

Prevalence of Viral diseases of Urdbean in Guntur District of Andhra Pradesh

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ABSTRACT: Urdbean is one of the important grain legume crops grown in India mainly for protein and nutrition. However, the production and productivity were very little due losses caused by various viral diseases from seedling to harvesting stage. Guntur district being the major pulse region of the Andhra Pradesh annually suffers from incidence of various viral diseases in urdbean. A comprehensive and systematic survey was carried out with the main objective to determine the incidence and prevalence of *Mungbean Yellow Mosaic Virus (MYMV)* and other viral diseases of urdbean during *kharif* and *rabi* 2019-2020 in ten major urdbean growing mandals in Guntur district of Andhra Pradesh. The results revealed a huge variation in incidence of all the viral diseases among the surveyed mandals and also within the mandals. However, the study recorded the highest overall mean incidence and severity of *MYMV* (13.54% and 20.18% during *kharif*; 22.08% and 30.32% during *rabi*) followed by leaf crinkle incidence (17.86% and 16.80%) and leaf curl incidence (16.06% and 11.65%) in Guntur district. Among all the surveyed villages, highest incidence (44.53%) and severity (65.15%) of *MYMV* was recorded in Muthupalle village of Nizampatnam mandal during *rabi*, whereas highest incidence of leaf curl (30.99%) was recorded in Govada village Amruthalur mandal during *kharif* and leaf crinkle (27.99%) was recorded in Karankivaripalem village of Nagaram mandal during *rabi*.

Keywords: Urdbean, Prevalence, MYMV, Viral diseases.

INTRODUCTION

Urdbean or blackgram (menumulu) [*Vigna mungo* (L.) Hepper] (2n=22) is one of the third chief pulse crops after chickpea and pigeonpea which is grown extensively as a source of nutrition and income (Ratnam, 2015). The crop is native of Indian sub-continent (Vavilov, 1926) and mainly grown as main, catch, cover, green manure, intercrop and multiple cropping systems during *kharif*, *rabi* and summer seasons under wide range of agro-climatic conditions (Srivastav *et al.*, 2012). The production of urdbean is mostly confined to Asian countries, of which, India is the largest producer with an area of 5.60 million hectares producing 3.60 million tons with the productivity of 546 kg/ha (Department of Agriculture and Cooperation, GOI, 2018-19). Major urdbean growing areas in India are Andhra Pradesh, Gujarat, Karnataka, Madhya Pradesh, Maharashtra, Orissa, Punjab, Rajasthan, Sikkim, Tamil Nadu and Uttar Pradesh accounting for about 75% of total production (Annual report, 2017). In Andhra Pradesh, blackgram occupies an area of 0.31 million hectares, giving a total production of 0.32 million tons and productivity of 977 kg/ha (Department of Agriculture and Cooperation, GOI, 2018-19). In coastal Andhra Pradesh, it fits well under rice fallow-pulse ecosystem with residual moisture after the harvest of paddy. It is an important

grain legume crop with high and easily digestible protein, and low flatulence contents (Salam *et al.*, 2009). It contains 24% protein, 60% carbohydrates, 4% minerals, 1.3% fat and 0.4% vitamins. It is a highly prized pulse with 5-6% rich in phosphoric acid than other pulses and consumed in the form of 'dal' or perched (Prema *et al.*, 2018).

Despite large area under urdbean cultivation, the productivity was very low due to many pests (e.g.: pod borers, sucking pests etc.), diseases (e.g.: *Alternaria* leaf spot, *Cercospora* leaf spot, powdery mildew, viral diseases etc.) and other abiotic factors. However, viral diseases are considered to be the most serious constraint in urdbean production across the Indian sub-continent with annual estimated yield loss up to 5-100% depending upon genotype and the age of the plant at which the infection occurs (Ghafoor *et al.*, 2000; Nene, 1972; Rathi, 2002; Singh, 1980; Singh *et al.*, 1982; Varma *et al.*, 1992; and Varma *et al.*, 1992). Crops infected at initial stages suffer more with severe symptoms of mosaic, complete yellowing, crinkling, curling and puckering (Salam, 2011). The viruses are transmitted by whitefly, thrips and aphids in a semi to persistent manner. Though regular incidences of viral diseases in urdbean growing regions of Andhra Pradesh are being observed, there were no systematic surveys and reports on the prevalence of viral diseases across major urdbean growing mandals in Guntur district in

recent years. One of the recent surveys conducted during the *rabi* season of 2013-14 in three mandals of Guntur district such as Chebrolu, Ponnuru and Tsundur reported the incidence of *MYMV* and severity were in the range of 4.00 & 1.78% to 36.00 & 38.22%, whereas incidence of leaf curl and leaf crinkle were in the range of 6% to 18% and 11 to 25% (Ratnam, 2015). However, no large-scale surveys were taken up on viral disease occurrence, covering multiple mandals, different agro-climatic zones, and cropping systems. Therefore, the present study was carried out with a systematic and robust surveys with the main objective to know the incidence of various viral disease in Guntur district of Andhra Pradesh which helps in formulating suitable management practices to farmers.

