

## SCREENING OF POMEGRANATE GERMPLASM AGAINST BACTERIAL BLIGHT

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**ABSTRACT:** Bacterial blight of pomegranate caused by *Xanthomonas axonopodis* pv. *punicae* is one of the most devastating disease affecting pomegranate production in Punjab. Therefore, an experiment was conducted for screening of pomegranate germplasm against bacterial blight at PAU, Ludhiana during 2013. Leaves and fruits of different genotypes of pomegranate were inoculated with clip method and pinprick method on its surface, respectively. Per cent disease index was recorded under artificial inoculated conditions and natural conditions. None of the genotypes exhibited resistant against bacterial blight. Some of the genotypes showed moderately susceptible reaction against bacterial blight of pomegranate.

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

Pomegranate (*Punica granatum* L.) is an ancient and important fruit crop of sub-tropical and tropical regions of the world. Although native of Iran and adjoining areas, pomegranate has been widely cultivated throughout India. India is the world's leading pomegranate producer with nearly 50% of world's production. In India, pomegranate was grown over an area of 112.74 thousand hectare with production of 741.08 thousand MT in 2012-13 (Anon., 2). The development of varieties such as Ganesh, Bhagwa and Mridula has revolutionized pomegranate cultivation in the country. However, bacterial blight, a disease of minor importance at one time has now emerged as a constraint of significance because of increased incidence over years in all the pomegranate growing regions (Anon., 1). During 2007, the total output of pomegranate production in India was down by 60 per cent (Raghavan, 5). The disease has been observed as serious threat to the cultivation of recommended varieties of pomegranate in Punjab. Disease index varied from 18.43 to 45.67 per cent on fruits and 15.32 to 37.81 per cent on leaves of different cultivars in Punjab (Rani, 6). Of the several disease management strategies, varietal resistance is considered as the best alternative. Therefore, the present studies, were undertaken to identify the resistant genotypes of pomegranate against bacterial blight, which can be used further in the breeding programme to improve resistance to bacterial blight of pomegranate.

### MATERIALS AND METHODS

To determine the comparative response of different genotypes of pomegranate against bacterial blight, ten genotypes of 16 years old were selected at New Orchard, Punjab Agricultural University, Ludhiana during 2013. Screening of the genotypes was done

both under natural and artificial inoculation conditions. For artificial inoculations, the pathogen (*Xanthomonas axonopodis* pv. *punicae*) was isolated from bacterial blight infected leaves collected from the variety Ganesh on nutrient agar medium. The culture thus obtained was maintained on peptone sucrose broth medium and preserved in polypropylene tubes having silica gel at -80°C. Thirty leaves and ten fruits of each genotype were inoculated using  $1 \times 10^8$  cfu  $m^{-1}$  bacterial suspension of 24 hours old bacterial culture in the month of July by the following methods:

#### (a) Inoculations on leaves

The leaves were firstly washed with sterile distilled water and then inoculated by leaf-clip method in which incision to the intact leaf was given near the tip with sterile scissors dipped in 24 hours old culture suspension. Inoculated leaves were covered with polythene bags containing a wet cotton swab and tied firmly to the twig.

#### (b) Inoculations on fruits

Healthy medium size intact fruits were marked on the branches in the orchard. The surface of fruits was thoroughly washed with sterile distilled water and sterilized with cotton swab dipped in absolute alcohol. The inoculations were carried out on fruits by pin-prick method. The fruit surface was injured by giving shallow pin pricks in the marked areas. Small suspension drops were placed on the injured fruit surface with a sterile needle. The inoculated fruits were covered by polythene bags containing a wet cotton swab and tied firmly to the twig.

The data were recorded in terms of per cent disease index on leaves and fruits using 0-4 scale

(Chester, 3) where, 0= no spot visible on the leaves, 1= one-fourth of the leaf area spotted, 2= half of the leaf area spotted, 3= three-fourth of the leaf area spotted and 4= more than three-fourth of the leaf area spotted.

