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A survey on the incidence of bacterial blight *Xanthomonas axonopodis* pv. *punicae* of Pomegranate in Tamil Nadu

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Abstract

Bacterial blight of pomegranate caused by *Xanthomonas axonopodis* pv. *punicae* (*X. axonopodis* pv. *punicae*) is one of the quit major diseases of pomegranate during 2002 in India. A detailed roving survey was conducted to assess the incidence of bacterial blight in major pomegranate growing areas of Tamil Nadu viz Erode, Theni, Krishnagiri, Coimbatore, Dindigul, and Tirunelveli districts. The maximum disease incidence was observed in the Manupatty village of Tiruppur district on pomegranate variety Ganesh (35 %) with the disease severity of 25 per cent in leaves followed by Chennampatti village of Erode district. The maximum incidence of bacterial blight of pomegranate fruits recorded in the Sivagiri village of Erode district (24 %) with severity of 20 per cent in fruits followed by Manupatty village of Tiruppur district. Hence the bacterial blight incidence was high in the leaf when compare to fruits in all the areas surveyed.

Keywords: Pomegranate bacterial blight, *Xanthomonas axonopodis* pv. *punicae*, Survey

Introduction

Pomegranate (*Punica granatum* L.) is known as the 'fruit of paradise' belongs to the family Lythraceae. The fruits of pomegranate are known to possess pharmaceutical and therapeutic properties. A compound found only in pomegranates called punicalagin is shown to benefit the heart and blood vessels, which is responsible for pomegranate's antioxidant and has beneficial effects on heart diseases and strokes as it helps in lowering non-essential fatty acids and cholesterol (Esmailzadeh *et al.*, 2006) [4]. Successful pomegranate cultivation in recent years has met with different constraints such as pest and diseases. Bacterial blight caused by *X. axonopodis* pv. *punicae* is one of the most devastating diseases of pomegranate during 2002 in India, which brings down the domestic and export production by 80 per cent (Poovarasana *et al.*, 2013) [8]. The disease assumed severity in all the pomegranate growing areas of Maharashtra, Karnataka, Andhra Pradesh, Assam, Rajasthan, Gujarat and Tamil Nadu resulting in severe yield loss both in terms of quality and quantity. A yield loss up to 70-90 per cent was recorded in India due to bacterial blight of pomegranate (Gargade, 2014) [5]. This disease causes 30-50 per cent losses in normal condition. Under favorable environmental conditions 80-100 per cent losses are reported. All the commercial grown cultivars are susceptible to this disease (Raghuwanshi *et al.*, 2013) [9]. Pomegranate bacterial blight is a daunting problem for pomegranate farmers in India. India loses about Rs 10,000 crore in production of pomegranate and about Rs 2000 crore as export opportunity loss every year due to this disease (Business- standard, 2014) [3]. The present investigation was carried out with an objective to assess the incidence of bacterial blight of pomegranate in major pomegranate growing areas of Tamil Nadu.

Materials and Methods**Survey for the incidence of bacterial blight of Pomegranate**

A roving survey was conducted during *Hasta bahar* season (October - May) 2015-16 to know the incidence of bacterial blight in major pomegranate growing areas of Tamil Nadu viz Erode, Theni, Krishnagiri, Coimbatore, Dindigul, and Tirunelveli districts, on major varieties like Bhagwa and Ganesh. Incidence of the disease on leaves and fruit was recorded. The disease severity was recorded by using the following scale developed by (ICAR-NRCP, 2006) [6]. Severity of bacterial blight of pomegranate was recorded by using 0-5 and 0-6 scale on leaf and fruit, respectively.

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Grade	Per cent area affected	
	Leaf	Fruit and stem
0	0.00	0.00
1	Up to 1	Up to 1
2	>1-10	>1-10
3	>10-20	>10-20
4	>20-40	>20-40
5	>40-70	>40-70
6	-	>70-100

Per cent disease incidence and severity (Mckinney, 1923) [7] on leaves and fruits was calculated by following formula given below:

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

$$\text{Per cent disease severity} = \frac{\text{Sum of individual disease ratings}}{\text{Total units observed}} \times \frac{100}{\text{Maximum grade}}$$