MATERIAL AND METHODS

Major urdbean growing mandals of the Guntur district of Andhra Pradesh were surveyed for the occurrence

and incidence of *MYMV* and other viral diseases during *Kharif* and *rabi* 2019-2020 when the crop was between the Vegetative to pre harvest stage. The disease incidence in each field was determined by selecting five number of one square meter areas *viz.*, four from each of the four corners, leaving the border rows and other at the center. Per cent disease incidence for each virus disease was calculated by using the following formula:

$$\text{Per cent disease incidence (PDI)} = \frac{\text{Number of infected plants}}{\text{Total number of plants}} \times 100$$

However, *MYMV* severity was assessed mandal-wise by following disease rating scale given by Alice and Nadarajan, (2007) (Table 1).

Table 1: Disease rating scale for *MYMV* (1-9 scale).

Scale	Description
1	No visible symptom on leaves or very minute yellow specks on leaves.
2	Small yellow specks with restricted spread covering 0.1-5% leaf area.
3	Yellow mottling of leaves covering 5.1-10% leaf area.
4	Yellow mottling of leaves covering 10.1-15% leaf area.
5	Yellow mottling and discoloration of 15.1-30% leaf area.
6	Yellow discoloration of 30.1 to 50% leaf area.
7	Pronounced yellow mottling and discoloration of leaves and pods, reduction in leaf size and stunting of plants covering 50.1-75% foliage.
8	Severe yellow discoloration of leaves covering 75.1 to 90% of foliage, stunting of plants and reduction in pod size.
9	Severe yellow discoloration of leaves covering above 90.1% of foliage of plant, stunting of plants and no pod formation.

The per cent disease index (PDI) was computed from the above scale by using the following formula (Wheeler, 1969).

$$\text{PDI} = \frac{\text{Sum of all the numerical ratings}}{\text{Number of observations} \times \text{Maximum disease grade}} \times 100$$

RESULTS AND DISCUSSION

A. Disease symptoms observed under natural field conditions

MYMV. *MYMV* produces typical yellow mosaic symptoms in plants. Symptoms first appeared on young leaves in the form of yellow to golden yellow color, diffused, round to irregular spots scattered on the leaf lamina (Fig. 2). Later it is characterized by presence of bright yellow patches interspersed with green areas on leaf lamina and were more concentrated near the leaf venation.



Fig. 1. Healthy Urdbean leaves.



Fig. 2. *MYMV* Symptoms.

The newly emerging leaves showed signs of mottling right from the beginning. Under severe conditions, completely affected leaves turn necrotic and the diseased plants usually mature later and had relatively few flowers and pods. However, similar type of symptoms are reported many of the earlier workers *viz.*, Bhavani and Kumar (2017), Nene (1972), Rathi (2002), Ratnam (2015), Singh *et al.*, (1980) and Singh *et al.*, (2002).

Leaf curl. Leaf curl virus symptoms initially appeared on the young leaves as chlorosis around some lateral veins and their branches near the margin. These veins later turned to necrotic resulting in downward curling of leaves and also twisting in few leaves (Fig. 3). Diseased plants showed reddish-brown discoloration on the under surface of the leaf margins which also extended to the petiole. Early infected plants showed stunted growth followed reduced internodal length and caused death due to bud necrosis. These symptoms are in agreement with the descriptions made in earlier reports of Bhat *et al.*, (2001), Bhavani and Kumar (2017), Nene (1972), Prasadarao *et al.*, (2003), Ratnam (2015) and Thein *et al.*, (2003).



Fig. 3. Leaf curl Symptoms.

Leaf crinkle. Urdbean Leaf Crinkle Virus infected plant showed various kinds of symptoms like puckering, curling of leaves, crinkling, stunted growth and malformation of flowers (Fig. 4). Third trifoliate leaf was characterized by an increase in the size of leaf and a lighter green color (chlorophyll loss). No pods were formed in severely affected plants. In severe cases the plants became sterile giving bushy appearance to inflorescence.

All these observations were similar to those described by Bashir *et al.* (2006), Bhavani and Kumar (2017), Bindra (1971), Khatri *et al.* (1971), Kolte and Nene (1979), Nene (1968), Subbarao (1984), and Ratnam (2015) Williams *et al.*, (1968).



Fig. 4. Leaf crinkle Symptoms.

B. Prevalence of viral diseases in urdbean

Data on the survey conducted for incidence of all the viral diseases in ten major urdbean growing regions of Guntur district was summarized in Table 2 and 3 and the figure 5 and 6 shows the graphical representation of incidence of viral diseases of urdbean in Guntur district. In the surveyed mandals, farmers cultivated urdbean crop in varied soils *viz.*, black loamy, red loamy and sandy loam under rainfed conditions during *kharif* and rice fallow pulse during *rabi* as a sole crop.