Twenty eight more genotypes of pomegranate (under evaluation) were screened only under natural conditions. On the basis of per cent disease index calculated, the reaction of pomegranate genotypes (Rani and Verma, 7) was categorized as under:

Per cent disease index	Disease reaction
0	Resistant (R)
0-5	Tolerant (T)
5-20	Moderately susceptible (MS)
20-40	Susceptible (S)
>40	Highly susceptible (HS)

## RESULTS AND DISCUSSION

The data presented in Table 1 and 2 indicated that none of the 10 genotypes screened against the

bacterial blight exhibited resistant or tolerant reaction under natural as well as artificial inoculation conditions. The degree of infection was varied on fruits and leaves, the former showing high level of the disease occurrence. Three genotypes namely Chawla-1, Ichakdana and Moga local showed moderately susceptible reaction under natural conditions. Whereas, the genotypes including Anar-Shirin, Chawla-2, G-137, Jodhpur White and Kali-Shirin expressed susceptible reaction on leaves and fruits under natural as well as artificial inoculation conditions except Chawla-2 and Kali-Shirin, which were found to be highly susceptible on fruits under artificial inoculation conditions. The Ganesh and Kandhari graded as highly susceptible as those had >40 per cent disease index on leaves and fruits under both natural as well as artificial inoculation conditions.

Twenty eight more genotypes were screened only under natural conditions. It is evident from the data given in Table 3 that all the genotypes exhibited highly susceptible reaction on leaves as those had >40 per cent disease index.

**Table 1 : Screening of pomegranate germplasm against bacterial blight under natural conditions**

Genotypes	PDI* on leaves	Reaction	PDI* on fruits	Reaction
Anar-Shirin	25.89	S	33.10	S
Chawla-1	18.05	MS	18.32	MS
Chawla-2	29.24	S	37.72	S
G-137	20.13	S	23.90	S
Ganesh	53.50	HS	69.35	HS
Ichakdana	16.66	MS	21.23	S
Jodhpur White	25.23	S	27.77	S
Kali-Shirin	27.64	S	36.56	S
Kandhari	52.50	HS	60.20	HS
Moga local	18.97	MS	22.56	S

**Table 2 : Screening of pomegranate germplasm against bacterial blight under artificial inoculation conditions.**

Genotypes	PDI* on leaves	Reaction	PDI* on fruits	Reaction
Anar-Shirin	29.66	S	39.72	S
Chawla-1	19.82	MS	21.66	S
Chawla-2	34.02	S	45.27	HS
G-137	24.16	S	27.08	S
Ganesh	62.50	HS	67.22	HS
Ichakdana	20.00	MS	23.61	S
Jodhpur White	28.81	S	33.33	S
Kali-Shirin	31.94	S	43.88	HS
Kandhari	54.70	HS	62.50	HS
Moga local	22.77	S	25.34	S

PDI\*- Per cent Disease Index

**Table 3 : Screening of pomegranate germplasm against bacterial blight under natural conditions.**

Genotypes	PDI* on leaves	
	2012	2013
A-117	51.25	60.62
A-215	55.00	63.75
A-222	63.75	75.00
A-223	53.12	65.62
A-232	45.00	55.00
A-312	45.62	56.25
A-314	49.37	56.87
A-322	50.62	62.50
A-332	58.12	65.62
A-334	53.75	67.50
A-424	55.00	59.37
A-425	57.50	70.62
A-428	59.37	70.00
A-430	44.37	59.37
A-46	49.32	63.12
A-519	41.25	58.12
A-67	68.75	74.37
A-733	40.00	53.12
Bessian Seedless	48.12	60.62
Bhagwa	50.00	53.12
G-137	53.12	53.12
Jodhpur Red	45.62	60.62
Jodhpur Seedless	58.12	48.75
Jyoti	43.75	58.75
Kandhari	47.50	45.00
Mridula	40.00	41.25
P-23	41.25	49.37
P-26	55.62	40.00

PDI\*- Per cent Disease Index

These results are similar as has been obtained by Rani (6) that the fruits showed higher level of disease

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occurrence as compared to leaves. Ganesh and Chawla-2 expressed highly susceptible reaction on fruits. All the other genotypes including Ichakdana, Chawla-1, G-137, Jodhpur White and Anar-Shirin were found to show susceptible disease reaction on fruits. Jalikop *et al.* (4) have also categorized Ganesh as highly susceptible cultivar.

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