	21.03	24.14	29.32	36.33	40.00	43.00	60.00	25.38

Table 4: YMV incidence recorded during *Kharif*, 2018-19

Treatments	Percentage of incidence of YMV in blackgram crop (Weekly interval)										
	7 DAS	14 DAS	21 DAS	28 DAS	35 DAS	42 DAS	49 DAS	56 DAS	63 DAS	70 DAS	Mean
T_1: Blackgram: Sorghum (5:1)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	5.00	10.17	1.67
T_2: Blackgram: Maize (5:1)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.33	13.33	13.33	3.50
T_3: Blackgram: Pearl millet (5:1)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.00	18.33	2.63
T_4: Sorghum as a border row	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	13.00	16.67	2.97
T_5: Maize as a border row	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00	8.50	1.35
T_6: Pearl millet as a border row	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00	7.60	5.00	1.76
T_7: Check (Chemical Control)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.33	8.33	1.07
T_8: No control measures	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.33	11.67	18.33	3.33

References

1. Anonymous. Selected state wise Area, Production and Productivity of blackgram (Kharif and Rabi) in India, Ministry of Agriculture and Farmers Welfare. Govt. of India. 2017.
2. Bakr MA, Afzal MA, Hamid A, Haque MM, Aktar MS. Blackgram in Bangladesh. Lentil Blackgram and Mungbean Development Pilot Project, Publication No.25, Pulses Research Centre, BARI, Gazipur; c2004. p. 60.
3. Ghosh D, Laha SK, Biswas NK. Effect of different pesticides on incidence of mungbean yellow mosaic virus incidence. International Journal of Plant protection. 2009;2(1):67-70.
4. Lambrides CJ, Godwin ID. Mungbean. In: Chittarajan, K., Genome Mapping and Molecular Breeding in Plants. 2006;3:69-90.
5. Mogotsi KK. *Vignaradiata* (L.) R. Wilczek. In: Brink, M. & Belay, G. (Editors). PROTA 1: Cereals and

pulses/Céréalesetlégumessecs. [CD-Rom]. PROTA, Wageningen, Netherlands. 2006.

6. Nene YL. A study of viral disease of pulse crops in Uttar Pradesh. Res Bull No. 4, G. B. Pant. Univ, Agric. Tech., Pantnagar; c1972. p. 144.
7. Obaiah S, Reddy BV, Reddy NP, Prasad Y. Molecular detection of yellow mosaic virus infecting blackgram (*Vignamungo*) in Andhra Pradesh. Int. J. Pl., Anim. Environ. Sci. 2014;4(1):16-18.
8. Raghupathi N, Sabitha D. Effect of barrier crops, mulching and yellow sticky traps in the management of yellow mosaic virus disease of soybean.In Crop Diseases - Innovative Techniques and Management. Eds. Sivaprakasam, K. and Seetharaman, K., Kalyani Publishers, New Delhi; c1994. p. 419-420.
9. Schreinemahers P, Balasubramanian S, Boopathi N, Viet C, Kenyon L, Praneetvatakul S. Farmer’s perception and management of plant viruses in vegetables and legumes in tropical and subtropical Asia. J Crop prot. 2015;75:115-123.
10. Singh A, Mukherjee V, Kumar S. Viral Diseases in Mung Bean and their Integrated Management. Int. J. Pure App. Biosci. SPI: 2018;6(1):184-189.
11. Sreekant M, Sreeramulu M, Rao RDVJP, Babu BS, Babu TR. Effect of intercropping on Thripspalmi (Karny) population and peanut bud necrosis virus (PBNV) incidence in mungbean (*Vignaradiata*). Indian J. Plant Protect. 2004;32(10):45-48.