Andhra Pradesh J Agril. Sci : 11(3): 218-225, 2025

SURVEY FOR THE INCIDENCE OF SUCKING PEST COMPLEX AND VIRAL DISEASES OF SUNFLOWER IN Y.S.R KADAPA AND KURNOOL DISTRICTS OF ANDHRA PRADESH

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Date of Receipt: 08-07-2025 Date of Acceptance: 26-07-2025

ABSTRACT

A roving survey was carried out in sunflower cultivating areas of Y.S.R Kadapa and Kurnool districts of Andhra Pradesh during rabi, 2024 to know the incidence of sucking pests complex and incidence of viral diseases in sunflower. From the selected districts, different mandals, *viz.,* Thondur, Jammalamadugu, Peddamudiyam, Pattikonda, Yemmiganur and Nandavaram were surveyed randomly for the incidence of sucking pests and viral diseases at crop growth period. Results revealed that whitefly and leafhopper population were more when compared to thrips. The highest mean number of whitefly population per six leaves was recorded in mandal of Thondur (8.69) during the month of January in Y.S.R Kadapa district and followed by Jammalamadugu (8.36). The highest mean number of leafhopper population was recorded in mandal of Jammalamadugu (9.20) during the month of January in Y.S.R Kadapa district and followed by Peddamudiyam (8.78). The highest mean number of thrips population was recorded in mandal of Peddamudiyam (6.79) during the month of January in Y.S.R Kadapa district and followed by Jammalamadugu (6.01). The incidence of viral disease was recorded highest in Thondur mandal with 15.16 % and 12.59 % of leaf curl and necrosis diseases in Y.S.R Kadapa district respectively and among two districts surveyed the highest mean number of whiteflies, thrips and leafhopper population were noticed in Y.S.R Kadapa district. Highest incidence of leaf curl and necrosis i.e, 16.67 % and 12.57 % were observed in Nandavaram mandal of Kurnool district.

KEYWORDS: Sunflower, Sucking pest, whitefly, thrips, leafhopper, viral disease, leafcurl, necrosis.

INTRODUCTION

Sunflower (*Helianthus annuus* L.) is an annual oilseed crop primarily grown for its edible oil and seeds in temperate and subtropical climates worldwide and native to North America. Sunflower seeds contain different micronutrients, macronutrients, saturated and unsaturated fatty acids, vitamins like B_1 and minerals (Skoric *et al*., 2008). Sunflower oil majorly contains 59% linoleic acid (polyunsaturated omega-6), 30% oleic acid (monounsaturated omega-9), 6% stearic acid and 5% palmitic acid (Avni *et al*., 2016). One of the reasons for this is the occurrence of serious insect pests and viral diseases. Sunflower is attacked by nearly 250 species of insects (Basappa and Santha Lakshmi Prasad, 2005). Thrips Thrips palmi (Karny), leafhoppers Amrasca biguttula biguttula (Ishida), whiteflies Bemisia tabaci (Gennadius) are the major sucking pests contributing to yield loss. Thrips attack tender plant parts, result in stunted growth in addition to transmission of the necrosis disease (Chander Rao, 2002). Leaf hoppers (Amrasca biguttula biguttula) suck sap (Jayewar *et al*., 2018) leading to hopper burn symptoms. Recently, whitefly Bemisia tabaci emerged as a new pest and as a vector of leaf curl begomovirus.

In the recent past, another viral disease caused by a begomovirus has been observed in Northern Karnataka, producing leaf curl symptoms mainly on Sunbreed-275 and KBSH-44 upto 40% and 10% respectively (Govindappa *et al*., 2011). Similar kind of disease symptoms were also observed in Aruna and Swathi hybrids of sunflower predominantly grown in Kurnool district in the past two years where in the disease incidence of 85-90% was recorded. The prominent symptoms are small size and malformed leaves, leaf and veinal thickening, enations and upward leaf curling, emerging leaves exhibits yellow discolouration and severe reduction in leaf size. The early infected plants are stunted with no ear head emergence (Venkataramanamma *et al*., 2022). The disease significantly affects the plant height, head diameter, seed weight and oil percentage (Deepa *et al*., 2015). As per the third advanced estimates of 2023-24 (DES), the acreage under sunflower came down drastically to 1.58 lakh ha^{-1} with estimated production of 1.69 lakh tonnes (ICAR-IIOR Annual Report of Sunflower, 2023-24). In

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India, during 2023-24, sunflower was cultivated in an area of 1.51 lakh ha with 1.72 lakh tonnes of production and 1144 kg ha^{-1} of productivity. Sunflower is grown in all the three cropping seasons - kharif, rabi and summer in Andhra Pradesh. sunflower was cultivated on an area 0.04 lakh ha with 0.038 lakh tonnes of production and 886 kg ha^{-1} of productivity in 2023-24. (https://www.indiastatagri.com/).