MYMV. MYMV was found to be a major problem throughout the Guntur district of Andhra Pradesh and its incidence and severity were varied from 1.86% to 27.48% and 5.62% to 35.28% during *kharif*, whereas in *rabi* 12.99% to 44.53% and 25.96% to 65.15% respectively.

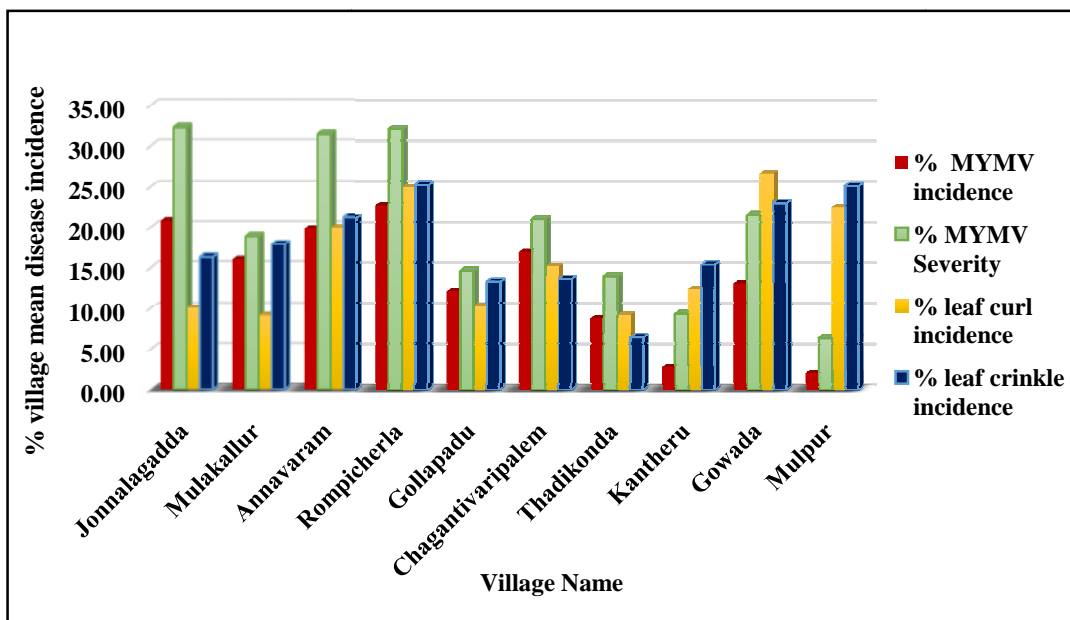


Fig. 5. Graphical representation of incidence of viral diseases of urdbean in Guntur district of Andhra Pradesh during *kharif* 2019-20.

Table 2: Incidence of viral diseases of urdbean in Guntur district of Andhra Pradesh during *kharif* 2019-2020.

S. No.	Name of the District	Name of the Mandal	Name of the Village	Variety of the crop	Stage of the crop	Mean Percent Disease Incidence			Mean MYMV Severity	Preceding / Surrounding crops	
						Leaf Curl	Leaf Crinkle	MYMV			
1	Guntur	Narsaraopet	Jonnalagadda	LBG752	Flowering	10.96	16.94	27.48	35.27	Cotton/Rice	
2			Jonnalagadda	LBG752	Flowering	9.10	15.87	14.04	29.29	Cotton/Rice	
			Village Mean			10.03	16.41	20.76	32.28		
3			Mulakallur	LBG752	Flowering	9.26	17.67	15.83	15.98	Sorghum/ Cotton	
4			Mulakallur	LBG752	Flowering	9.07	18.11	16.46	21.77	Cotton/ Cotton	
			Village Mean			9.17	17.89	16.15	18.88		
		Mandal Mean			9.60	17.15	18.45	25.58			
5		Rompicherla	Annaram	Annaram	LBG752	Pod filling	20.99	20.66	19.99	34.77	Intercrop with Red gram
6				Annaram	LBG752	Pod filling	18.99	21.68	19.73	28.28	Intercrop with Red gram
			Village Mean			19.99	21.17	19.86	31.53		
7			Rompicherla	LBG752	Harvesting	27.99	25.59	24.66	34.61	Intercrop with Red gram	
8			Rompicherla	LBG752	Harvesting	21.99	24.96	20.79	29.65	Intercrop with Red gram	
			Village Mean			24.99	25.28	22.73	32.13		
		Mandal Mean			22.49	23.22	21.29	31.83			
9		Muppalla	Gollapadu	Gollapadu	PU31	Harvesting	10.93	12.99	12.55	11.92	Sorghum/Cotton
10				Gollapadu	PU31	Harvesting	9.74	13.63	11.78	17.39	Sorghum/ Cotton
			Village Mean			10.34	13.31	12.17	14.66		
11			Chagantivaripalem	Chagantivaripalem	PU31	Harvesting	13.44	14.89	15.33	20.20	Sorghum/ Cotton
12				Chagantivaripalem	PU31	Harvesting	16.99	12.35	18.66	21.89	Sorghum/Cotton
			Village Mean			15.22	13.62	17.00	21.05		
	Mandal Mean			12.78	13.47	14.58	17.85				
13	Thadikonda	Thadikonda	Thadikonda	LBG752	Flowering	10.33	5.99	7.98	12.19	Sorghum/ Cotton	
14			Thadikonda	LBG752	Flowering	8.22	6.99	9.67	15.78	Sorghum/ Cotton	
		Village Mean			9.28	6.49	8.83	13.98			
15		Kanteru	Kanteru	PU31	Early Flowering	15.66	15.99	3.12	8.52	Sorghum/ Cotton	
16			Kanteru	PU31	Early Flowering	9.25	14.89	2.54	10.26	Sorghum/ Cotton	
		Village Mean			12.46	15.44	2.83	9.39			
	Mandal Mean			10.87	10.97	5.82	11.69				
17	Amruthalur	Govada	Govada	LBG752	Pod filling	30.99	22.66	13.66	21.85	Maize/ Rice	
18			Govada	LBG752	Pod filling	22.32	23.32	12.55	21.20	Maize/ Rice	
		Village Mean			26.66	22.99	13.11	21.53			
19		Mulpur	Mulpur	PU31	Early Flowering	23.33	26.33	2.26	7.12	Maize/ Rice	
20			Mulpur	PU31	Early Flowering	21.66	23.92	1.86	5.62	Maize/ Rice	
		Village Mean			22.50	25.12	2.06	6.37			
	Mandal Mean			24.58	24.05	7.58	13.95				
	District Mean			16.06	17.86	13.54	20.18				

