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Integrated Disease Management Practices for the Control of Bacterial Blight in Pomegranate in Karnataka

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ABSTRACT

Pomegrante (*Punica granatum* L.) is mainly grown in states of Maharashtra, Karnataka, Andhra Pradesh and Tamil Nadu. Changing climatic scenario and intensive cultivation practices led to outbreak of bacterial blight disease caused by *Xanthomonas axonopodis* pv. *punicae* in pomegranate leading to heavy losses ranging from 30-50 per cent depending on the pathogenic load in orchard and aberrant climatic conditions. Pomegranate orchards at Bagalkote district in Karnataka are severely affected by bacterial blight disease to the tune of 40 per cent. For the management of bacterial blight of Pomegranate, Integrated Disease Management (IDM) practices developed by UAS, Dharwad were demonstrated under Front Line Demonstration (FLD) by ICAR-Krishi Vigyan Kendra, Bagalkote at Kaladagi village during the year 2016-17 and 2017-18. Method demonstration in farmers' pomegranate orchard at Kaladagi village comprised of sanitation practices including removal of infected shoots, pasting of stem and branches with Bordeaux mixture @ 1% foliar spray of copperoxychloride @ 3g/l, streptocycline @ 0.5g/l, *Pseudomonas fluorescens* @ 5g/l against oily spot disease of pomegranate, which benefited growers. The incidence of bacterial blight in pomegranate and yield in IDM demonstrated and Farmers' Practice fields during the year 2016-17 and 2017-18 were recorded. Percent Disease Incidence (PDI) in IDM demonstrated fields was 26.35 with yield of 13.50 t/ha and BC ratio of 5.69. However, the disease incidence in farmers' practice orchard was 38.95, with yield 9.75 t/ha and BC ratio 3.31. In IDM demonstrated orchards there was reduction of disease by 32.34 per cent and increase in the yield levels by 38.46 per cent.

Key Words: Bacterial Blight, Bagalkote, Pomegranate, Integrated Disease Management.

INTRODUCTION

The pomegranate (*Punica granatum* L.) has emerged as commercially important fruit, owing to its enormous medicinal and nutritional properties, built-in ability to tolerate heat and drought, low resource input demanding nature and high returns on investment (Singh *et al*, 2012). India is one of the largest producers of pomegranate in the world. During 2017-18, pomegranate was cultivated over 234 thousand ha with an annual production of 2845 thousand Mt and productivity of 12.15 Mt/ ha in India. At present, Maharashtra is the leading state in acreage covering about 62 per cent of area under pomegranate. The other important states next to Maharashtra with respect to pomegranate cultivation are Karnataka, Gujarat and Andhra Pradesh (Anonymous, 2018). In Karnataka, area under pomegranate is 25.97 thousand ha with a production of 268.2 thousand metric tons. Bagalkote district has diversified cropping patterns among agricultural and horticultural crops, where in pomegranate is one of the important fruit crops of the district grown over an area of 2298 ha with production of 25034.8 t/ha and productivity 10.89 t/ ha (Kammar et al, 2019).

Bacterial blight (*Xanthomonas axonopodis* pv. *punicae*) in recent years has become one of the most serious diseases of pomegranate in all the major growing areas resulting in enormous losses to growers. Under epidemic conditions

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Table1. Technology Integrated Disease Management.

Spray Schedule	Time of Sprays	Plant Protection Chemicals Sprayed
1st	Immediately after pruning	Bordeaux Mixture (1%)
2nd	Seven days after 1 st Spray	*Pseudomonas fluorescens* talc based formulation @ 5g/lit
3rd	Eight days after 2nd spray (When new flush come out)	copper oxy chloride 50 WP (3g/lit)+bronopol (0.5g/lit) along with spreader sticker
4th	Fifteen days after 3rd spray (at flower bud initiation)	Streptocycline (0.5g/lit)+carbendazim 50WP (2g/lit) along with spreader sticker
5th	Fifteen days after 4th spray	captan 50 WP (2.5g/lit)+bronopol (0.5g/lit) along with spreader sticker
6th	Fifteen days after 5th spray (at initiation of fruit setting)	Streptocycline (0.5g/lit)+thiophanate methyl 70 WP (1g/lit)
7th	Seven days after 6th spray	*Pseudmonas fluorescens* talc based formulation @ 5g/lit
8th	Seven days after 7th spray	Bordeaux Mixture (1%)
9th	Fifteen days after 8th spray (at 50 % fruit setting)	Streptocycline (0.5g/lit)+Carbendazim 50WP (2g/lit) + Neem Seed Kernal Extract (50g/lit) along with spreader sticker
10th	Fifteen days after 9th spray (at 100 % fruit setting)	Bordeaux Mixture (1%)
11th	Fifteen days after 10th spray	Captan 50 WP (2.5g/lit)+Bronopol (0.5g/lit) along with spreader sticker
12th	Fifteen days after 11th spray	Streptocycline (0.5g/lit)+Thiophanate methyl 70 WP (1g/lit)
13th	Fifteen days after 12th spray	Bordeaux Mixture (1%)
14th	Fifteen days after 13th spray	Streptocycline (0.5g/lit)+ copper oxy chloride 50 WP (3g/lit)+ Neem Seed Kernal Extract (50g/lit) along with spreader sticker
15th	Fifteen days after 14th spray	*Pseudomonas fluorescens* talc based formulation @ 5g/lit