Results and Discussion

Symptomatology

Bacterial blight of pomegranate produced different kinds of symptoms on the leaves, stem and fruits. On the leaves, the symptoms appear as small irregular prominent water soaked spots, which later become necrotic with light to dark brown center surrounded by water soaked margin. At advanced stage, the individual spots coalesced giving a blight appearance (Plate 1a). The lesions on the fruit appeared as irregular shining brown to black spots with 'Y' or 'L' shaped cracking or splitting of pericarp (Plate.1b). Bora and Katak (2014) [2] reported that aerial parts like leaves, stems, flowers and fruits of pomegranate plants have showed diseased symptoms initially as irregular to circular translucent, small, dark water soaked spots on leaves. Later they became necrotic at the centre. Severely infected leaves shed off prematurely. In severe cases girdling and cracking symptoms appeared on the stem. Spots on fruits were somewhat dark brown in colour, irregular, slightly raised with oily appearance, which split open with L or Y shaped cracks under severe stages of disease.

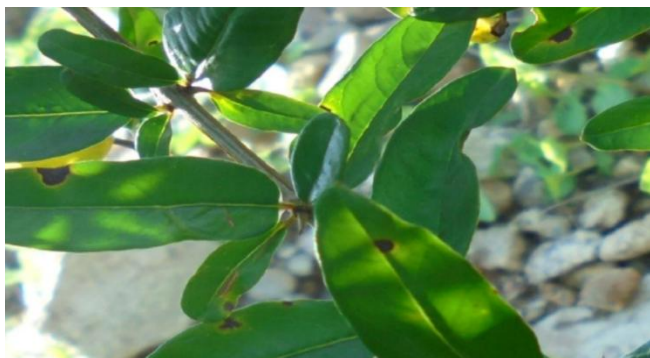
Survey

Survey for the occurrence of any plant disease is essential to know the level of incidence, damage caused, spread and management of the diseases. In the present study a roving survey was conducted during 2015-16 and the incidence and severity of pomegranate bacterial blight were recorded. The result of the survey was presented in Table 1, Fig 1, Fig 2. The occurrence of pomegranate bacterial blight disease was noticed in all the areas. The maximum incidence of bacterial

blight was observed in the Manupatty village of Tiruppur district on pomegranate variety Ganesh (35%) with the disease severity of 25 per cent in leaves. This is followed by Chennampatti village of Erode district where 22.5 per cent disease incidence was recorded with the severity of 13.5 per cent. The other villages of Erode, Dindigul and Coimbatore districts recorded comparatively lesser bacterial blight incidence. The maximum incidence of bacterial blight of pomegranate fruits recorded in the Sivagiri village of Erode district (24 %) with severity of 20 per cent in fruits (Fig. 2). This followed by Manupatty village of Tiruppur district where 20 per cent disease incidence was recorded on fruits. From the results it can be concluded that the maximum incidence was noticed in Tiruppur district followed by Erode district. The bacterial blight incidence was high in the leaf when compare to fruits in all the areas surveyed. The varying level of disease incidence was observed in different districts of Tamil Nadu, ranging from 10 - 35 per cent this variation might be due to prevalence of different weather conditions *i.e.* temperature, rainfall and relative humidity (RH) which affect the infection and spread of bacterial blight of pomegranate. Yenjarappa *et al.* (2004) [13] recorded highest severity of bacterial blight of pomegranate in Bellary Taluk and moderate incidence in Andhra Pradesh. Raju *et al.* (2010) [10] conducted a survey during 2009-10 in the major areas of Karnataka. They recorded bacterial blight incidence ranging from 8 to 80 per cent. The PDI of the bacterial blight was high in the range of 4.8 to 54 per cent. Survey by Sharma *et al.* (2011) [11] in important pomegranate growing states conducted during 2006 to 2008 revealed the disease prevalence in different districts of Maharashtra *viz.*, Solapur, Sangli, Pune, Nashik, Osmanabad, Aurangabad, Latur and Jalna in mild to severe form. In Andhra Pradesh disease was prevalent in mild to severe form in most pomegranate growing areas of Anantapur district, whereas in Karnataka disease was prevalent in mild to moderate form in Bijapur, Gadag, Koppal and Bagalkot districts. Anand Gouda *et al.* (2013) [11] conducted an intensive roving survey to assess the incidence and severity of bacterial blight of pomegranate in major growing areas comprising Raichur, Koppal and Bellary districts of Karnataka. Disease index on leaves ranged between 11.56 to 34.37 PDI with the highest disease index of 34.57 in Nelahal village of Raichur taluk followed by in Laxmipura village of Bellary taluk (31.40 PDI). Yenjarappa *et al.* (2014) [12] conducted a survey in various places of Karnataka and Andhra Pradesh to assess the bacterial blight incidence. They observed 38.2 per cent of disease in Chitradurga district and 36.4 per cent in Anantapur. The present finding is also in conformity with the observation of the above workers, who reported devastating disease of bacterial blight of pomegranate.