During *kharif*, that the overall mean incidence of *MYMV* was 13.54% and 20.18% in Guntur district. Lowest *MYMV* incidence and severity of 1.86% and 5.62% was observed in Mulpur village of Amruthalur mandal, whereas the highest incidence and severity of 27.48% and 35.28% was recorded in Jonnalagadda village of Narasaraopet mandal. Among all the mandals surveyed, the highest mean incidence (21.29%) and severity (31.83%) was recorded in Rompicherla mandal (Table 2 and Fig. 5). Similarly, in *rabi*, the overall mean incidence and severity of *MYMV* was 22.08% and 30.32%. Lowest *MYMV* incidence and severity of 12.99% and 25.96% was noticed in Cherukupalli village and mandal, whereas, the highest incidence and severity of 44.53% and 65.15% was recorded in Muthupalle village of Nizampatnam mandal respectively. Of all the mandals surveyed, the highest mean incidence (24.05%) and severity (42.14%) was recorded in Cherukupalli mandal (Table 3 and Fig. 6).

However, similar type of surveys were conducted and documented many workers in earlier. Biswas *et al.* (2009) showed maximum incidence of *Mungbean yellow mosaic India virus (MYMIV)* disease 65.5-72.0% by in urdbean P 2056 cultivar. Salam *et al.* (2011) reported higher incidence of *MYMV* in different districts of Karnataka *viz.*, Bidar (22.64%) and Kalaburgi (17.6%) districts. Panduranga *et al.*, (2012) recorded the higher *MYMV* incidence 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. Manjunath *et al.* (2013) conducted survey of major mung bean growing areas of southern Karnataka indicated the occurrence of *MYMV* disease incidence ranging from 31.49 to 100%. Survey carried out by Ratnam (2015) during *rabi* 2013-14 revealed the incidence and severity of *MYMV* ranged from 4.00-36.00% and 1.78-38.22% in Guntur district in blackgram. However, in the present study, the highest disease incidence and severity were recorded in *rabi* season in Muthupalle village of Nizampatnam mandal which might be attributed due to the growing of susceptible cultivar such as LBG 623.

Leaf curl. Results revealed the overall mean incidence of urdbean leaf curl virus disease was 16.06% and 11.65% during *kharif* and *rabi* in Guntur district. In *kharif*, the lowest leaf curl incidence of 8.22% was recorded in Thadikonda village and mandal, whereas the highest incidence of 30.99% was recorded in Govada village of Amruthalur mandal. Among all the mandals, the highest mean incidence (24.58%) was recorded in Amruthalur mandal (Table 2 and Fig. 5). Similarly, during *rabi* the lowest leaf curl incidence of 7.34% was recorded in Padamatipalem village of Bhattiprolu mandal, whereas the highest incidence of 15.33% was recorded in Amruthalur village and mandal. In all the mandals, the highest mean incidence (12.61%) was recorded in Cherukupalli mandal (Table 3 and Fig. 6).