blight resulted in yield losses up to 80 per cent. Bacterial blight pathogen survives in infected plant stems, buds and plant debris in soil up to one year. Apparently healthy planting material may carry the blight pathogen in latent form, particularly in buds, resulting in infection of new plants (Hingorani and Mehta, 1952; Hingorani and Mehta, 1959). Bacterial blight of pomegranate has been effectively managed by adopting Integrated Disease Management (IDM) practices developed by University of Agricultural

Table 2. Bacterial blight disease incidence in IDM and Farmers' Practice Pomegranate Orchard.

Parameter Average Percent Disease Incidence %	2016-17	2017-18	Pooled	Average Percent disease reduction over control (%)
Demo (IDM)	30.30	22.49	26.35	32.34
Check (FP)	41.35	37.70	38.95	
SE (m)	0.65	0.58	0.54	
CD @ 5%	2.08	1.86	1.73	
CV (%)	5.74	6.12	5.23	

Sciences, Dharwad (Benagi and Ravikumar 2009). Pomegranate is the major fruit crop of Kaladagi Village of Bagalkote District, hence, the technology developed by UAS, Dharwad was demonstrated under front line demonstration in farmers field with an objective of disease reduction and fruit yield enhancement.

MATERIALS AND METHODS

KVKs are playing a proactive role in transfer of technology at field level with beneficial impacts. The details of technology intervened through ICAR-Krishi Vigyan Kendra, Bagalkote with the farmers of Kaladagi Village of Bagalkote District under Front Line Demonstration (FLD) in the year 2016-17 and 2017-18 is depicted in table1.

The FLD was conducted in ten farmers' pomegranate orchard in an area of 4 ha replicated ten times in a randomized block design. The spray schedule was followed for Kesar/Bhagwa variety in demonstration plots and farmers own practice was considered as check. The observations on bacterial blight incidence were recorded after the spray schedule in IDM demonstration plots and Farmers Practice was followed. Per cent disease incidence (Wheeler, 1969) on fruit was calculated by applying the formula given below.

$$\text{Per cent disease incidence (\%)} = \frac{\text{Number of Infected fruit}}{\text{Total number of fruits observed in a set}} \times 100$$

Incidence of bacterial blight disease on pomegranate in IDM demonstrated plots and farmers practice were recorded. Fruit yield and economics were also worked out for the same.

RESULTS AND DISCUSSION

Management practices demonstrated in IDM demo plots/orchards with different spray schedule showed reduction in disease incidence and increase in yield levels. The incidence of bacterial blight on pomegranate and yield in IDM demonstrated orchard and farmers' practice orchard during the year 2016-17 and 2017-18 were recorded and pooled data is presented in table 2 and 3. Percent Disease Incidence (PDI) in IDM demonstrated orchard was 26.35 per cent, while PDI in farmers practice orchard was 38.95 per cent. The fruit yield in demonstration orchard was 13.50 t/ha while with farmers own practice the fruit yield was 9.75 t/ha and there was 38.46% increase in fruit yield and disease reduction by 32.34 per cent in IDM demonstrated orchards as compared to farmers practiced orchard. The present findings are also in conformity with the results of Ravikumar *et. al* (2011), who reported the devastating nature of bacterial blight of pomegranate in Bellary, Bijapur and Bagalkot districts on all the varieties, irrespective of age of the plant during late summer and *kharif* season. The disease incidence was more in *mrigbahar* when compared to *ambiabahar* and *hastbahar* seasons because of environmental factors like rainfall and temperature (Rani and Verma, 2001; Dhandar *et*

Table 3. Yield in IDM and Farmers Practice Pomegranate Orchard.