MATERIAL AND METHODS

A roving survey was conducted to record the incidence of sucking pest complex in major sunflower growing areas of Andhra Pradesh during rabi season, 2024-2025. The districts covered under this study were Y.S.R. Kadapa and Kurnool districts of Andhra Pradesh during rabi from December 2024 to March 2025. From each district, three mandals and five villages from each mandal were selected based on the sunflower area. From each Village, the survey was undertaken in five farmer fields. In each location five plants were selected randomly in a field. Whitefly, thrips and leafhoppers population were counted in sunflower crop by counting the number of nymphs and adults on six leaves *i.e.,* two at bottom, two at middle and two at the top per plant during vegetative stage to flowering stage. In order to study the symptoms of the disease, healthy sunflower plants and sunflower leaf curl infected plants were compared during roving survey from different locations. The symptoms exhibited by the diseased plants were recorded in various stages of crop growth.

Per cent disease incidence (PDI)

The incidence of the disease was recorded during the survey on naturally infected plants by using following equation as suggested by Wheeler (1969). The zigzag pattern is followed to collect required data in which ten randomly selected plants were evaluated at each location.

$$PDI = \frac{\text{Total number of plants infected}}{\text{Total number of plants observed}} \times 100$$

RESULTS AND DISCUSSION

Whiteflies (*Bemesia tabaci*): The results of the survey conducted during 2024-25, revealed that, the mean population of whiteflies in different mandals in Y.S.R Kadapa district ranged between 3.25 to 8.14 whiteflies/6 leaves during December to March months and in Kurnool district the mean population ranged from 3.59 to 7.26 whiteflies / 6 leaves (Table 2 & Figure 1). Similar results were observed Kumari *et al*., (2023) on pulses in farmers field from second fortnight of June 2020 and 2021 to first fortnight of October 2020 and 2021 in Mahendergarh, Rewari and Gurugram districts of Haryana. The population whitefly (7.71 whitefly/plant), was more abundant in Gurugram district as compared to Mahendragarh and Rewari districts. Overall survey studies revealed that sucking pest population and its incidence depends on various climatic factors, it's geographic allocation, genotypes and farmer's cultivation practices.

Thrips (Thrips spp.): The mean population of thrips in different mandals in Y.S.R Kadapa district ranged between 3.03 to 5.98 thrips / 6 leaves during December to March months and in Kurnool district mean population ranged from 2.40 to 4.96 thrips / 6 leaves (Table 2 & Figure 1).

