

Survey on the incidence of bacterial blight of pomegranate in major growing areas of Karnataka

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Abstract

Pomegranate (*Punica granatum* L.) is an important fruit crop extensively cultivated in several parts of Karnataka. Bacterial blight, caused by *Xanthomonas citri* pv. *punicae*, is one of the major constraint to pomegranate production, resulting in substantial losses in fruit yield and quality. A roving survey was conducted from October 2025 to March 2026 to assess the incidence of bacterial blight in major pomegranate growing districts of Karnataka viz., Raichur, Bagalkot, Vijayapura, Chitradurga, Ballari, Koppal and Tumakuru. The disease incidence varied from 0.00 to 68.36 per cent among the surveyed orchards. The maximum disease incidence of 68.36 per cent was recorded at Hirearalahalli village of Yelburga taluk whereas no disease incidence was observed in Mustigarahalli and Javaragondanahalli villages of Sira taluk. Among the districts surveyed, Koppal recorded the maximum mean disease incidence of 33.25 per cent followed by Ballari (30.86 %) and Chitradurga (29.54 %). Characteristic symptoms of the disease were observed on leaves, twigs, branches and fruits. Symptoms on leaves comprised of irregular dark brown to black lesions surrounded by a yellow halo, while infected twigs exhibited elongated dark lesions leading to cracking and girdling of the twigs. Symptoms on fruits were characterized by dark brown to black necrotic lesions that subsequently developed into typical L or Y shaped cracks, ultimately leading to splitting of fruits. The considerable variation in disease incidence among locations indicated the influence of geographical and environmental conditions on disease development and distribution.

Keywords: Pomegranate, bacterial blight, survey, symptomatology, Karnataka

Introduction

Pomegranate (*Punica granatum* L.) is an economically important fruit crop cultivated under diverse agro climatic conditions and is highly valued for its nutritional and medicinal properties (Martos *et al.*, 2010) [8]. However, its production is constrained by several biotic and abiotic factors that adversely affect crop growth, productivity and fruit quality (Pal *et al.*, 2014) [10]. Among the major biotic constraints, pomegranate is affected by several fungal and bacterial diseases, including wilt, anthracnose, leaf spot, fruit rot, heart rot and bacterial blight (Madhukar and Reddy, 1976) [6].

Among the various diseases affecting pomegranate, bacterial blight caused by *Xanthomonas citri* pv. *punicae* (formerly known as *Xanthomonas axonopodis* pv. *punicae*) is one of the most important and destructive disease. The disease affects leaves, twigs, branches and fruits, resulting in substantial yield losses of 60-80 per cent under favourable environmental conditions (Sharma *et al.*, 2010) [12]. The increase in day temperature (38.60 °C) and mid-day relative humidity (30 to 80 %) along with cloudy weather and intermittent rainfall favors the initiation and spread of the disease (Kumar *et al.*, 2006) [5].

Considering the economic importance of pomegranate and the recurring occurrence of bacterial blight, the present investigation was undertaken to assess the incidence and distribution of bacterial blight in major pomegranate growing districts of Karnataka and to document the characteristic symptoms expressed on different plant parts.

Material and Methods

Survey and sample collection

A roving survey was conducted from October 2025 to March 2026 to assess the incidence of bacterial blight of pomegranate in major pomegranate growing districts of Karnataka. The survey covered seven districts, viz., Raichur, Bagalkot, Vijayapura, Chitradurga, Ballari, Koppal and Tumakuru, comprising 14 taluks and 29 pomegranate orchards. During the survey, orchards were inspected for the occurrence of bacterial blight symptoms on leaves, twigs and fruits. The disease incidence in each orchard was recorded and expressed as per cent disease incidence.

Assessment of disease incidence

The per cent disease incidence on fruits was calculated based on the number of infected fruits in relation to the total number of fruits observed in each orchard using the formula described by Wheeler (1969) [13].

$$\text{Per cent disease incidence} = \frac{\text{Number of fruits infected}}{\text{Total number of fruits observed}} \times 100$$

The disease incidence recorded from individual orchards was used to determine the mean incidence at the taluk and district levels.

Disease symptomatology

During the survey, characteristic symptoms of the disease were recorded on leaves, twigs and fruits. Representative symptomatic plant parts were photographed and carefully collected from affected orchards, packed in brown paper bags, labelled and brought to the laboratory for further examination.

Results and Discussion

Survey and incidence of bacterial blight

A roving survey was conducted from October 2025 to March 2026 to determine the occurrence and distribution of bacterial blight in major pomegranate growing areas of Karnataka. A total of 29 orchards across 14 taluks of seven districts were surveyed (Table 1). During the survey, symptomatic leaf and fruit samples were collected from affected orchards and brought to the laboratory for further investigations.