During early days, Amin *et al.* (1985) reported 5-40 per cent of leaf curl disease on greengram and blackgram in

farmers fields during 1979 in Nalgonda district of A.P. Survey carried out in the major blackgram growing areas of Guntur district of A.P. revealed 7.21- 10.71% of leaf curl incidence during *kharif* 1991-93 (Sreenivasulu, 1994). Krishnaveni (1998) surveyed major blackgram growing areas of A. P. for the leaf curl incidence during 1991 and 1992 *kharif* and *rabi* seasons and noted incidence of leaf curl from 39.00-43.60% in Chittoor district, 4.90-35.90% in Guntur district and 2.50-30.90% in Ranga Reddy district. Leaf curl incidence on urdbean in Guntur, Krishna and Prakasam districts was in the range of 10.04 to 11.98% during *rabi* 2001-02 and from 2.92 to 5.73% in rice fallows of Guntur and Krishna districts (Prasadarao *et al.*, 2003). Ratnam (2015) revealed the incidence of leaf curl ranging from 6-18% in Guntur district during *rabi* 2013-14. However, in the present study, Amruthalur Mandal showed the highest incidence of leaf curl virus disease both the seasons.

Leaf crinkle. The overall mean incidence of urdbean leaf crinkle virus disease in Guntur district of Andhra Pradesh was 17.86% during *kharif* and 16.80% *rabi*. Lowest leaf crinkle incidence of 5.99% was recorded in Thadikonda village and mandal, whereas the highest incidence of 26.33% was recorded in Mulpur village of Amruthalur mandal in *kharif* season. Among all the mandals surveyed, the highest mean incidence (24.05%) was recorded in Amruthalur mandal (Table 2 and Fig. 5). Similarly, during *rabi* the lowest leaf crinkle incidence of 7.96% was recorded in Vemavaram village of Bhattiprolu mandal, whereas the highest incidence of 27.99% was recorded in Karankivaripalem village of Nagaram mandal. Among all the mandals surveyed, the highest mean incidence (21.88%) was recorded in Nagaram mandal (Table 3 and Fig. 6).

According to Nene (1970), blackgram leaf crinkle virus (*BLCV*) was not as widespread as yellow mosaic virus in U.P. Subbarao (1984) conducted a similar survey in Guntur district of A.P during *kharif* and *rabi* in 1982-83 and reported that the blackgram crop suffers seriously from *MYMV* and *BLCV*. Vijaykumar (1993) observed the incidence of *ULCV* disease ranging from 1.15 to 4.52% in Guntur district of A.P. during *kharif* 1993 and also revealed that the incidence of *ULCV* was high during *rabi* (1.25-7.52%) as compared to *kharif* (1.15-4.52%) and rice fallows (1.10-2.52%). The occurrence of *ULCV* under field conditions was also noticed by Vijaykumar and Subbarao (1994) from Guntur district of A.P. Biswas *et al.* (2009) documented the highest disease incidence of 66.1 % by *ULCV* in T 9 cultivar. Survey conducted by Ratnam (2015) during *rabi* 2013-14 in three major blackgram mandals of Guntur district of A. P. revealed leaf crinkle incidence ranging from 11-25%.

In the present study, the incidence and prevalence of *MYMV* is higher than leaf curl and leaf crinkle in both *kharif* and *rabi*. This is mainly due to availability of huge number of whitefly (*Bemisia tabaci*) population for virus transmission. It also observed that urdbean cultivar LBG 752 was occupied greater extent in all the surveyed mandals.

Table 3: Incidence of viral diseases of urdbean in Guntur district of Andhra Pradesh during rabi 2019-2020.