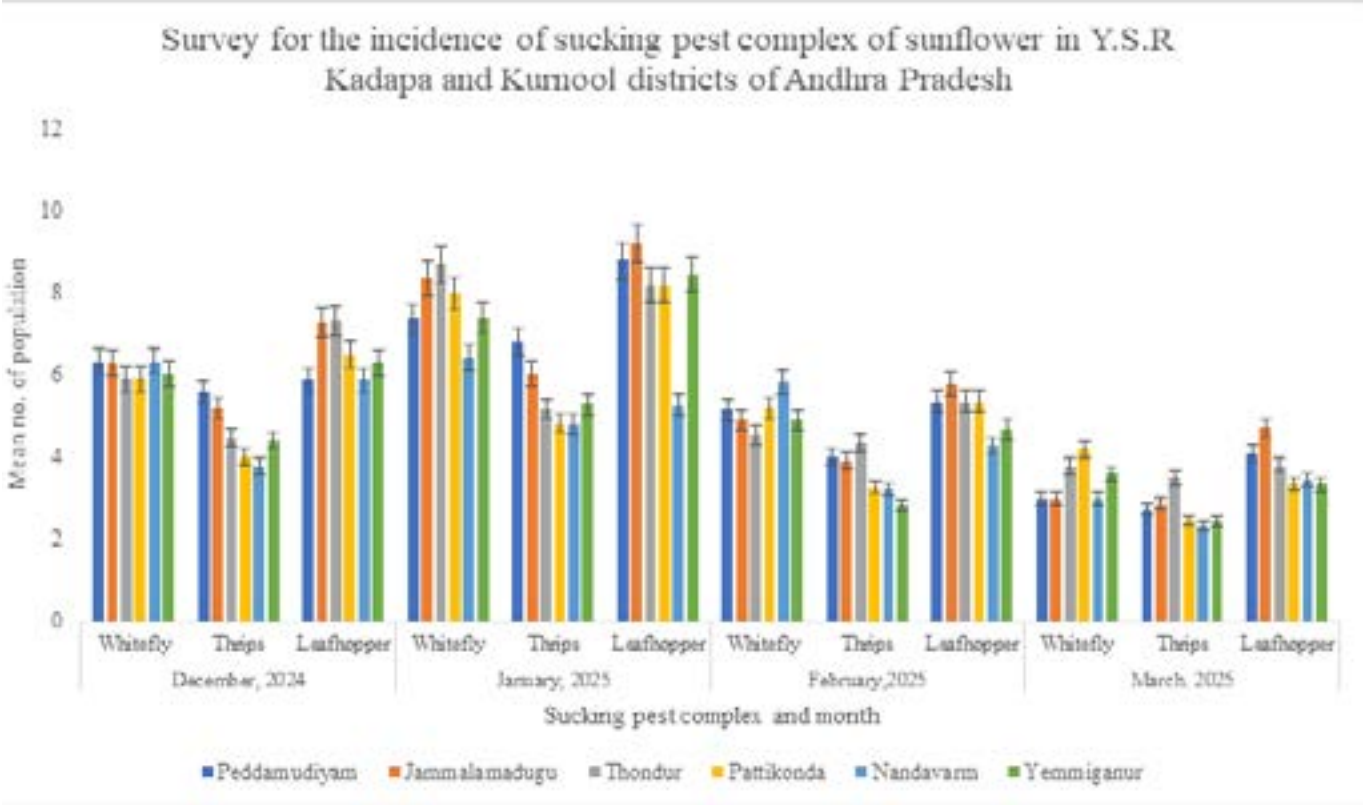
Table 1. Locations selected for survey of sucking insect pests on sunflower at Y.S.R Kadapa and Kurnool district of A.P.

S. No.	District	Mandal	Latitude	Longitude
1.	Y.S.R Kadapa	Peddamudiyam	14.870284°	78.397261°
2.		Jammalamadugu	14.823664°	78.321410°
3.		Thondur	14.588736°	78.299753°
4.	Kurnool	Pattikonda	15.377954°	77.435401°
5.		Nandavarm	15.561037°	77.251354°
6.		Yemmiganur	15.824382°	77.530134°

Table 2. Occurrence of sucking pest complex on sunflower in Y.S.R Kadapa and Kurnool district of Andhra Pradesh during *rabi,* 2024-2025

S. No.	District	Mandal	Mean No. of nymphs or adults / 6 leaves / plant											
			December, 2024			January, 2025			February, 2025			March, 2025		
			W	T	L.H	W	T	L.H	W	T	L.H	W	T	L.H
1.	Y.S.R Kadapa	Peddamudiyam	6.33	5.58	5.85	7.36	6.79	8.78	5.14	4.01	5.35	2.99	2.73	4.08
2.		Jammalamadugu	6.27	5.19	7.27	8.36	6.01	9.20	4.89	3.93	5.77	2.98	2.86	4.69
3.		Thondur	5.89	4.46	7.31	8.69	5.15	8.18	4.53	4.34	5.35	3.77	3.50	3.80
		Mean	**6.16**	**5.08**	**6.81**	**8.14**	**5.98**	**8.72**	**4.85**	**4.09**	**5.49**	**3.25**	**3.03**	**4.19**
4.	Kurnool	Pattikonda	5.89	4.02	6.48	7.98	4.82	8.18	5.19	3.24	5.35	4.19	2.44	3.33
5.		Nandavarm	6.33	3.77	5.85	6.42	4.79	5.25	5.83	3.19	4.26	2.99	2.32	3.44
6.		Yemmiganur	6.01	4.40	6.30	7.38	5.27	8.46	4.89	2.83	4.66	3.58	2.43	3.32
		Mean	**6.08**	**4.06**	**6.21**	**7.26**	**4.96**	**7.30**	**5.30**	**3.09**	**4.76**	**3.59**	**2.40**	**3.36**
	Overall mean		**6.12**	**4.57**	**6.51**	**7.70**	**5.47**	**8.01**	**5.08**	**3.59**	**5.13**	**3.42**	**2.72**	**3.78**
	SE(m)±													
	CD (P=0.05)													
	CV (%)													