The incidence of bacterial blight ranged from 0.00 to 68.36 per cent among the surveyed orchards (Table 1). The maximum disease incidence of 68.36 per cent was recorded at Hirearahalli village of Yelburga taluk in Koppal district, followed by Sevalanagar-1 (35.73 %) of Hiriyuru. In contrast, no disease incidence was recorded in Mustigarahalli and Javaragondanahalli villages of Sira taluk. The mean disease incidence differed markedly among the surveyed taluks. The maximum incidence was recorded in Yelburga taluk of Koppal district (68.36 %), followed by Challakere (32.86 %), Ballari (31.25 %) and Kurugodu (30.47 %). Raichur recorded minimum incidence of 14.44 per cent, whereas no disease was observed in Sira taluk.

Among the districts surveyed, Koppal recorded the maximum mean disease incidence of 33.25 per cent, followed by Ballari (30.86 %), Chitradurga (29.54 %), Vijayapura (26.11 %), Bagalkot (22.84 %) and Raichur (14.98 %). No disease incidence was recorded in Tumakuru district (Fig. 1).

Among the cultivars observed during the survey, Bhagwa was predominant and exhibited disease incidence ranging from 0.00 to 68.36 per cent. The cultivar Ganesh was recorded only in few orchards of Vijayapura district.

The considerable variation in bacterial blight incidence among the surveyed locations may be associated with differences in geographical location and prevailing environmental conditions. Similar variation in disease incidence and severity among pomegranate growing districts of Karnataka was reported by Benagi *et al.* (2011), who recorded the maximum disease intensity in Bagalkot (74.08 %) and the minimum in Bellary (6.73 %). Similar variation in bacterial blight incidence has also been reported from pomegranate growing regions of Maharashtra and Tamil Nadu by Mulla *et al.* (2009) and Chowdappa *et al.* (2018), respectively.

The comparatively higher disease incidence recorded in Koppal district, particularly in Yelburga taluk, may be attributed to the conducive environmental conditions for disease development. Intermittent rainfall, cloudy weather, prolonged leaf wetness, higher day temperature and elevated relative humidity can provide favourable conditions for infection and subsequent disease development and dissemination (Kumar *et al.*, 2006) [5]. The present findings are in close agreement with Gamangatti and Patil (2014) [3], who reported comparatively higher disease severity in Koppal district (44.90 PDI) and lower severity in Raichur (10.40 PDI) among the surveyed districts of Karnataka. Similarly, Yenjerappa *et al.* (2014) [16] reported considerable variation in bacterial blight incidence across major pomegranate growing regions of Karnataka, with the highest disease incidence recorded in Chitradurga (38.29 %), followed by Koppal (32.40 %).

The comparatively lower incidence observed in Raichur district and the absence of disease in Sira taluk of Tumakuru district may be associated with differences in environmental conditions and orchard management practices. Cultural practices such as timely pruning and destruction of infected plant parts, maintenance of orchard sanitation and provision of adequate rest to the crop may contribute to reducing pathogen inoculum and disease development (Yenjerappa *et al.*, 2011) [15].

Disease symptomatology

Symptoms on leaves

The symptoms observed on leaves were characterized by small to medium sized, irregular, dark brown to black lesions, surrounded by a yellow halo (Plate 1). With advancement of infection, individual lesions coalesced and formed larger necrotic areas, resulting in extensive blighting of affected leaves. Yellowing followed by premature shedding of infected leaves was observed in orchards exhibiting severe disease incidence.

Symptoms on twigs and branches

On twigs and branches, the disease was manifested as elongated, dark brown to black lesions. With progression of infection, affected twigs exhibited longitudinal cracking of the bark, followed by girdling of the affected branches (Plate 1). Drying of young shoots and branches was frequently observed in orchards with severe disease incidence.

Symptoms on fruits

Fruit symptoms were manifested as small, dark brown to black lesions on the rind, which gradually enlarged and developed into corky lesions. With advancement of infection, the lesions developed characteristic L or Y shaped cracks on the fruit surface (Plate 1). Severely infected fruits exhibited extensive cracking and splitting, resulting in deterioration of fruit quality and reduced marketability.

The symptoms recorded during the present investigation closely resembled the symptoms reported by Hingorani and Mehta (1952) [4]. They described the symptoms as irregular brown lesions on leaves that enlarged, coalesced and resulted in premature defoliation. Comparable observations were made by Manjula and Khan (2003) [7], who reported the symptoms on leaves as minute water-soaked lesions that gradually turned brown to dark brown spots surrounded by a yellow halo. Further, elongated black lesions appears on twigs leading to twig blight while infected fruits developed necrotic lesions with characteristic L, Y or star shaped cracks.

