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Survey of late wilt of maize in major maize growing areas of Karnataka

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Abstract
Maize (*Zea mays* L.), popularly known as the "Queen of Cereals", is an important cereal and food grain crop in India owing to its high yield potential, wide adaptability and diverse uses. However, its production is increasingly affected by late wilt disease caused by the soil and seed-borne fungus *Magnaporthiopsis maydis* (syn. *Harpophora maydis*), which can cause yield losses of 25-35 per cent under favourable conditions. A field survey conducted during 2025-26 in major maize-growing districts of Karnataka revealed the highest mean disease incidence in Chitradurga (28.12 %), followed by Koppal (27.08 %) and Davanagere (26.25 %), while the lowest incidence was recorded in Ballari (17.50 %).

Keywords: Maize, *Magnapothiopsis maydis*, Per cent disease incidence

Introduction
Maize or corn (*Zea mays* L.) is an important cereal crop belonging to the family Poaceae, tribe Maydeae, with a chromosome number of 2n = 20. Originating in Central America, it is a C_4 plant with high photosynthetic efficiency, water and nitrogen-use efficiency and biomass production. The grain contains about 72 per cent starch, 10 per cent protein, 8.5 per cent fibre, 4.8 per cent oil, 3 per cent sugars and 1.7 per cent ash, making it an important food, feed and industrial crop. Owing to its high productivity, adaptability and diverse uses, maize is widely known as the "Queen of Cereals" and "Miracle Crop" (Downsell *et al*., 1996) [5].
In India, maize is mainly cultivated during the *kharif* season but is also grown during *rabi* and summer due to its photo-insensitive nature. It ranks third among cereal crops after rice and wheat. During 2023-24, maize occupied 108.87 lakh hectares with a production of 356.73 lakh tonnes, highlighting its growing economic importance (Anon., 2024) [1]. The crop contributes substantially to food, feed, industrial raw materials and livelihood security.
Diseases constitute one of the major yield-limiting factors in maize cultivation worldwide. More than 112 diseases have been reported to affect maize globally, of which about 35 diseases occur in India (Kumar *et al.*, 2013) [7]. Among the biotic stresses fungal diseases are particularly destructive and are responsible for significant yield losses estimated to range from 10 to 23 per cent under diverse agro-ecological conditions (Stukenbrock and Gurr, 2023) [9]. Important diseases affecting maize under field conditions include downy mildews, leaf blights, stalk rots, ear rots and rusts.
Among the pathogens associated with post-flowering stalk rot (PFSR), *Harpophora maydis* (syn. *Magnaporthiopsis maydis*) is particularly important. When caused exclusively by this pathogen, the disease is known as late wilt disease (LWD). The soil and seed-borne pathogen colonizes maize vascular tissues, disrupting water and nutrient transport and causing wilting, lodging and plant death, particularly during the reproductive stage. Late wilt was first reported in Egypt in 1962 (Samra *et al*., 1962) [8] and has since been reported from several maize-growing regions of Asia, Africa and Europe. Disease incidence may reach 100 per cent, with yield losses up to 51 per cent reported in severe cases (Johal *et al*., 2004) [6]. Since early symptoms are difficult to detect, resistant cultivars offer a sustainable management approach. Field surveys assess disease incidence by recording symptomatic plants and confirming the pathogen from stem samples, with disease intensity varying according to cropping history, irrigation and environmental conditions (Degani, 2021) [4].

Material and methods
During 2025-2026 an intensive roving survey was conducted in major maize growing regions of Karnataka to determine the incidence of wilt disease. The percentage of disease incidence was assessed by recording the number of plants showing disease symptoms on fixed plot of size 100×100 sq. feet. The total number of plants were examined and disease incidence is calculated by using the formula given by Wheeler (1969) [10].

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

Results and Discussion
During 2025-26, late wilt disease incidence in maize-growing areas of Karnataka ranged from 5.00 to 50.00 per cent. The highest incidence was recorded in Hanumpura village of Koppal district (50.00 %), followed by Katadur (47.50 %) and Hireguntanuru of Chitradurga (37.50 %), whereas the lowest was recorded in Sandur village of Ballari district (5.00 %).
At the taluk level, Koppal recorded the highest mean disease incidence (32.50 %), followed by Holalkere and Yalburga (31.25 % each), while Sandur recorded the lowest (6.25 %). District wise, Chitradurga showed the highest mean incidence (28.12%), followed by Koppal (27.08 %) and Davanagere (26.25 %), whereas Ballari recorded the lowest (17.50 %). The considerable variation among locations indicates widespread occurrence of late wilt in Karnataka.