W : Whitefly (*Bemesia tabaci*)
T : Thrips (*Thrips* spp.)
L.H : Leafhopper (*Amrasca biguttula biguttula*)



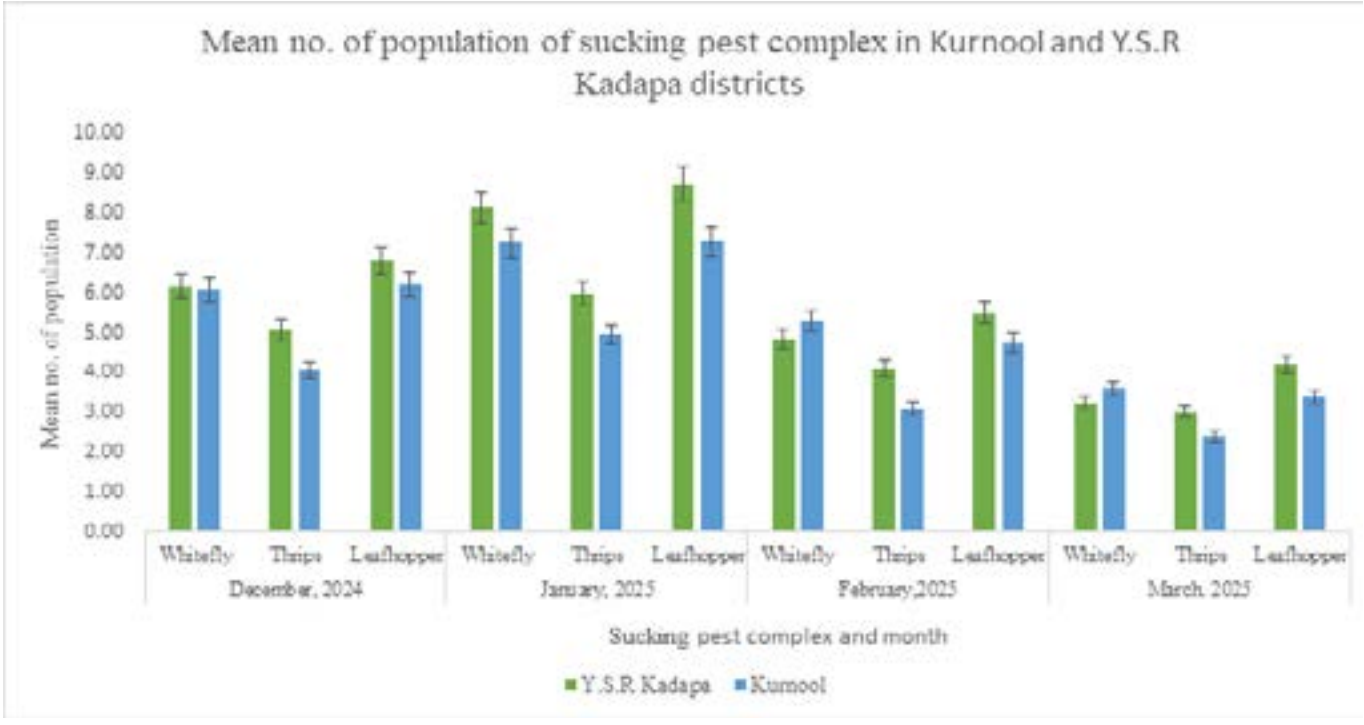


Fig. 1. Survey for the incidence of sucking pest complex in sunflower at Kurnool and Y.S.R Kadapa districts of A.P.