In a similar line, Sharma *et al.* (2017) recorded the symptoms of bacterial blight as dark brown to black necrotic lesions on leaves, cracking of the bark, dieback of infected twigs and dark necrotic lesions on fruits that subsequently developed into characteristic L or Y shaped cracks, ultimately resulting in fruit splitting. Similarly, Yenjerappa (2009) [14] reported brown to black water-soaked lesions on leaves, elongated dark lesions on stem leading to cracking and girdling, and black necrotic lesions on the fruits that developed characteristic L, Y or star shaped cracks, resulting in fruit splitting and drying.

Table 1: Status of bacterial blight of pomegranate in major pomegranate growing areas of Karnataka

District	Taluk	Village	Latitude	Longitude	Variety	Disease incidence (%)	Mean disease incidence (%)	
							Taluk	District
Raichur	Lingasugur	Lingasugur rural	16.112405	76.509643	Bhagwa	29.08	15.51	14.98
		Adavibhavi-1	16.142869	76.476193	Bhagwa	7.24		
		Adavibhavi-2	16.143066	76.476243	Bhagwa	10.21		
	Raichur	Turkandona-1	15.994918	77.327283	Bhagwa	11.65	14.44	
		Turkandona-2	15.995223	77.326523	Bhagwa	17.23		
Bagalkot	Bagalkot	Murnala	16.168673	75.64282	Bhagwa	27.34	22.84	22.84
		Durganagar	16.156914	75.617018	Bhagwa	18.35		
Vijayapura	Basavana bagewadi	Manguli-1	16.661452	75.820565	Ganesh	24.21	24.53	26.11
		Manguli-2	16.66078	75.820719	Ganesh	27.35		
		Ukkali-1	16.719808	75.86306	Bhagwa	22.72		
		Ukkali-2	16.720366	75.863533	Bhagwa	23.86		
	Vijayapura	Kumatagi	16.846426	75.890702	Bhagwa	27.69	27.69	
Chitradurga	Challakere	Kaluvehalli	14.36539	76.777596	Bhagwa	32.86	32.86	29.54
	Hiriyur	Hiriyur	13.965697	76.640669	Bhagwa	15.78	26.21	
		Sevalanagar-1	13.963726	76.647162	Bhagwa	35.73		
		Sevalanagar-2	13.964731	76.646755	Bhagwa	29.12		
Ballari	Ballari	Kappagal	15.206842	76.985417	Bhagwa	31.25	31.25	30.86
	Kurugodu	Orvai	15.352167	76.767912	Bhagwa	32.19	30.47	
		Lakshmipura	15.337628	76.796293	Bhagwa	28.75		
Koppal	Kushtagi	Shakappur-1	15.604915	76.408082	Bhagwa	12.57	15.99	33.25
		Shakappur-2	15.715562	76.162058	Bhagwa	13.66		
		Yelburthi	15.714129	76.140115	Bhagwa	21.75		
	Koppal	Budihal	15.273064	76.089402	Bhagwa	18.12	18.12	
	Yalburga	Hirearalahalli	15.716143	76.158919	Bhagwa	68.36	68.36	
	Gangavathi	Kanakapura	15.604915	76.408082	Bhagwa	13.01	20.52	
		Neerloti	15.586383	76.450957	Bhagwa	15.20		
		Arlahalli	15.516762	76.481546	Bhagwa	33.34		
Tumakuru	Sira	Mustigarahalli	13.804605	76.888587	Bhagwa	0.00	-	-

