



Survey and symptomatology of sunflower leaf curl disease in northern Karnataka

Md. Anwar ul haq¹, Poornima², Aswathanarayana D S¹, Sreedevi S C¹, Vikas V K²

¹ Department of Plant Pathology, University of Agricultural Sciences, Raichur, Karnataka, India

² AICRP on Sunflower, MARS, University of Agricultural Sciences, Raichur, Karnataka, India

Corresponding Author: Md. Anwar ul haq

DOI: <https://doi.org/10.66856/ijees.2026.8.4.8084>

Abstract

Sunflower (*Helianthus annuus* L.) is one of the important oilseed crops in India, popularly known as “Surajmukhi” which belongs to the botanical family “*Asteraceae*”. It originated in North America and is one of the major sources of vegetable oil in the worldwide. Among the virus diseases, sunflower leaf curl disease can cause yield loss up to 82.80 per cent under severe conditions. A roving survey was conducted during *Rabi* 2025-26 in five districts of Northern Karnataka viz., Bagalkote, Vijayanagara, Koppal, Raichur and Yadgir. Around 26 villages were surveyed and the disease was observed in all the surveyed locations with considerable variation in disease incidence among districts, taluks and villages. The maximum disease incidence was recorded in Raichur (23.55 %) followed by Koppal (16.34 %), whereas the minimum disease incidence was observed in Bagalkote (5.58 %). At taluk level, the maximum disease incidence was recorded in Sindhanur (32.35 %), while the minimum mean disease incidence was recorded in Hungund (4.62 %). During the survey, characteristic symptoms of leaf curl disease were recorded, including upward curling of leaves, cupping of leaves, vein thickening followed by vein clearing, leatherying of leaves, chlorosis of bracts and reduction in head size and stunted growth of plants.

Keywords: Sunflower, leaf curl disease, survey and symptomatology

Introduction

Sunflower is an important edible oilseed crop. It is popularly known as “Surajmukhi” belongs to the family “*Asteraceae*” and it is originated in North America. It is an annual herbaceous crop with short duration of 90-120 days and cultivated throughout the year. In India it is majorly cultivated in Karnataka, Andhra Pradesh, Maharashtra and Tamil Nadu. In India, sunflower was cultivated over an area of 1.94 lakh hectares, with a total production of 2.36 lakh tonnes and an average productivity of 1,214 kg ha⁻¹ during 2024-25. In Karnataka, sunflower occupied 1.02 lakh hectares, producing 1.05 lakh tonnes with an average productivity of 1,023 kg ha⁻¹. According to the advance estimates for 2025–26 (*kharif*), Karnataka recorded a sunflower area of 0.56 lakh hectares, production of 0.54 lakh tonnes, and productivity of 958 kg ha⁻¹ (Anon., 2026). It is assumed that 100 g of this raw material contain 20.78 g of protein, 51.46 g of fat, 20 g of carbohydrates, 3.02 g of ash and 8.6 g of fibre. (Blicharz-Kania *et al.*, 2023) [2] They are rich in polyphenols, vitamins, carbohydrates, fat, fiber and ash. In recent years the sunflower cultivation has been declined due to virus disease.

Among the virus diseases affecting sunflower, leaf curl disease has emerged as an important disease in the recent years. The disease caused by a begomovirus belonging to the family Geminiviridae and transmitted by the vector *Bemisia tabaci*. Sunflower leaf curl disease was reported for the first time from Main Agricultural Research Station (MARS), University of Agricultural Sciences (UAS), Raichur, Karnataka, India, Govindappa *et al.* (2011) [4].

According to Venkataramanamma *et al.* (2024) [8] infection at the star bud stage leads to substantial seed yield loss of 82.80 per cent. The disease appears from vegetative to flowering stage, with initial symptoms exhibits chlorosis, mottling, upward curling of leaves, enations on leaves,

leatherying of leaves, yellowing of bracts, Reduction in head size and zig-zag twisting veins and veinlets. The disease is severe especially during *Rabi* season. Understanding the distribution of the disease, its incidence in different regions is crucial for strategizing management practices. The present study was carried out to assess the incidence of leaf curl disease during *Rabi* 2025-26. Hence, the present study was undertaken to assess the incidence of sunflower leaf curl disease through a roving survey in Northern Karnataka and to document the characteristic symptoms associated with the disease during the survey.

