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Survey for Incidence of Mungbean Yellow Mosaic Virus (MYMV) in Mungbean *Vigna radiata* (L.) Wilczek

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Abstract

Field surveys in mungbean growing areas of Warangal and Khammam districts of Andhra Pradesh during *rabi* season, 2009-10 have assessed the incidence and severity of mungbean yellow mosaic virus (MYMV) and populations of the whitefly vector (*Bemisia tabaci*). Results revealed that MYMV incidence was wide spread in Warangal district during vegetative (49.6%) and flowering (57.70%) stages as compared to Khammam district, which recorded 42.20 and 50.62% of disease incidence respectively. This study can be used to predict future disease spread, develop appropriate management strategies and compare disease development between seasons and locations.

Key words : Mungbean, *Bemisia tabaci*, MYMV.

Mungbean *Vigna radiata* (L.) Wilczek is one of the important and widely cultivated pulse crops in different seasons in India. Mungbean is grown in India an area of about 3.7 million ha with an annual production of 1.5 million tonnes. In Andhra Pradesh, it is cultivated in an area of 3.19 lakh ha with an annual production of 1.49 lakh tones (1). Mungbean in attacked by a variety of sucking and lepidopteran insect pests. Among these pests, whitefly *Bemisia tabaci*, jassids *Empoasca* spp. and thrips *Thrips palmi* are of major importance (2). Whitefly causes severe damage and serious threat to the crop growth and can also affect the crop stand and yield of mungbean. *B. tabaci* acts as vector of mungbean yellow mosaic virus (MYMV), a serious disease of mungbean crop and its incidence resulting in considerable yield losses ranging from 34 to 86% (3). During recent years in Andhra Pradesh the area under mungbean cultivation has come down drastically as the MYMV disease is affecting the crop in severe form and reduced the productivity of the crop. Therefore, there is a need to study the disease occurrence and its spread in different parts of Andhra Pradesh to chalk out better management of the disease.

Methods

The survey was carried out to have first hand information on the occurrence of whitefly vector and MYMV incidence on mungbean in two districts of Andhra Pradesh viz., Warangal and Khammam. In each district, the survey was conducted two times during *rabi* season 2009-10. The first survey was done at the time of vegetative stage of the crop and second survey at the time of flowering stage of the crop.

For conducting the survey, in each district, three mandals with three villages in each were selected for study and in each village three fields were surveyed randomly. In each field 1 m^2 area was selected from each of four corners of the field leaving the border rows and another 1 m^2 area was fixed at center of the field to record the whitefly population and MYMV incidence. The number of diseased plants and total number of plants in each of fixed area were recorded. The diseased plants were identified based on the symptoms of presence of bright yellow patches on leaves interspersed with green areas, complete yellowing and stunting of the plants (4). The per cent disease incidence was calculated by using the

Table 1. Survey for incidence of whitefly vector and MYMV in Warangal district of Andhra Pradesh during vegetative stage and flowering stage of mungbean crop (*rabi*, 2009-10).

District	Mandal	Village	No. of fields surveyed	No. of whiteflies/ plant		MYMV incidence (%) Vegetative stage		Flowering stage		Cultivars
				V-stage	F-stage	Mean	Range	Mean	Range	
Warangal	Venkatapur	Lakshmidev pet Palam pet Guram pet	9	2–5	1–7	50.20	17.65–82.76	59.81	29.00–90.62	LGG-460, LGG-407, PDM-11, Local Pasera
	Govindarao pet	Govindarao pet Dampalligudam Pasara	9	2–4	2–6	46.77	12.90–80.64	54.27	24.17–84.37	LGG 467, WGG 26, MGG 348, NMI
	Manga pet	Bikshan pet Narasimhasagar Komath palli	9	1–8	1–11	51.88	16.67–87.09	58.98	25.81–72.00	MGG350, MGG 347, WGG 26, Local pasera

formula

$$\text{MYMV diseased incidence (\%)} = \frac{\text{Number of diseased plants}}{\text{Total number of plants}} \times 100\%$$

For recording whitefly population, five plants were selected randomly from each field and three leaves representing top, middle and bottom part of each plant were selected and number of whiteflies found on the three leaves were counted during early morning hours and the overall mean population was computed.

Results and Discussion

Incidence of MYMV and Whitefly Vector in Warangal District

The survey was carried out in three mandals of Warangal district viz., Venkatapur, Govindarao pet and Mangapet where mungbean is extensively cultivated. The sirvey carried out during vegetative stage of the crop (Table 1) revealed that mean incidence of MYMV was more in Mangapet (51.88%) followed by Venkatapur with 50.20% incidence, while in Govindarao pet, Comparatively less incidence of MYMV (46.77%) was recorded. At flowering stage of the crop, MYMV incidence was more in Venkatapur mandal (59.81%) followed by Mangapet with 58.98% incidence, while Govindarao pet recorded 54.27% disease incidence. The population counts of whitefly vector recorded during the survey period in different mandals of Warangal district ranged from 1.0—8.0 whiteflies/plant during vegetative stage and 1.0—11 whiteflies/plant during flowering stage of mungabean crop.