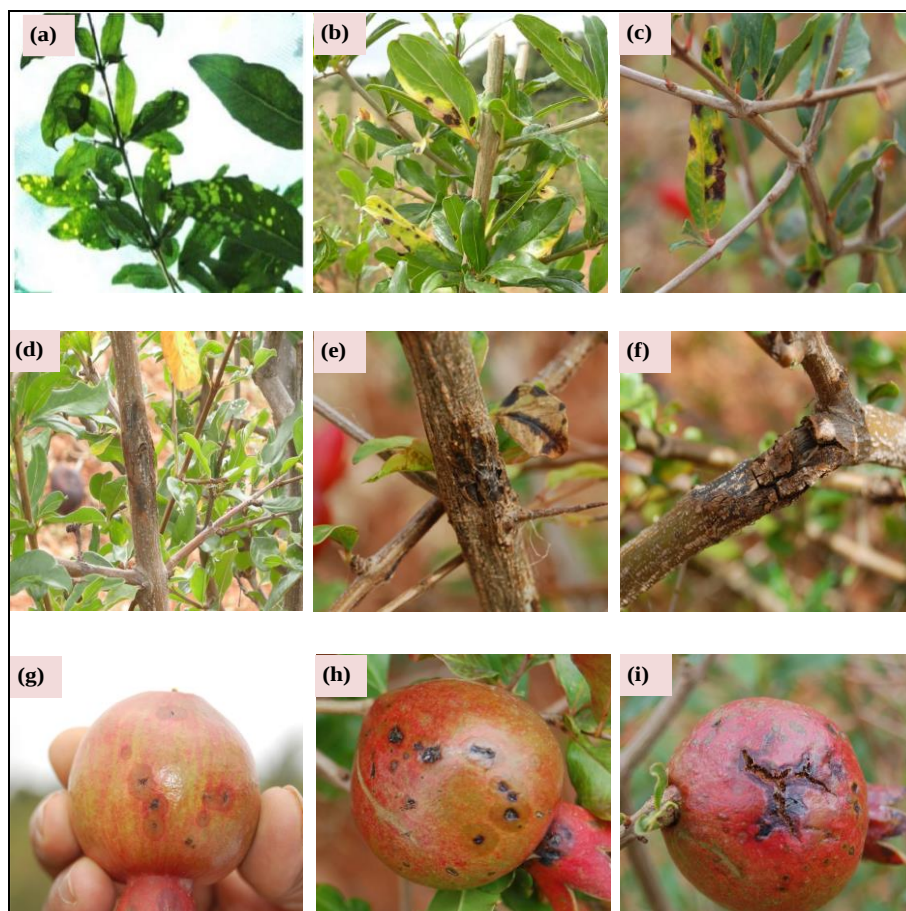


Plate 1: Progressive symptoms of bacterial blight of pomegranate. (a) water-soaked lesions on the leaves, (b) dark brown to black necrotic spots surrounded by yellow halo, (c) spots coalesce to form large lesions resulting in blighting of leaves, (d) black lesion on twig, (e) and (f) cracking and girdling of the twigs, (g) water-soaked lesions on fruits, (h) black necrotic spots on fruits, (i) characteristic L or Y shaped cracks on the fruit

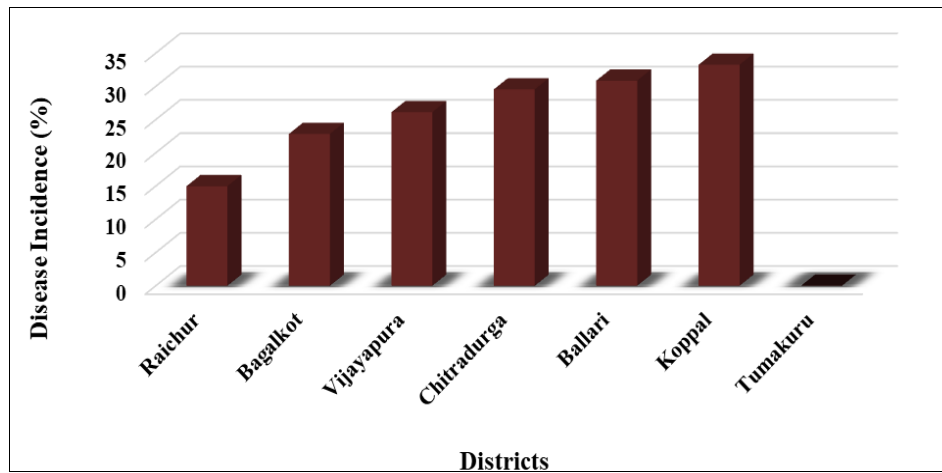


Fig 1: District-wise incidence of bacterial blight of pomegranate in Karnataka

Conclusion

A roving survey conducted across seven major pomegranate growing districts of Karnataka revealed considerable variation in the incidence of bacterial blight among the orchards. The disease incidence ranged from 0.00 to 68.36 per cent, with the maximum incidence recorded at Hirearalahalli village of Yelburga taluk in Koppal district. At the district level, Koppal recorded the highest mean disease incidence, whereas no disease was observed in Tumakuru district. The predominant cultivar encountered during the survey was Bhagwa. Characteristic symptoms were observed on leaves, twigs, branches and fruits, with L and Y shaped cracks on fruits being a prominent symptom. The marked spatial variation in disease incidence suggests the influence of geographical, environmental and orchard management strategies on disease development and distribution. The findings emphasize the need for regular surveillance and timely management of bacterial blight in major pomegranate growing regions of Karnataka.

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