International Journal of Ecology and Environmental Sciences
www.ecologyjournal.in
Online ISSN: 2664-7133
Received: 26-02-2026, Accepted: 29-03-2026, Published: 13-04-2026
Volume 8, Issue 2, 2026, Page No. 18-20

Severity of *Alternaria* blight disease of sunflower in Karnataka

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Abstract
Sunflower (*Helianthus annuus*) is one of the important oilseed crops in India, popularly known as "Surajmukhi" which belongs to the botanical family "*Asteraceae*". It was originated in North America and is known for major source of vegetable oil in the world but its production is constrained due to various biotic and abiotic stresses. Among the biotic stress, *Alternaria* blight of sunflower causes yield loss up to 80 per cent under severe conditions. An intensive roving survey was conducted to know the severity of leaf blight of sunflower, in different locations of Karnataka *viz*., Bagalkote, Chamarajanagar, Gadag, Koppal, Raichur and Vijayapura districts during *Kharif* 2024-25. The disease severity ranged from 10.56 to 63.15 per cent. Among the sunflower growing districts, the maximum disease severity was recorded in Chamrajanagar (56.99%) followed by Koppal (49.66%). However, least severity was observed in Gadag with 30.02 per cent.

Keywords: Sunflower, roving survey, *Alternaria* blight, disease severity

Introduction

Sunflower is an important oilseed crop, which belongs to the family "*Asteraceae*". In the world, it ranks fourth in production among the oilseed crops after palm, soybean and rapeseed. It is an annual herbaceous crop with short duration of 90-120 days and cultivated throughout the year. The crop was introduced to India in 1969 as edible oilseed crop but cultivation in large scale started only after 1972. Globally, it is cultivated in tropical and subtropical regions. As it is tolerant to drought and salinity, it is cultivated throughout the year, but majorly cultivated during *Kharif* season. Sunflower seeds contain 39-49 per cent oil content which is mainly used for vegetable oil production. They are rich in polyphenols, vitamins, carbohydrates, fat, fiber and ash. In India it is majorly cultivated in Karnataka, Andhra Pradesh, Maharashtra and Tamil Nadu. Karnataka contributes for major production with 0.11 million tonnes in India (Anon, 2025). In recent years the cultivation of sunflower has been declined due to biotic and a biotic stress.

Alternaria blight of sunflower is one of the destructive foliar diseases of sunflower that causes yield loss from 11.30 to 73.33 per cent (Reddy and Gupta, 1977) [11]. The disease was first reported in India by Narain and Saksena (1973) [8]; Kolte and Mukhopadhyay (1973) [6] from Uttar Pradesh simultaneously. In Karnataka it was first reported by Anilkumar *et al*. (1974) [2]. This disease under severe conditions has major impact on the production of sunflower world-wide. It is prevalent in tropical and subtropical regions of the world. In Karnataka it was reported that the severity of *Alternaria* blight is 55.88 per cent (Ajith *et al*., 2023) [1].

The disease appears from flowering stage to maturity stage, with initial symptoms seen on old bottom leaves which further spreads to middle and upper young leaves. Initially, small chlorotic spots with yellow halo are noticed. These spots enlarge and become necrotic with concentric rings. As disease progresses, the spots enlarge in size, become irregular, coalesce and cause blighting of leaves. Symptoms also appear on leaf, petiole and stem which are elongated and dark brown or black in colour and on parts of capitulum *viz*., ray florets, receptacle and bracts, spots were light brown to brown and elliptical in shape (Patel *et al*., 2010; Prasad *et al*., 2020) [9, 10]. The disease is severe in the areas of high rainfall and high relative humidity, especially during *Kharif* season. Understanding the distribution of the disease, its severity in different regions is crucial for strategizing management practices. There is less information on severity of *Alternaria* blight of sunflower in Karnataka. The present study was carried out to assess the severity of *Alternaria* blight of sunflower during Kharif 2024-25.

Material and methods

Assessment for the severity of *Alternaria* blight of sunflower during *Kharif* 2024-25 in different districts of Karnataka *viz*., Bagalkote, Chamarajanagar, Gadag, Koppal, Raichur and Vijayapura by conducting roving survey. Two taluks from each village and from each taluk three villages were surveyed to assess the severity of the disease. Additional data on soil type, stage of the crop, variety/hybrid grown in these locations and Global Positioning System (GPS) way points were also recorded. The data collected were imported to draw the spatial map of leaf blight disease distribution using the software. The disease was scored using 0-9 scale given by Mayee and Datar (1986) [7]. The severity of the disease was worked out by the following formula (Wheeler 1969) [13]:

$$\text{Per cent Disease Index} = \frac{\text{Sum of all individual disease rating scale}}{\text{Total number of leaves observed}} \times \frac{100}{\text{Maximum disease score}}$$

Results and Discussion

A roving survey was conducted in different districts of Karnataka to assess the severity of *Alternaria* blight disease of sunflower. The severity of the disease was recorded during *Kharif* 2024-25 in Bagalkote, Chamarajanagar, Gadag, Koppal, Raichur and Vijayapura. Around 36 villages were surveyed during *Kharif* 2024-25 and in one district two taluks were visited, three villages from one taluk were taken into consideration. During the survey, *Alternaria* blight disease was observed in all the surveyed locations with considerable variation in the disease severity was across districts, taluks and villages.

