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RESEARCH ARTICLE

Efficacy of different phytoextracts for management of bacterial blight disease of pomegranate caused by *Xanthomonas axonopodis* pv. *punicae*

■ **G.B. RAUT, C.V. AMBADKAR AND A.S. DHAWAN**

SUMMARY

A study on efficacy of different plant extracts for management of bacterial blight disease of pomegranate caused by *Xanthomonas axonopodis* pv. *punicae* was conducted during the year 2011-12 at College of Agriculture, Osmanabad. Plant leaf extract of seven botanicals *viz.*, Shatavari leaf extract, Sadaphuli leaf extract, Adulasa leaf extract, Karanj leaf extract, Ashwagandha leaf extract, Behada leaf extract, Ritha leaf extract @ 10 and 20 per cent were evaluated *in vitro* by applying inhibition zone technique (paper disc method) and using nutrient agar (N.A.) as basal culture medium. The result revealed that Sadaphuli leaf extract at 10 per cent was found most effective for controlling *X. axonopodis* pv. *punicae* by forming 8.22 per cent inhibition followed by Ritha leaf extract (6.50%), Adulasa leaf extract (5.35%), Shatavari leaf extract (4.52 %), Karanj leaf extract (4.11%), Ashwagandha leaf extract (4.11 %) and Behada leaf extract (3.28%). Similarly, Sadaphuli leaf extract at 20 per cent was found most effective for controlling *X. axonopodis* pv. *punicae* by forming 9.06 per cent inhibition followed by Ritha leaf extract (8.22 %), Adulasa leaf extract (6.99 %), Shatavari leaf extract (6.58 %), Karanj leaf extract (5.75 %), Ashwagandha leaf extract (5.36 %) and Behada leaf extract (5.36 %).

Key Words : *Xanthomonas axonopodis* pv. *punicae*, Plant leaf extract, Bacterial blight disease of pomegranate

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India is largest pomegranate producer in the world sharing about 36 per cent of the world's production and above 30 per cent of the international pomegranate trade. Majority of the existing pomegranate orchards are severely affected by bacterial blight/oily spot disease. Bacterial blight disease of pomegranate caused by *Xanthomonas axonopodis* pv. *punicae* is one of the most destructive disease of pomegranate (*Punica granatum*) inflicting considerable quantitative and qualitative losses. Mostly the disease occurred on leaves, stems and fruits. Considering the economic importance of the fruit crop as well as disease, present investigations were undertaken to find out the efficacy of plant extracts

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against *X. axonopodis* pv. *punicae in vitro.*

MATERIAL AND METHODS

Design : Complete Randomized Design
Replications : Three
Treatments : Eight.

In vitro evaluation of plant extracts :

Plant leaf extract of seven botanicals *viz.,* Shatavari leaf extract (*Asparagus racemosa*), Sadaphuli leaf extract (*Catharanthus roseus*), Adulasa leaf extract (*Adhatoda vasica*), Karanj leaf extract (*Pongamia pinnata*), Ashwagandha leaf extract (*Withania somnifera*), Behada leaf extract (*Terminalia belerica*), Ritha leaf extract (*Sapindus mukorossi*) (@ 10 and 20%) were evaluated against *X. axonopodis* pv. *punicae*. Before preparation of leaf extract leaves of each plant species were dipped in the 0.1 per cent mercuric chloride ($HgCl_2$). Leaf extracts were prepared by grinding 100g washed leaves of each plant species in 100ml distilled water with mixture-cum grinder. These were then filtered through Whatman number 1 filter paper using funnel and volumetric flask (100 ml capacity). The final clear filtrate obtained was treated as 100 per cent concentration of standard leaf extract. The desired quantity required for preparation of 10 and 20 per cent concentration was taken from this 100 per cent standard leaf extract. These leaf extracts were then evaluated *in vitro* against *X. axonopodis* pv. *punicae* by applying inhibition zone technique.