Incidence of MYMV and Whitefly Vector in Khammam District

Survey atvegetative stage of the crop in Khammam district (Table 2) revealed that the mean MYMV incidence in three mandals of khammam district ranged from 37.54 to 47.36%. Of all the mandals surveyed, highest MYMV incidence (47.36%) was recorded in Konijerla mandal followed by 41.93 and 37.54% disease incidence recorded in Madhira and Paloncha mandals, respectively. During flowering season, considerable increase in the MYM incidence was observed in all the three mandals of Khammam district. High incidence of MUMV (52.48%) was observed in Konijerla mandal closely followed by Madhira (51.77%). Paloncha mandal recorded 47.61% disease incidence. The population counts of whitefly vector recorded during survey period ranged from 1.0—5.0 whiteflies/plant during vegetative stage and 3.0—11 whiteflies/plant during flowering stage of the crop.

The summary (Table 3) of the survey findings on MYMV incidence during vegetative and flowering stages of mungbean crop revealed that the disease incidence was more in Warangal district both during vegetative and flowering stages and recorded 49.61% and 57.70% MYMV disease, respectively when compared to Khammam district, which recorded 42.20 and 50.62% disease incidence at vegetative and flower-

Table 2. Survey for incidence of whitefly vector and MYMV in Khammam district of Andhra Pradesh during vegetative stage and flowering stage of mungbean crop (*rabi*, 2009-10).

District	Mandal	Village	No. of fields surveyed	No. of whiteflies/ plant		MYMV incidence (%)				Cultivars
						Vegetative stage		Flowering stage		
				V-stage	F-stage	Mean	Range	Mean	Range	
Khammam	Madhira	Madhira Krishnapuram Siripuram	9	2–6	1–5	41.93	16.12–67.74	51.77	24.24–79.31	Mgg 295, MGG 348, LGG 460, PIMS 4
	Paloncha	Somalagudam Keshapuram Bikkuthanda	9	1–5	1–7	37.54	13.77–61.29	46.71	19.35–75.86	MGG 348, MGG 330, Local pasera, NMI
	Konijeral	Peddagopathi Singarayapalam Gubbagurthy	9	2–8	3–11	47.36	15.16–78.57	52.48	18.75–86.21	MGG 295, MGG 348, MGG 361, Local paera

ing stages, respectively.

The survey studies conducted in 3 mandals of Warangal district revealed that during vegetative stage the three villages viz., Bikshanpet, Marasimhasagar and Komathpalli of Mangapet mandal recorded high mean incidence of MYMV (51.88%) ranging from 16.67 to 87.09%, while during flowering stage Lakshmidev pet, Palam pet and Guram pet of Venkatapur mandal recorded a high mean MYMV incidence of 59.81% ranging from 29.0 to 90.62%. The three villages of Govindarao pet mandal viz., Govindarao pet, Dampalligudam and Pasara recorded comparatively low mean incidence of MYMV both during vegetative (46.77%) and flowering (54.27%) stages when compared to other two mandals.

In Khammam district, Peddagopathi, Singarayapalam and Gubbagurthy villages of Konijerla mandal recorded high mean incidence of MYMV both during vegetative (47.36%) and flowering (52.47%) stages of mungbean crop while the incidence recorded in other two mandals varied from 37.54 to 41.93% and 47.61 to 51.77% during vegetative and flowering stages respectively.

The variation in MYMV incidence observed in two districts and different mandals of each district in the present study could be attributed to the growing of different varieties, variation in sowing time of the crop, varied environmental conditions prevailling during survey period and non-adoption of recommended package of practices by the farmers for growing the crop, establishment of different weeds etc. which might contribute to the variation in population dynamics of vector and subsequent incidence of MYMV. Pathak and Jhamaria (5) reported that mungbean yellow mosaic virus (MYMV) incidence ranged from 2.22 to 100% depending upon the varieties. Nath and Saikia (6) studied the effect of weather parameters on whitefly populations and incidence of YMV on greengram during 1990-91 in Assam and reported simple positive significant correlation between MYMV disease incidence, whitefly population, temperature, relative humidity, rain fall and yield of greengram had a negative correlation with disease incidence. Decisions on the timing and frequency of sampling are affected by seasonal variability of weather conditions (especially, rainfall and temperature) that influence crop growth and symptom expression and consequently the quality and consistency of the data collected. Rainfall and temperature also influence adult whitefly populations (7).

The characteristics of vector insect populations, e.g., which species or biotypes are present, can be

Table 3. Summary of the survey on the incidence of mungbean yellow mosaic virus (MYMV) in two districts of Andhra Pradesh during *rabi* season, 2009-10. * – Mean incidence of MYMV on mungbean in three mandals and nine villages.

	Particulars	Warangal*		Khammam*	
		Vegetative stage	Flowering stage	Vegetative stage	Flowering stage
1	No. villages surveyed	9	9	9	9
2	No. farmer's field surveyed	27	27	27	27
3	MYMV incidence (%)	49.61	57.7	42.2	50.62

key factors in the emergence and development of plant virus diseases (8). To minimize the devasting effects of whitefly-transmitted viruses in mungbean, sustainable vector and disease management options need to be developed, tested and deployed including the use of resistant and/or tolerant cultivars, as well as cultural and biological control practices. There is a need for training of entomologists and virologists in areas of detection, identification and characterization of whitefly-transmitted viruses, whiteflies and their natural enemies as well as training in epidemiological research methodologies. The development of such options needs to be based on and supported by appropriate research institution.

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