The district-wise assessment of disease incidence revealed substantial spatial variation across the surveyed maize-growing regions. Chitradurga district registered the maximum mean disease incidence (28.12 %), followed by Koppal (27.08 %) and Davanagere (26.25 %). Vijayanagara recorded a moderate mean disease incidence of 24.37 per cent, whereas Ballari exhibited the minimum incidence (17.50 %).

The present survey revealed considerable variation in the incidence of late wilt disease among the surveyed villages, taluks and districts of Karnataka, indicating that disease development is influenced by agro-climatic conditions, soil characteristics, cropping history and the susceptibility of maize hybrids. The comparatively higher disease incidence recorded in Chitradurga and Koppal districts may be attributed to continuous maize cultivation, favourable environmental conditions and the persistence of the disease is ubiquitous across the many of the hybrids found susceptible irrespective of soil conditions.

The findings of the present investigation are in agreement with those of Bergstrom *et al.* (2008) [2], who reported that *Magnaporthiopsis maydis* is a destructive soil and seed-borne pathogen capable of surviving in infected crop residues and soil, thereby facilitating the persistence and spread of late wilt in endemic areas. Similarly, Degani and Cernica (2014) [3] reviewed the global distribution of late wilt disease and reported that the pathogen, first identified in Egypt in 1960, has subsequently spread to several maize-growing countries, including India, Israel, Hungary, Spain and Portugal. They further stated that the disease is endemic in Egypt, where disease incidence may reach 100 per cent in severely affected fields, demonstrating its potential to cause severe epidemics under favourable environmental conditions.

Table 1: Incidence of late wilt of maize in major maize-growing districts of Karnataka

Sl. No.	District	Taluk	Village	Lattitude	Longitude	Name of the hybrid	Rainfed/ Irrigated	Previous crop	Soil type	Crop stage	Disease Incidence
1	Davangere	Davangere	Davangere	14.391962	76.036676	Arjun	Rainfed	Ragi	Red	Maturity	25.00
			Hebbalu	14.375931	76.092018	Arjun	Rainfed	Sorghum	Red	Maturity	30.00
		Jagalur	Asagodu	14.557181	76.14496	DMH2	Rainfed	Ragi	Red	Silking and grain filling	27.50
			Hallikatte	14.540613	76.336943	DMH2	Rainfed	Ragi	Red	Maturity	22.50
2	Chitradurga	Chitradurga	Chitradurga	14.379290	76.26222	Kaveri	Rainfed	Sorghum	Black	Maturity	12.50
			Hireguntanuru	14.210360	76.27338	Kaveri	Rainfed	Maize	Red	Maturity	37.50
		Holalkere	Chitrahalli	14.053900	76.2697	CP818	Rainfed	Maize	Black	Maturity	20.00
			Bommankatte	14.009300	76.19687	CP818	Rainfed	Sorghum	Black	Maturity	22.50
3	Ballari	Ballari	Ballari	15.130879	77.059907	Kaveri	Rainfed	Sorghum	Red	Maturity	17.50
			Hagari	15.082854	77.061527	Superking	Rainfed	Groundnut	Red	Maturity	32.50
		Sandur	Sandur	15.085600	76.55211	Superking	Rainfed	Ragi	Red	Maturity	5.00
			Daroji	15.227340	76.68988	Kaveri	Rainfed	Maize	Black	Silking and grain filling	7.50
		Kampli	Kampli	15.402650	76.60241	Kaveri	Rainfed	Sorghum	Red	Maturity	27.50
			Nagalapur	15.407850	76.68988	Superking	Rainfed	Groundnut	Black	Maturity	15.00
4	Vijayanagar	Harapanhalli	Yadihalli	14.660947	75.917643	NAH2049	Irrigated	Sorghum	Red	Maturity	32.50
			Bagali	14.860478	75.983387	DMH2	Rainfed	Maize	Red	Maturity	22.50
		Hagaribommanahalli	Kallahalli	14.939329	76.277397	CP818	Rainfed	Maize	Red	Maturity	12.50
			Gaddikere	15.071186	76.081718	Kaveri	Rainfed	Maize	Red	Maturity	25.00
		Hoovinahadagali	Hoovinhadagali	15.023149	75.933846	CP818	Rainfed	Sorghum	Red	Maturity	30.00
			Ittagi	14.944491	76.099838	Superking	Rainfed	Ragi	Black	Maturity	22.50
		Kotturu	Kotturu	14.834886	76.228939	NAH2049	Irrigated	Ragi	Red	Maturity	27.50
			Ayyanhalli	14.798715	76.162812	CP828	Rainfed	Sorghum	Black	Maturity	22.50
5	Koppal	Koppal	Katadur	15.643862	76.478401	CP818	Rainfed	Maize	Red	Silking and grain filling	47.50
			Basapur	15.092300	75.475200	CP818	Rainfed	Groundnut	Red	Silking and grain filling	17.50
		Yalburga	Hanumpura	15.63335	76.06559	CP828	Rainfed	Maize	Black	Maturity	50.00
			Hirearlihalli	15.61514	76.005334	CP828	Rainfed	Sorghum	Red	Maturity	12.50
		Kanakgiri	Rampura	15.572983	76.417109	Kaveri	Rainfed	Ragi	Black	Maturity	12.50
			Devalapura	15.572822	76.417978	Arjun	Rainfed	Groundnut	Red	Maturity	22.50