Material and methods

To assess the incidence of sunflower leaf curl disease during *Rabi* 2025-26 in different districts of Northern Karnataka viz., Bagalkote, Vijayanagara, Koppal, Raichur and Yadgir, a roving survey was conducted. Two taluks from each district were selected and villages within each taluk were surveyed to assess the incidence of the disease. Additional data on soil type, stage of the crop, variety/hybrid grown, irrigation type, surrounding crops and previous crops were also recorded. Disease incidence was calculated by using formula given Van der Plank (1963) [7].

$$\text{Disease incidence (\%)} = \frac{\text{Number of infected plants}}{\text{Total number of plants observed}} \times 100$$

Results and Discussion

A roving survey was conducted during *Rabi* 2025-26 in different sunflower growing areas of Northern Karnataka to assess the incidence of sunflower leaf curl disease. A total of around 26 villages covering five districts viz., Bagalkote, Vijayanagara, Koppal, Raichur and Yadgir were surveyed. During the survey, sunflower leaf curl disease was observed

in all the surveyed locations with considerable variation in disease incidence across districts, taluks and villages. The maximum mean Disease incidence was observed in Raichur district recorded the maximum mean disease incidence of 23.55 per cent, followed by Koppal 16.34 per cent, whereas minimum mean per cent disease incidence was observed in Bagalkote district 5.58 per cent (Table 2).

At the taluk level, the maximum disease incidence was recorded in Sindhanur taluk (32.35%), whereas the minimum mean disease incidence was recorded in Hungund taluk (4.62%). At the Dhadesgur village of Sindhanur taluk recorded the maximum disease incidence of 32.35 per cent, while Hungund village recorded no disease incidence during the survey period (Table. 1 and Fig. 1).

Table 1: Status of incidence of sunflower leaf curl disease in Northern Karnataka during *rabi* 2025-26

Sl. No	District	Taluk	Village	Latitude (°N)	Longitude (°E)	Variety/Hybrid	Stage of the crop	Type of Irrigation	Soil Type	Surrounding crops	Previous crop	Disease incidence (%)	
1	Bagalkote	Bagalkote	Bagalkote	16.172084	75.695699	Local	Flowering	Rainfed	Black	Sorghum	Chickpea	6.72	
			Sigikeri	16.147042	75.71919	Local	Flowering	Rainfed	Red	Maize	Groundnut	8.27	
			Kelawadi	16.107958	75.699432	Local	Flowering	Rainfed	Red	Maize	Cotton	4.67	
		Taluk Mean											6.55
		Hungund	Hungund	15.957846	76.057392	Ganga Kaveri	Flowering	Rainfed	Black	Sorghum	Chickpea	0.00	
			Tumba	16.008998	76.162086	Ganga Kaveri	Flowering	Rainfed	Black	Bajra	Groundnut	9.24	
		Taluk Mean											4.62
District Mean											5.58		
2	Vijayanagara	Hagaribomanahalli	Ulavathi	15.017521	76.139093	Local	Flowering	Irrigated	Red	Red gram	Maize	14.35	
			Sonna	15.021442	76.099574	Local	Flowering	Irrigated	Red	Red gram	Sunflower	12.45	
		Taluk Mean											13.40
		Huvinahadagali	Huvinahadagali	14.978133	75.930556	MSFH-17 Plus	Flowering	Irrigated	Red	Tomato	Groundnut	16.66	
			Koilaragathi	15.056721	75.922639	MSFH-17 Plus	Vegetative	Irrigated	Red	Tomato	Chilli	14.35	
			Thippapura	14.998911	75.903403	MSFH-17 Plus	Flowering	Irrigated	Black	Sponge gaurd	Red gram	18.88	
			Dasarahalli tanda	15.029053	75.912211	MSFH-17 Plus	Flowering	Irrigated	Red	Chilli	Sunflower	9.46	
		Taluk Mean											14.83
		District Mean											14.11
3	Koppal	Koppal	Hatti	15.217839	75.93523	Local	Vegetative	Irrigated	Red	Maize	Cotton	20.35	
			Raghunathanhalli	15.224464	75.953213	Local	Flowering	Irrigated	Black	Tomato	Groundnut	13.67	
			Mainahalli	15.283562	76.060381	Local	Flowering	Irrigated	Red	Chilli	Sunflower	22.36	
			Hiresindogi	15.290424	76.075047	Local	Flowering	Irrigated	Red	Beans	Cotton	9.00	
		Taluk Mean											16.34
		District Mean											16.34
4	Raichur	Kushtagi	No crop										
		Raichur	MARS, Raichur	16.196883	77.318096	Local	Flowering	Irrigated	Black	Chilli	Sunflower	24.25	
			Murhanpur	16.191347	77.195726	Local	Flowering	Irrigated	Black	Red gram	Cotton	18.00	
			Naglapur	16.203389	77.325795	Local	Flowering	Irrigated	Black	Maize	Sunflower	20.12	
		Taluk Mean											20.79
		Sindhanur	Dhadesgur	15.696267	76.890814	Local	Flowering	Irrigated	Black	Paddy	Cotton	32.35	
		Taluk Mean											32.35
		Lingasugur	Lingasugur	16.104615	76.509607	Local	Flowering	Irrigated	Red	Maize	Cotton	18.45	
			Mudgal	16.012347	76.442186	Local	Flowering	Irrigated	Black	Cotton	Sunflower	15.00	
			Kasba lingasugur	15.963742	76.510386	Local	Flowering	Irrigated	Black	Sunflower	Sunflower	19.14	
Taluk Mean											17.53		
District Mean											23.55		
5	Yadgir	Shorapur	Shorapur	16.521347	76.757826	Local	Flowering	Irrigated	Black	Chilli	Paddy	6.80	
		Taluk Mean											6.80
		Shahapur	Bheemarayana gudi	16.73361	76.790676	Local	Flowering	Irrigated	Black	Maize	Maize	9.36	
			Kembhavi	16.67097	76.543218	PAC 334	Flowering	Irrigated	Black	Ajwan	Red gram	4.50	
			Shivaji Nagar	16.679896	76.535235	Local	Flowering	Irrigated	Black	Cotton	Cotton	5.65	
		Taluk Mean											6.50
		District Mean											6.65