For this purpose fresh nutrient agar medium was prepared and dispersed in 100 ml quantities in conical flask (250 ml capacity), plugged and autoclaved at 15 lbs/cm^2 pressure for 15 -20 minute. The desired concentration of leaf extract *i.e.,* 10 and 20 per cent was prepared by using appropriate quantities of leaf extract required for 10 and 20 per cent concentration. In these desired concentration of leaf extract 5 mm disc of Whatman number 1 filter paper were dipped for few minutes. After sterilization of media, it was allowed to cool down to 35^0C before pouring. Approximately 20 ml liquid media was poured in previously sterilized Petriplate and allowed them to solidify. Pouring of plates always done by using laminar air flow cabinet under aseptic condition. After solidification of media in Petriplate, the bacterial suspension was spread on nutrient agar with glass spreader. After uniform spreading of bacterial suspension 5mm. dia. Whatman number 1 filter paper previously dipped in desired concentration of leaf extracts was placed in the center of medium. Three replications for each concentration of leaf extract were maintained. Plates containing nutrient agar with bacterial suspension without any leaf extract were maintained as control. All these Petriplates were incubated at room temperature (28 + 2^0C) for 48 hrs.

Observation on colony growth of test pathogen and per cent inhibition over control was calculated by the formula of Vincent (1947) :

$$I = \frac{C - T}{C} \times 100$$

where,
I = Per cent inhibition
C = Growth of test pathogen in control plate
T = Growth of test pathogen in treatment plate.

RESULTS AND DISCUSSION

In vitro evaluation of seven plant extract *viz.,* Shatavari leaf extract, Sadaphuli leaf extract, Adulasa leaf extract, Karanj leaf extract, Ashwagandha leaf

Table 1 : Inhibitory effect of plant extracts (10 and 20 %) on growth of *X. axonopodis* pv. *punicae*

Treatment No.	Treatments	Mean bacterial growth* (mm) at conc.		% inhibition of bacterial growth	
		10 %	20%	10 %	20%
T_1	Shatavari leaf extract (*Asparagus racemosa*)	85.93	84.08	4.52 (7.27)	6.58 (8.24)
T_2	Sadaphuli leaf extract. (*Catharanthusroseus*)	82.60	81.85	8.22 (9.01)	9.06 (9.39)
T_3	Adulasaleaf extract. (*Adhatoda vasica*)	85.18	83.71	5.35 (7.66)	6.99 (8.43)
T_4	Karanj leaf extract *Pongamia pinnata*)	86.30	84.82	4.11 (7.08)	5.75 (7.85)
T_5	Ashwagandha leaf extract (*Withaniasomnifera*)	86.30	85.18	4.11 (7.08)	5.36 (7.66)
T_6	Behada leaf extract (*Terminalia belerica*)	87.04	85.18	3.28 (6.69)	5.36 (7.66)
T_7	Ritha leaf extract (*Sapindusmukorossi*)	84.07	82.60	6.50 (8.23)	8.22 (9.01)
T_8	Control	90	90	0.00	0.00
	S.E. ±	0.89	0.51	0.51	0.29
	C.D. (P=0.05)	2.68	1.53	1.55	0.89

* Mean of three replications Figures in parenthesis are arcsin values.

extract, Behada leaf extract, Ritha leaf extract (@ 10 and 20%) were carried out for control of *X. axonopodis* pv. *punicae* by using inhibition zone technique. More or similar results were obtained by Jambenal *et al.* (2011) on grapes and Raju *et al*. (2012) on pomegrante.

The result presented in Table 1 revealed that Sadaphuli leaf extract at 10 per cent was found most effective for controlling *X. axonopodis* pv. *punicae* by forming 8.22 per cent inhibition. Ritha leaf extract was found second best effective plant extract which showed 6.50 per cent inhibition followed by Adulasa leaf extract (5.35%), Shatavari leaf extract (4.52 %), Karanj leaf extract (4.11%), Ashwagandha leaf extract (4.11 %) and Behada leaf extract 3.28 per cent inhibition zone. Gamangatti and Patil (2013 a and b) in pomegrante and Kumar and Balabaskar (2013) in rice.

Similarly, The result presented in Table 1 revealed that Sadaphuli leaf extract at 20 per cent was found most effective for controlling *X. axonopodis* pv. *punicae* by forming 9.06 per cent inhibition. Ritha leaf extract was found second best effective plant extract which showed 8.22 per cent inhibition followed by Adulasa leaf extract (6.99 %), Shatavari leaf extract (6.58 %), Karanj leaf extract (5.75 %), Ashwagandha leaf extract (5.36 %) and Behada leaf extract 5.36 per cent inhibition zone.

The results obtained on control strategies correlates with the results of earlier worker Vudhivanich (2003), Tiwari *et al*. (2004), Basavaraj *et al*. (2007), Jagunatharaddi *et al*. (2007), Suryawanshi *et al.* (2009) and Atar (2011).

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