Table 2: Mean incidence of late wilt disease in different taluks and districts of major maize growing areas of Karnataka during 2025-26

District	Taluk	Mean disease incidence (%)	
		Taluk	District
Davangere	Davangere	27.50	26.25
	Jagalur	25.00	
Chitradurga	Chitradurga	25.00	28.12
	Holalkere	31.25	
Ballari	Ballari	25.00	17.50

	Sandur	6.25	
	Kampli	21.25	
Vijayanagar	Harapanhalli	27.50	24.37
	Hagaribommanahalli	18.75	
	Hoovinahadagali	26.25	
	Kotturu	25.00	
Koppal	Koppal	32.50	27.08
	Yalburga	31.25	
	Kanakgiri	17.50	

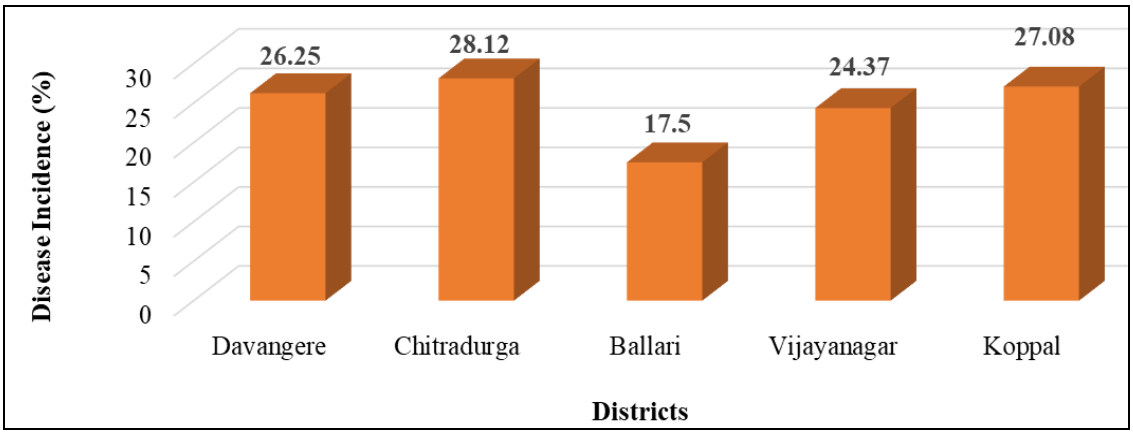

Fig 2: Incidence of late wilt of maize in different districts of major maize growing areas Karnataka during 2025-26

Conclusion

The survey confirmed the widespread occurrence of late wilt disease of maize in Karnataka, with disease incidence ranging from 5.00 to 50.00 per cent across the surveyed locations. The considerable variation in disease incidence among locations highlights the need for regular surveillance, early diagnosis and effective integrated disease management strategies.

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