Table 2: Mean leaf curl incidence of district and taluk during *rabi* 2025-26

District	Taluk	Disease Incidence (%)	
		Taluk Mean	District Mean
Bagalkote	Bagalkote	6.55	5.58
	Hungund	4.62	
Vijayanagara	Hagaribomanahalli	13.40	14.11
	Huvinahadagali	14.83	
Koppal	Koppal	16.34	16.34
	Kushtagi	No crop	
Raichur	Raichur	20.79	23.55
	Sindhanur	32.35	
	Lingasugur	17.53	
Yadgir	Shorapur	6.80	6.65
	Shahapur	6.50	

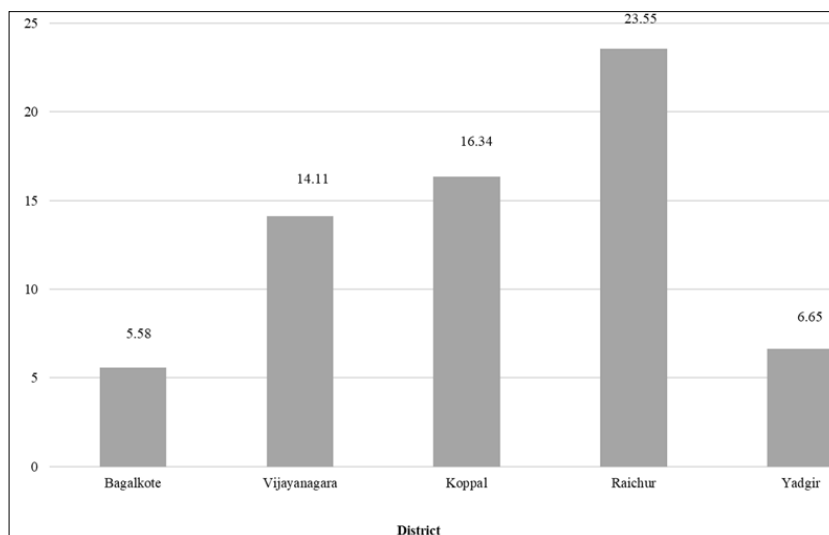


Fig 1: Status of sunflower leaf curl disease in different district of Northern Karnataka

The maximum disease incidence recorded in Raichur district (23.55 %), may be due to the presence of maximum vector population with a favourable temperature conditions during *rabi/summer* periods and also due to the presence of weeds *i.e Parthenium hysterophorous, Euphorbia spp and Abutilon spp* surrounding the sunflower crop. Weeds are also act as source of inoculum for both vector and virus. In Raichur district cotton and chilli is also most preferred host for whiteflies, thus the SuLCV vectors are naturally getting suitable scope for their continuous multiplication and encouraging in spreading the SuLCV disease more in Raichur district Differences in disease incidence among the surveyed locations may also be associated with variations in crop stage, irrigation, surrounding crops and prevailing weather conditions.