Table: 3 Incidence of viral diseases of sunflower in Y.S.R Kadapa and Kurnool district of Andhra Pradesh during *rabi,* 2024-2025

S. No.	District	Mandal	Diseases of sunflower							
			December, 2024		January, 2025		February, 2025		March, 2025	
			Leaf curl	Necrosis	Leaf curl	Necrosis	Leaf curl	Necrosis	Leaf curl	Necrosis
1.	Y.S.R Kadapa	Peddamudiyam	5.45	6.91	9.23	5.33	6.67	3.93	6.62	5.79
2.		Jammalamadugu	8.91	7.57	12.95	8.24	6.62	4.92	4.23	7.36
3.		Thondur	9.26	5.86	15.16	12.59	6.56	7.48	2.84	6.29
		Mean	**7.87**	**6.78**	**12.45**	**8.72**	**6.62**	**5.44**	**4.56**	**6.48**
4.	Kurnool	Pattikonda	9.03	6.26	10.68	12.24	6.81	5.26	5.65	6.71
5.		Nandavarm	5.67	6.37	16.67	12.57	9.66	8.87	7.31	5.67
6.		Yemmiganur	14.06	5.51	9.53	4.59	6.59	8.58	7.36	6.77
		Mean	**9.59**	**6.05**	**12.29**	**9.80**	**7.69**	**7.57**	**6.77**	**6.38**
	Overall mean		8.73	6.42	12.37	9.26	7.16	6.51	5.67	6.43
	SE ± (m)									
	CD(P=0.05)									
	CV (%)									

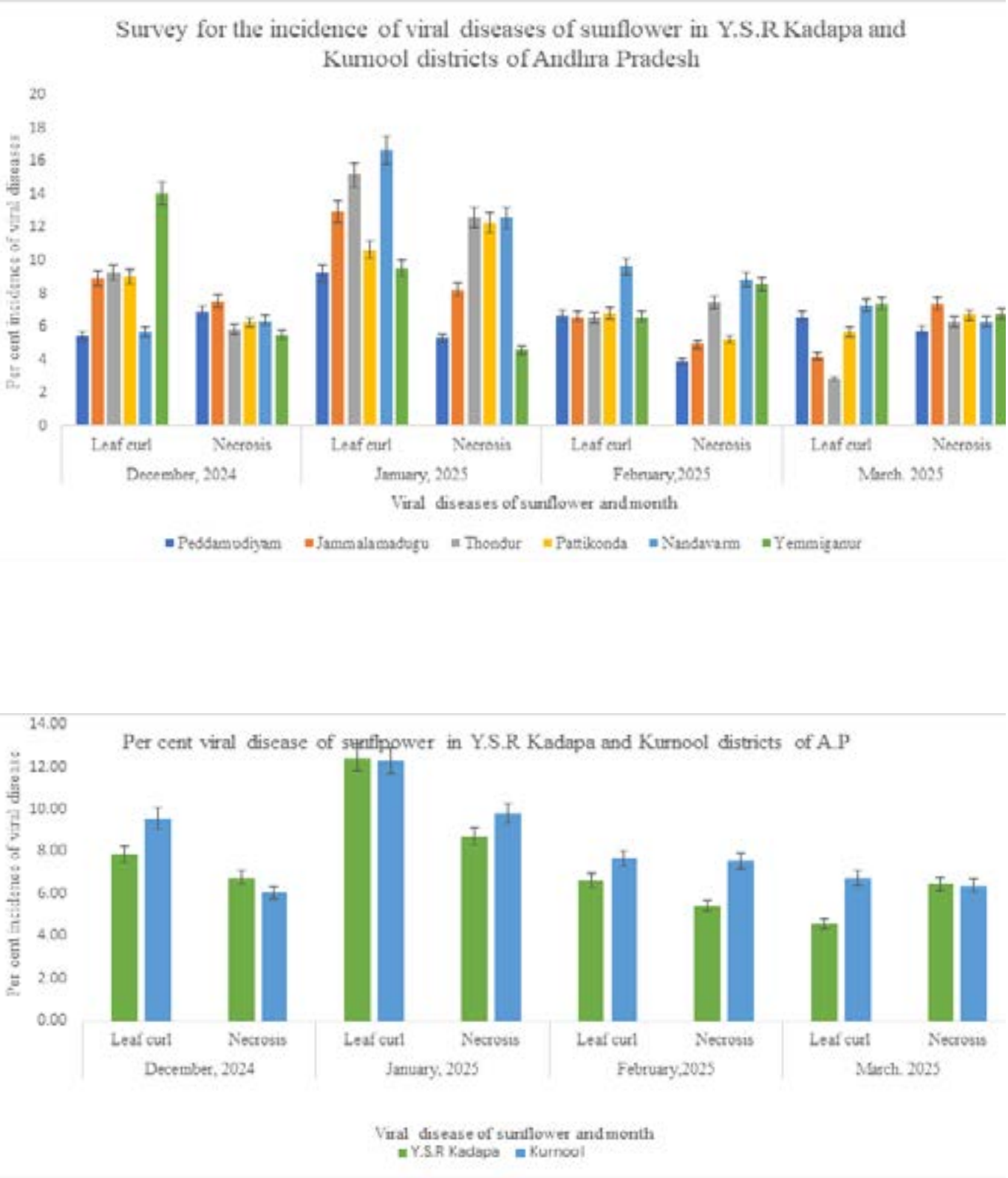


Fig. 2. Per cent viral disease incidence of sunflower in Y.S.R Kadapa and Kurnool districts of Andhra Pradesh