Table 1: Occurrence of pomegranate bacterial blight disease in Tamil Nadu

S. No.	Location	District	Variety	Leaves		Fruits	
				Disease incidence (%)	Disease severity (%)	Disease incidence (%)	Disease severity (%)
1	Thondamuthur	Coimbatore	Ganesh	10	6	-	-
2	TNAU, Orchard	Coimbatore	Ganesh	10	7	-	-
3	Sennampatty	Erode	Ganesh	22.5	13.5	16.25	18.5
4	Sivagiri	Erode	Ganesh	22	16	24	20
5	Thamaraipalayam	Erode	Bhagwa	18	14	15	10
6	Vaiyampatty	Erode	Bhagwa	17	10	-	-
7	Ambalikai	Dindigul	Ganesh	18	11	-	-
8	Oddanchatram	Dindigul	Ganesh	13	8	-	-
9	Manupatty	Thirupur	Ganesh	35	25	20	18



Glistening spots on leaves

Plate 1a: Symptoms of bacterial blight on pomegranate

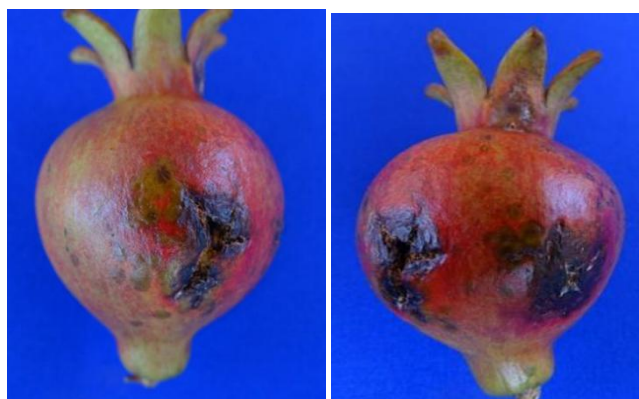


Plate 1b: L and Y shaped cracks on fruit

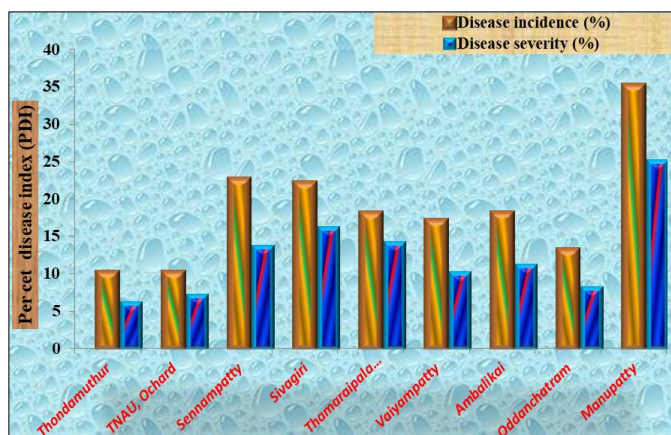


Fig 1: Percentage of disease incidence and disease severity on pomegranate leaves

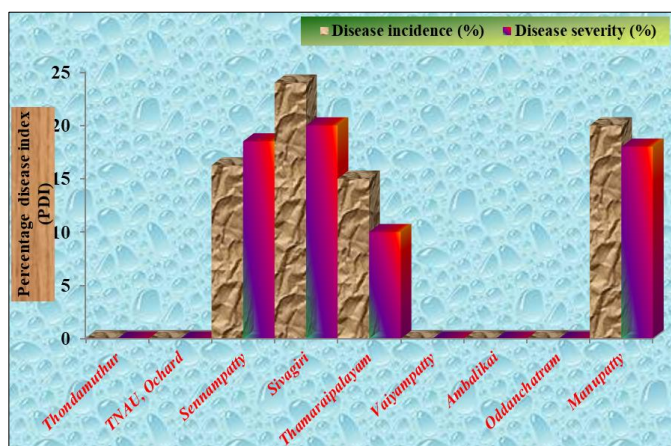


Fig 2: Percentage of disease incidence and disease severity on pomegranate fruits

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