S. No.	Name of the District	Name of the Mandal	Name of the Village	Variety of The crop	Stage of the crop	Mean (%) Disease Incidence			Mean MYMV Severity	Preceding / Surrounding crops
						Leaf Curl	Leaf Crinkle	MYMV		
1	Guntur	Cherukupalli	Cherukupalli	LBG752	Flowering	12.33	20.33	24.66	42.03	Rice/Maize
2			Cherukupalli	LBG752	Vegetative	9.86	13.19	12.99	25.96	Rice/ Maize
			Village Mean			11.09	16.76	18.82	34.00	
3			Arumbaka	LBG752	Pod filling	13.66	18.66	30.44	58.39	Rice/ Maize
4			Arumbaka	LBG752	Vegetative	14.61	15.53	28.09	42.20	Rice/ Groundnut
			Village Mean			14.13	17.09	29.26	50.29	
		Mandal Mean			12.61	16.92	24.05	42.14		
5		Amruthalur	Panchalavaram	PU31	Pod filling	10.33	15.99	27.59	35.28	Rice/ Maize
6				LBG752	Early Flowering	10.60	15.42	23.59	28.68	Rice/Greengram
			Village Mean			10.46	15.70	25.59	31.98	
7			Amruthalur	PU31	Flowering	15.33	26.33	18.66	36.96	Rice/ Maize
8			Amruthalur	LBG752	Pod filling	12.99	16.13	16.36	27.04	Rice/ Maize
			Village Mean			14.16	21.23	17.51	32.02	
		Mandal Mean			12.31	18.46	21.55	31.99		
9		Nizampatnam	Kuchinapudi	LBG752	Flowering	13.66	17.33	14.33	36.79	Rice/ Maize
10				PU31	Early Flowering	13.36	15.33	16.06	31.44	Rice/ Maize
			Village Mean			13.51	16.33	15.19	34.12	
11			Muthupalle	LBG623	Pre-Harvesting	14.66	18.66	44.53	65.15	Rice/ Maize
12				LBG752	Early Flowering	8.33	15.26	20.21	28.68	Rice/ Maize
			Village Mean			11.49	16.96	32.37	46.92	
	Mandal Mean			12.50	16.64	23.78	39.84			
13	Nagaram	Karankivaripalem	PU31	Flowering	10.99	27.99	14.33	36.12	Rice/Sorghum	
14			LBG752	Vegetative	9.06	21.95	18.23	32.54	Rice/ Maize	
		Village Mean			10.02	24.97	16.28	34.31		
15		Nagaram	LBG752	Pod filling	9.66	19.66	19.33	45.41	Rice/Greengram	
16			LBG752	Podfilling	12.32	17.95	21.49	37.17	Rice/ Maize	
		Village Mean			10.99	18.80	20.41	41.29		
	Mandal Mean			10.50	21.88	18.34	37.17			
17	Bhattiprolu	Vemavaram	PU31	Pod filling	9.33	7.96	16.99	35.10	Rice/ Maize	
18			PU31	Pre-Harvesting	12.66	9.48	14.82	29.34	Rice/ Maize	
		Village Mean			10.99	8.73	15.90	32.21		
19		Padamatipalem	LBG752	Pod filling	7.34	9.33	33.86	49.14	Rice/Green gram	
20			LBG752	Flowering	10.33	13.61	25.07	37.01	Rice/ Maize	
		Village Mean			8.83	11.47	29.46	43.07		
	Mandal Mean			9.91	10.10	22.68	37.63			
	District Mean			11.65	16.80	22.08	30.32			

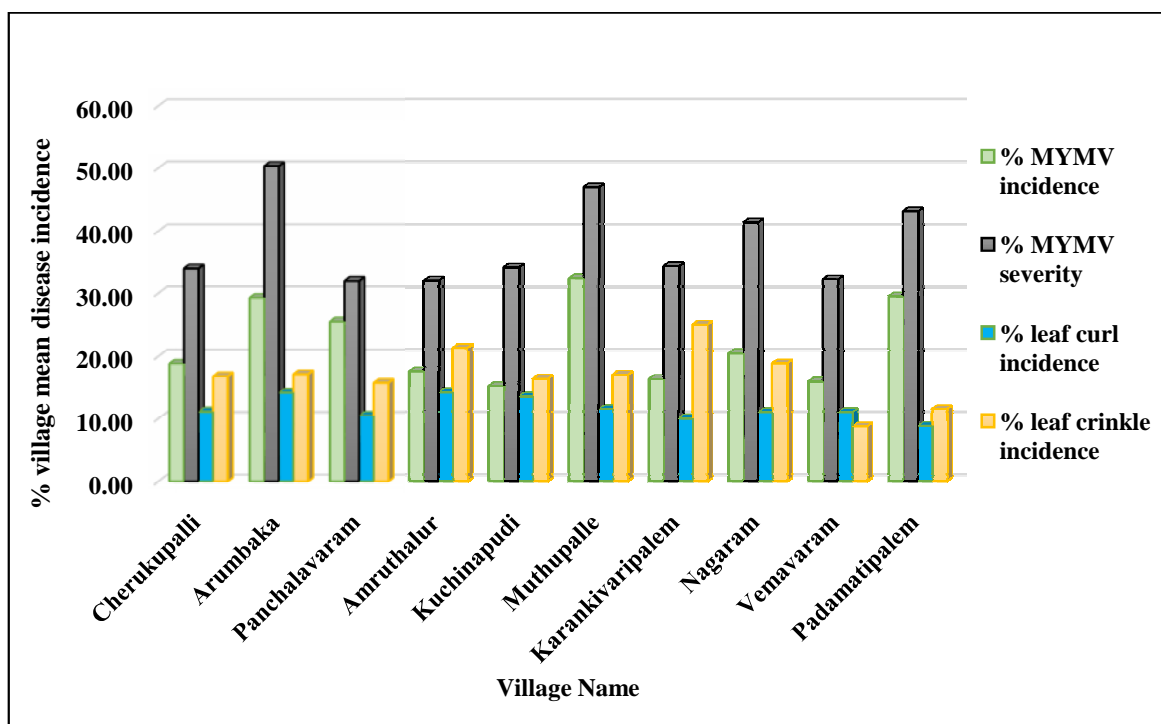


Fig. 6. Graphical representation of incidence of viral diseases of urdbean in Guntur district of Andhra Pradesh during *rabi* 2019-20.