The results are in confirmity with the findings of Nayak *et al*., (2022) who studied on seasonal abundance of insect pests in sunflower in the Western Undulating zone of Odisha during 2019-2020. The sucking pest of thrips appeared at early growth stage of sunflower and continued to build up and attained the peak during 50-51 MW with highest population of 1.80 / leaf.

Leafhoppers (*Amrasca biguttula biguttula*): The mean population of leafhopper in different mandals in Y.S.R Kadapa district ranged between 4.19 to 8.72 leafhopper / 6 leaves during December to March month and in Kurnool district the mean population ranged from 3.36 to 7.30 leafhopper / 6 leaves (Table 2 & Figure 1).

Similar results were observed by Kumari *et al*. (2023) on pulses in farmers field from second fortnight of June 2020 and 2021 to first fortnight of October 2020 and 2021 in Mahendergarh, Rewari and Gurugram districts of Haryana. The population of leafhopper (6.96 leafhopper/plant) was more abundant in Gurugram district as compared to Mahendragarh and Rewari districts.

The present information on the status and diversity of the sucking insect pests of sunflower crop eco systems in Y.S.R Kadapa and Kurnool districts will help to formulate the priority research strategies by researchers. The knowledge on sucking insect pest scenario in sunflower crop ecosystems will also help the extension workers and farmers in deciding the judicious use of insecticides.

Viral disease of leaf curl (Transmitted- whitefly): The per cent incidence of leaf curl viral disease in different mandals in Y.S.R Kadapa district ranged between 4.56 to 12.45 % during December to March months and in Kurnool district the per cent incidence of leaf curl viral disease ranged from 6.77 to 12.99 % (Table 3 & Figure 2).

Similar results were observed Deepa *et al*., (2015) and the experiment was carried out to assess the crop loss due to sunflower leaf curl virus (SuLCV) disease. The crop loss assessment in terms of growth and yield components was recorded at first appearance of symptoms of SuLCV at 30 days to 90 days during the crop growth. The SuLCV disease infection in sunflower significantly affected the plant height (72.60 to 157 cm), size of the head (8.60 to 18.78 cm), 100 seed weight (2.20 to 6.32 g), oil content (31.24% to 38.26%), and weight of seeds/10 heads (77.20 to 372.2 g) as compared to the healthy control plants. In the plants, first appearance of symptoms at 30 DAS was recorded the seed yield loss of 79.25 per cent.

Viral disease of necrosis (Transmitted- Thrips): The per cent incidence of necrosis viral disease in different mandals in Y.S.R Kadapa district ranged between 6.48 to 8.72 % during December to March months and in Kurnool district the per cent incidence of necrosis viral disease ranged from 6.05 to 9.80 % (Table 3 & Figure 2).

The results are in confirmity with the findings of Bestar (2004) who reported that sunflower necrosis virus disease was prevalent in all the sunflower fields visited. The incidence ranged, 1 per cent at Dambal (Gadag) to 65 per cent at Navalgund and Devikoppa (Dharwad). Incidence and severity were higher in the fields grown with ITC-Zeneca sunflower hybrid (PAC-36). Maximum disease was observed in Dharwad district and minimum was recorded at Gadag district.

The results are in confirmity with the findings of Lokesh *et al*., (2008) who conducted a survey to know the sunflower necrosis virus disease and stated that the disease was prevalent in all the sunflower fields with the maximum necrosis disease incidence of 24 per cent in 2005. The highest incidence of necrosis of 22 per cent and high mean thrips numbers 2.42 per five plants was observed on KBSH-1 in Bagepalli taluk in 2006. However, least incidence of necrosis disease was observed in Bangalore (4%), and Shimoga (4%) followed by HD Kote (6%) and Honnalli (6%) during September 2006 and concluded that the disease and the thrips vectors were least during rabi months whereas, it were more in kharif sown crops.

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