The maximum severity of the disease with 63.15 per cent was seen in Alwandi village of Koppal taluk, followed by 62.50 per cent in Putthanapura village of Gundlupete taluk, Chamarajanagar district. Banihatti village of Sindagi taluk of Vijayapura district showed less PDI of 10.56. Among different districts, maximum mean PDI of 56.99 was recorded in Chamarajanagar district followed Koppal district (49.66) and the least mean PDI of 30.02 was noticed in Gadag district (Fig. 1). In different taluks, Gundlupete and Kollegal taluk of Chamarajanagar district showed maximum mean PDI of 57.85 and 56.13, respectively, while Nargund taluk in Gadag district had lowest mean PDI of 23.14 (Table 1). The increased severity of the blight disease in Chamarajanagar is due to a combination of micro-climatic humidity favourable for *Alternaria* infection, prolonged leaf wetness during flowering, and pathogen population adaptability as evidenced by genetic diversity analyses (Divyashree *et al*., 2025) [5].

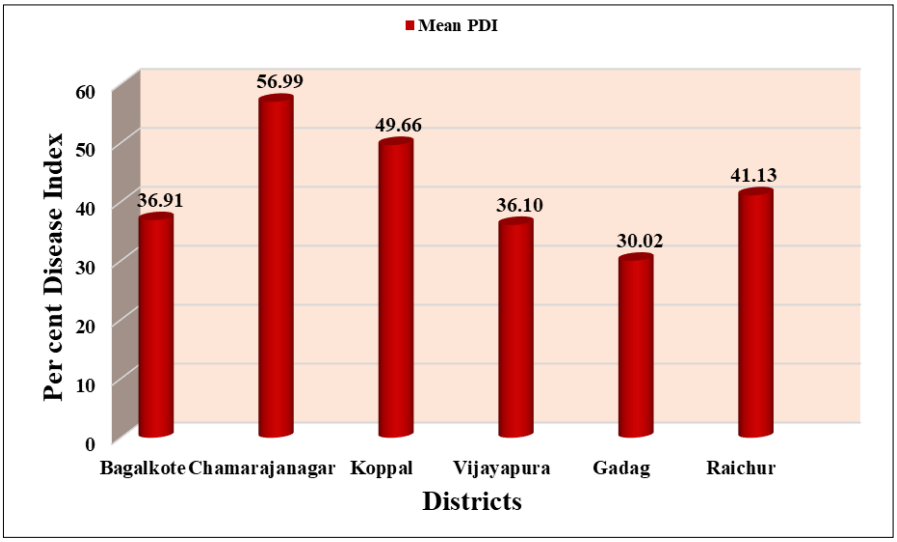

Fig 1: Status of *Alternaria* blight of sunflower in different districts of Karnataka during *Kharif* 2024-25

In Chamarajanagar district, the highest disease severity was noticed in Putthanapura (62.50 %), followed by Malavalli with 58.60 per cent. In Koppal district, the highest disease severity of 63.15 per cent was recorded in Alwandi, followed by Hiremannapur with 54.32 per cent while least disease severity of 36.24 per cent was recorded in Banahalli village. In Gadag district, maximum disease severity of 49.13 per cent was observed in Gadag, followed by Asundi with 46.19 per cent, whereas the least disease severity of 15.38 per cent was observed in Arshinagodi village. The maximum disease severity of 48.68 per cent was recorded in Kalmala, followed by MARS, Raichur with 44.25 per cent and the least disease severity was recorded in 32.27 per cent. Bommanjogi village showed highest disease severity of 57.43 per cent, while lowest disease severity of 10.56 per cent was noticed in Banihatti village in Vijayapura district.

The results are in consistent with Balabheem (2014), maximum disease severity of *Alternaria* blight was recorded in Gulbarga (35.01%) district followed by Yadgir (29.76%) and Bijapur (25.56%) whereas disease severity was minimum at Raichur district (13.30%).

Similarly, Vidyashree *et al*. (2020) [12] where they observed that the severity of the blight of sunflower ranged from 13.33 to 65.60 per cent among the surveyed areas of Raichur, Bellari, Koppal and Gulbarga districts of northern Karnataka.