Although, the similar variety was in cultivated in the maximum surveyed villages, the variation in incidence and prevalence of viral diseases among the surveyed fields can be ascribed due to different prevailing cropping systems, differences in sowing time, varied environmental conditions, establishment of different weed flora which acts alternate hosts for virus and non-adoption of recommended management practices by the farmers *etc.*

CONCLUSION

Results indicated the incidence and prevalence of all the viral diseases were observed in all the mandals surveyed in Guntur district of Andhra Pradesh in both *kharif* and *rabi*. Further, a huge variation in incidence of all the three diseases of urdbean was recorded. Highest overall mean incidence and severity of *MYMV* (22.08% and 30.32%) was observed in *rabi* rather than *kharif*, whereas the highest overall mean incidence of leaf curl (16.06%) and leaf crinkle (17.86%) was showed in *kharif* rather than *rabi*. Based on survey analysis, the study clearly showed that *rabi* season is more favorable for the incidence and severity of *MYMV*, whereas *kharif* season highly congenial for the incidence of leaf curl and leaf crinkle virus. The study concludes that management of viral diseases could be done depending upon the incidence level season based. To minimize the devastating effects of caused by various viruses in urdbean, sustainable vector and disease management options need to be established, tested and deployed including the use of resistant and/or tolerant

varieties, as well as biological control and cultural practices like early/ late sowing.

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REFERENCES

- Alice, D., and Nadarajan, N. (2007). Pulses: Screening techniques and assessment for disease resistance. *All India Coordinated Research Project on MULLaRP*, Tamil Nadu Agricultural University. Kasturi Graphics and Printers, Coimbatore, 24.
- Amin, P.W., Ghanekar, A.M., Rajeshwari, R., and Reddy, D.V.R. (1985). Tomato spotted wilt virus as the causal pathogen of leaf curl of mungbean *Vigna radiata* (L.) Wilczek and urdbean *Vigna mungo* (L.) Hepper in A.P., India. *Indian Journal of Plant Protection*, **13**: 9-13.
- Annual report, (2017). Project coordinator's report (Mungbean and Urdbean), *All India Coordinated Research Project on MULLaRP*. ICAR- Indian Institute of Pulse Research, Kanpur, 208 024.
- Bashir, M., Jamali, A.R., and Ahmad, Z. (2006). Genetic resistance in mungbean and mashbean germplasm against mungbean yellow mosaic begomovirus. *Mycopathology*, **4**: 1-4.