The results are in consistent with Deepa and Gururaj Sunkad (2016) conducted a survey on SuLCV disease and reported that it prevailed in almost all parts of Raichur, Yadgir and Koppal districts. Disease incidence ranged from 0.00-92.00 per cent and maximum incidence was recorded in Raichur (20.45%) followed by Koppal (15.67%) and Lingsugur (11.98 %) taluks. The least disease incidence was recorded

in Shorapur (2.50%) taluk. The observations on severe incidence of SuLCV might be due to continuous prevalence of dry weather supporting rapid multiplication of whiteflies during the rabi season. Low temperatures coupled with dry weather are most suitable for whitefly population buildup (Meghashree, 2017) ^[5]. Similar variation of sunflower leaf curl disease incidence was observed by Poornima *et al.* (2022) ^[6] they conducted survey in Raichur, Koppal and Kalaburagi districts, the Disease incidence of leaf curl during *Rabi* 2020-21 ranged between 0.00 to 18.70 per cent in three districts surveyed. Highest disease incidence was recorded at Kalapur (18.70%) village of Lingasugur taluk.

Symptomatology

During the survey, the characteristic symptoms observed upward curling of leaves, cupping of leaves, vein thickening with enations, vein clearing, leatherying of leaves, chlorosis of bracts, severe curling of leaves, reduction in head size and stunted growth. The symptoms were documented through field observations and photographs and presented (Plate 1).



a. Upward curling of leaves



b. Cupping of leaves



c. Vein thickening with enations



d. Vein clearing



e. Leathering of leaves



f. Chlorosis of bracts



g. Severe curling of leaf



h. Reduction in head size and stunted growth of plant

Plate 1: Symptomatology of sunflower leaf curl disease

Conclusion

The roving survey conducted during *Rabi* 2025–26 revealed the occurrence of sunflower leaf curl disease across all surveyed locations in Northern Karnataka, with considerable variation in disease incidence among districts, taluks and villages. The highest mean disease incidence was recorded in Raichur district, while the lowest was recorded in Bagalkote. The affected plants exhibited characteristic symptoms including upward curling, cupping, vein thickening followed by vein clearing, leaf leatherying, chlorosis of bracts, reduction in head size and stunted growth.

Acknowledgement

We would like to thank the University of Agricultural Sciences Raichur, the Department of plant pathology, and the AICRP on Sunflower, Main Agricultural Research Station (MARS), Raichur, Karnataka, India for their support and facilities provided for conducting this study.

Reference

1. Anonymous, United States Department of Agriculture (USDA). World Agricultural Production, 2026, 37.
2. Blicharz-Kania A, Pecyna A, Zdybel B, Andrejko D, Marczuk A. Sunflower seed cake as a source of nutrients in gluten-free bread. *Scientific Reports*, 2023;13(1):10864.
3. Deepa, Sunkad G. Survey and characterizations of symptoms of the sunflower leaf curl virus disease transmitted by whitefly. *Ecology, Environment and Conservation*, 2015;22(4):1999–2006.
4. Govindappa MR, Shankergoud I, Shankarappa KS, Wickramaarachchi WART, Reddy BA, Rangaswamy KT. Molecular detection and partial characterization begomovirus associated with leaf curl disease of sunflower (*Helianthus annuus*) in southern India. *Pl. Path. J.*, 2011;10:29-35.
5. Meghashree. Epidemiology and host resistance for the management of Mungbean yellow mosaic virus (MYMV) in Mungbean. M.Sc. (Agri.) thesis, Univ. Agril. Sci. Raichur, Karnataka, India, 2017, 77-82.
6. Poornima, Kulkarni VV, Ghante V, Umesh MR. Present status of major diseases of sunflower in Northern East Dry Zone of Karnataka. *J. Oilseeds Res.*, 2022;40(special issue):47-48.
7. Van der Plank JE. *Plant Diseases: Epidemics and Control*. New York: Academic Press, 1963.
8. Venkataramanamma K, Venkataravanappa V, Prabhakar K, Reddy BRP, Sri PA, Venkateswarlu N. Survey and molecular characterization of begomovirus, and assessment of yield losses caused by leaf curl disease of sunflower (*Helianthus annuus* L.). *Indian J. Agric. Sci.*, 2024;94(11):1226 – 1233.