Intensive roving survey was carried out by Ajith *et al*. (2023) [2] in sunflower growing areas of Bagalkote, Belagavi, Gadag, Haveri, Bellari and Vijayapura districts of Karnataka during August-September 2022 and December-January 2022-23. The Gadag district had higher leaf blight severity in *Kharif* while in *Rabi*, Vijayapura district recorded highest leaf blight severity. Severe outbreak of leaf blight was observed in *Kharif* season under rain fed system compared to *Rabi* season which was favoured by heavy rains with humid or wet weather and moderate temperatures. The higher leaf blight severity in different regions may be due to favourable weather conditions such as relative humidity, optimum temperature, presence of primary inoculum in that particular place, cultivation of susceptible crop for many years in the large scale might have helped for inoculum build up, sustenance and increased the process of infection of the *Alternaria* sp.

Table 1: Severity of Alternaria blight of sunflower in Karnataka during Kharif 2024-25

Sl. No.	District	Taluk	Village	Latitude (°N)	Longitude (°E)	Variety	Soil Type	PDI	Taluk Mean PDI	District Mean PDI
1	Bagalkote	Bagalkote	Bagalkote	16.172086	75.695692	Local	Black soil	27.30	31.70	36.91
			Bevoor	16.05829	76.0079	Local	Black soil	37.54		
			Kajjidoni	16.180338	75.459393	Local	Black soil	30.25		
		Hungund	Amingad	16.055949	75.957029	Ganga Kaveri	Black soil	26.60	42.11	
			Bevinamatti	16.212905	75.897852	Ganga Kaveri	Black soil	45.51		
			Hungund	16.0600001	76.041694	Ganga Kaveri	Black soil	54.22		
2	Chamarajanagar	Kollegal	Kurahatti	12.162279	77.106031	Local	Red soil	56.13	56.13	56.99
		Gundlupete	Agathagowdanahalli	11.871633	76.66666	Local	Red soil	52.45	57.85	

			Malavalli	11.858325	76.670177	Local	Red soil	58.60		
			Puttanapura	11.766765	76.659165	Local	Red soil	62.50		
3	Koppal	Koppal	Alwandi	15.227106	75.9817	Local	Red soil	63.15	50.66	49.66
			Biknahalli	15.269714	76.061396	Local	Red soil	52.60		
			Banahalli	15.290523	76.075655	Local	Red soil	36.24		
		Kushtagi	Gumgeri	15.76317	76.24556	Teja	Red soil	47.30	48.66	
			Hiremannapur	15.765579	76.273481	Jwala	Red soil	54.32		
			Tavargeri	15.7509905	76.43017	Teja	Red soil	44.37		
4	Gadag	Gadag	Gadag	15.407854	75.582483	Local	Red soil	49.13	36.90	30.02
			Neeralgi	15.495532	75.581002	Local	Red soil	15.38		
			Asundi	15.498886	75.731333	Local	Red soil	46.19		
		Naragund	Arshinagodi	15.785735	75.376125	Local	Red soil	15.31	23.14	
			Benakanakoppa	15.816974	75.404756	Local	Red soil	20.64		
			Muganur	15.677823	75.40543	Local	Red soil	33.47		
5	Raichur	Raichur	Kalmala	16.29605	77.209764	Local	Blacksoil	48.68	41.73	41.13
			MARS, Raichur	16.083071	77.335551	Local	Black soil	44.25		
			Naglapur	16.203389	77.325795	Local	Black soil	32.27		
		Manvi	Hirekotnekal	15.96236	76.949193	Local	Black soil	42.53	40.52	
			Amareshwar camp	15.942318	76.92365	Local	Black soil	38.65		
			Uralgaddi	15.935266	76.915112	Local	Black soil	40.39		
6	Vijayapura	Vijayapura	Vijayapura	16.810898	75.698583	Ganga Kaveri	Black soil	28.23	38.27	36.10
			Bommanjogi	16.754029	75.78881	Ganga Kaveri	Black soil	57.43		
			Kannur	17.03471	75.700443	Ganga Kaveri	Black soil	29.15		
		Sindagi	Sindagi	16.89831	76.221812	Ganga Kaveri	Black soil	35.10	33.92	
			Banihatti	16.817021	76.27874	Ganga Kaveri	Black soil	10.56		
			Rampur	16.969898	76.227606	Ganga Kaveri	Black soil	22.18		

Conclusion

The survey conducted during Kharif 2024-25 for *Alternaria* blight of sunflower in Karnataka showed that the disease was noticed in all the surveyed locations and the severity of the disease varied across the villages, taluks and districts. The maximum severity of the disease was noticed in Chamarajanagar (56.99 %), followed by Koppal (49.66 %) may be due to the influence of congenial microclimatic conditions and continuous cultivation of susceptible hybrids. The least severity was recorded in Gadag district *i.e*. 30.02 per cent. The variation in the severity of the disease may be due to congenial micro climate for the development of the disease like high rainfall and high relative humidity and early sowing of the crop. Other factors like growing of the susceptible varieties, season of the crop sown, stage of the crop and sufficient inoculum for the development of the disease.

Acknowledgement

We would like to thank the University of Agricultural Sciences Raichur, Karnataka, India for supporting and facilitating the study.

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