- Bhat, A.I., Jain, R.K., Varma, A., Chandra, N., and Lal, S.K. (2001). Tospoviruses infecting grain legumes in Delhi-their identification by serology and nucleic acid hybridization. *Indian Phytopathology*, **54**: 112-116.
- Bhavani, G., and Kumar, V.M. (2017). Incidence of urdbean leaf crinkle with other viral diseases of urdbean in Guntur district of Andhra Pradesh. *Trends in Biosciences*, **10**(44): 9087-9092.
- Bindra, (1971). Studies on arthropods in relation to plant diseases in Punjab. Paper presented at second international symposium, Plant Pathology, IARI, New Delhi. 27th January-3rd February.
- Biswas, K.K., Tarafdar, A., Kumar, A., Dikshit, H.K., and Malathi, V.G. (2009). Multiple infection in urdbean (*Vigna mungo*) in natural conditions by begomovirus, tospovirus and urdbean leaf crinkle virus complex. *Indian Phytopathology*, **62**: 75-82.
- Department of Agriculture and Cooperation, Government of India, (2018-19). Area and production of agricultural crops in India. www.indiaagristat.com.
- Ghafoor, A., Ahmad, Z., Qureshi, A.S., and Iqbal, S.M. (2000). Significance of mungbean yellow mosaic virus on yield and its components in *Vigna mungo*. *Pakistan Journal of Phytopathology*, **12**: 74-78.
- Khatrri, H.L., Bhatia, D.S., and Chohan, J.S. (1971). Brief account of the work done on diseases of kharif pulse crops at department of Botany and Plant Pathology. PAU, Ludhiana during 1970-71. Fifth All India Pulse Improvement Programme Workshop, Hissar.
- Kolte, S.J., and Nene, Y.L. (1979). ULCV: Noteworthy symptoms on host and influence of growth stages on host susceptibility. *Tropical Grain Legume Bulletin*, **15**: 5-8.
- Krishnaveni, D. (1988). Studies of transmission of blackgram leaf crinkle virus. M. Sc. (Ag.) Thesis submitted to Andhra Pradesh Agricultural University.
- Manjunath, B., Jayaram, N., Muniyappa, V., and Prameela, H.A. (2013). Status of yellow mosaic virus and whitefly *Bemisia tabaci* biotypes on mungbean in Southern Karnataka. *Legume Research*, **36**: 62-66.
- Nene, Y.L. (1968). Annual Report (No.1) Project, FG-In-358, Uttar Pradesh Agricultural University, Pantnagar, India.
- Nene, Y.L. (1970). A survey of the viral diseases of pulse crops in Uttar Pradesh. Third Annual Report F.G-In-358. U. P Agricultural University. 1-26.
- Nene, Y.L. (1972). A survey of the viral diseases of pulse crops in Uttar Pradesh. First Annual Report. F.G-In-358, Uttar Pradesh Agricultural University. 1-25.
- Panduranga, G.S., Reddy, P.K., and Rajakhekar, H. (2012). Survey for incidence of Mungbean Yellow Mosaic Virus (MYMV) in mungbean *Vigna radiata* (L.) Wilczek. *Environment and Ecology*, **30**: 1030-1033.
- Prasadarao, R.D.V.J., Reddy, D.V.R., Nigam, S.N., Reddy, A.S., Waliyar, F., Yallamanda Reddy, T., Subramanyam, K., Johnsudheer, M., Naik, K.S.S., Bandhyopadhyay, A. Desai, S. Ghewande, M.P. Basu, M.S., and Somasekhar. (2003). Peanut stem Necrosis: A new disease of groundnut in India. International Crop Research Institute for Semi-Arid Tropics. Information Bulletin No. 67. Patancheru, Andhra Pradesh, India.
- Prema, G.U., and Rangaswamy, K.T. (2018). Molecular Characterization of Coat Protein Gene of Blackgram Yellow Mosaic Virus (BGYMV) from Karnataka, India. *International Journal of Microbiology and Applied Sciences*, **7**(7): 2225-2235.
- Rathi, Y.P.S. (2002). Epidemiology, yield losses and management of major diseases of kharif pulses in India, Plant Pathology and Asian Congress of Mycology and Plant Pathology, University of Mysore, Mysore, India.
- Ratnam, N.J. (2015). Studies on viral diseases of urdbean [*Vigna mungo* (L.) Hepper]. M. Sc. (Ag.) Thesis. Acharya N G Ranga Agricultural University, Hyderabad, India.
- Salam, Sk. (2011). Studies on mungbean yellow mosaic virus disease on greengram. *Karnataka Journal of Agricultural Sciences*, **24**(2): 247-248.
- Salam, S.K., Patil, M.S., and Byadgi, A.S. (2009). IDM of mungbean yellow mosaic disease. *Annals of Plant Protection Science*, **17**: 157-160.
- Singh, R.A., Rajib K.D.E., Gurha, S.N., and Ghosh, A., (2002). Yellow mosaic of mung bean and urd bean. IPM system in Agriculture. 8: 395-408.
- Singh, B.R. Singh, M., Yadav, M.D., and Dingar, S.M. (1982). Yield loss in mungbean due to yellow mosaic. Science and Culture. C.S. Azad University of Agriculture and Technology, Kanpur, India. **48**: 435-436.
- Singh, J.P. (1980). Effect of virus diseases on growth components and yield of mungbean (*Vigna radiata*) and urdbean (*Vigna mungo*). *Indian Phytopathology*, **33**: 405-408.
- Sreenivasulu, A. (1994). Effect of certain management practices on the occurrence of thrips and leaf curl virus on blackgram (*Vigna mungo* L. Hepper). M.Sc. Thesis. Acharya N G Ranga Agricultural University, Rajendranagar, Hyderabad, Andhra Pradesh, India. 90.
- Srivastava, A.K., and Prajapati, R.K. (2012). Influence of weather parameters on outbreak of mungbean yellow mosaic virus in blackgram (*Vigna mungo* L.) of Bundelkhand zone of Central India. *Journal of Agricultural Physics*, **12**: 143-151.

- Thein, H.X., Bhat, A.I., and Jain, R.K. (2003). Mungbean necrosis disease caused by a strain of Groundnut bud necrosis virus. *Indian Phytopathology*, **56**: 54-60.
- Varma, A., Dhar, A.K., and Mandal, B. (1992). MYMV transmission and control in India. In: Green SK, Kim D (eds) Mungbean yellow mosaic disease. Asian Vegetable Research and Development Centre, Taipei, 8–27.
- Vavilov, N.I. (1926). Studies on the origin of cultivated plants. *Bulletins of Applied Botany*. **16**: 139-248.
- Vijaykumar, S., and Subbarao, M. (1994). Incidence of blackgram leaf crinkle virus disease in Guntur District of Andhra Pradesh. *Indian Phytopathology*, **47**: 295.
- Vijaykumar, S. (1993). Studies on blackgram leaf crinkle virus. M. Sc. (Ag.) Thesis submitted to Andhra Pradesh Agricultural University, Hyderabad.
- Wheeler, B.E.J. (1969). An Introduction to Plant Diseases. John Wiley publication, London. 301.
- Williams, F.J., Grewal, J.S., and Amin, K.S. (1968). Serious and new diseases of pulse crops in India in 1966. *Plant Disease Reporter*, **52**: 300-304.

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