Parameter (Net Returns Rs/ha)	2016-17	2017-18	Pooled	Average Percent increase in yield (%)
Demo (IDM)	13.65	12.36	13.50	38.46
Check (FP)	9.80	9.05	9.75	
SE (m)	0.49	0.31	0.28	
CD @ 5%	1.58	1.01	0.88	
CV (%)	13.34	9.30	7.48	

al, 2004;). The incidence of bacterial blight is less with use of NSKE and *Pseudomonas fluorescens*, use of plant products and bioagents against the pathogen were cost effective essentially required to minimize the use of chemicals and is considered as one of the components in the integrated disease management (Sharma *et al*, 2008). Pooled data of two years revealed that the cost of cultivation in demonstration plots was Rs. 2.14 lakh while the gross income obtained from selling of produce was Rs. 1.22 lakh. The net profits in demonstrated plots were appreciably high with cost benefit ratio of 5.69. The cost of cultivation in farmers' practice was Rs. 2.35 lakh while the gross income obtained from selling of produce was Rs.7.86 lakh.

Most of the farmers do not follow correct plant protection measures. Hence, the effectiveness of different spray schedule with chemical fungicides, antibiotics, NSKE and bio-agent *Pseudomonas fluorescens* was shown to the farmers through demonstration orchards. Trainings, method demonstrations and literature on IDM practices in pomegranate was provided to the farmers to impart knowledge on pomegranate diseases and management practices. The measurable results were increase in yield level and income of the farmers, their knowledge and skill on management practices improved as a result of KVK intervention (Sudha *et al*., 2019 and Santosh *et al*., 2018).

CONCLUSION

The result shows that the IDM practices brought down the bacterial blight infection significantly up to 32.34 % and enhanced productivity of pomegranate. It was inferred from the present study that bacterial blight disease of pomegranate could be managed to have profitable return using Integrated Disease Management Practices developed by UAS, Dharwad which is a boon to pomegranate growers.

REFERENCES

Anonymous (2018). *Horticulture statistics at a glance*. Horticulture statistics division, Ministry of Agriculture and Farmer's welfare. pp 1-490.

Benagi V I and Ravi Kumar M R (2009). Present status of pomegranate bacterial blight and its management. In: *Souvenir & abstracts, 2nd international symposium on pomegranate and minor including Mediterranean fruits*, org. ISHS, Belgium, June 23–27, 2009 at UAS, Dharwad. Karnataka, India, pp 53–58.

Dhandar D G, Nallathambi P, Rawal R D and Sawant D M (2004). Bacterial leaf and fruit spot, A new threat to Pomegranate orchards in Maharashtra. *J Mycol Plant Pathol* **34** (3):971

Hingorani M K and Mehta P P (1952). Bacterial leaf spot of pomegranate. *Indian Phytopath* **5**: 55-56.

Hingorani M K and Singh J N (1959). *Xanthomonas punicae* sp nov. on *Punica granatum* L. *Indian J Agric Sci* **29**:45–48.

Kammar M R, Dinesh Kumar S P, Arjun R S, Mahesh Kadagi, Sudha S, Airadevi P A, S C Angadi and Majeed G (2019). A Strategy document on technological interventions for improving agricultural scenario in Bagalkot district. ICAR-Krishi Vigyan Kendra, Bagalkot Published by ICAR-Agricultural Technology Application Research Institute (ATARI) Zone XI Bengaluru pp: 1-144.

Rani U and Verma K S (2001). Pathogenic potential of *Xanthomonas axonopodis* pv. *punicae* and field response of different pomegranate cultivars. *Plant Dis Res* **16** (2):198–202.

Ravi Kumar M R, Wali S Y, Benagi V I, Patil H B and Patil S S (2011). Management of bacterial blight of pomegranate through chemicals/ antibiotics. *Acta Hortic* 890: 481-484.

Santhosha H M, Akkamahadevi D Agasimani, Roopa S Patil and M Shivashenkarmurthy (2018). Berry Drop Management in Black Pepper through On Farm Testing in Uttara Kannada *J Krishi Vigyan* **7** (Special Issue): 169-171.

Sharma K K, Sharma J, Jadhav V T, Chandra R (2008). Bacterial blight of pomegranate and its management. *Indian Phytopathol* 61 (3):380–381.

Singh N, Singh S and Meshram D (2012). Pomegranate: *In Vitro* Propagation and Biohardening. Lambert Academic Publishing, Saarbrucken, Germany, pp. 160.

Sudha A, Kavitha P S and Sriram N (2019). Integrated Management of Panama Wilt Disease in Banana, *J Krishi Vigyan* **8** (1) : 174-177.

Wetzstein H Y, Ravid N, Wilkins E and Martinelli A P (2011). A morphological and historological characterization of bisexual and male flower types in pomegranate. *J Am Soc Hort Sci* 136: 83-92.

Wheeler B E J (1969). *An introduction to plant diseases,* John Wiley and sons Limited, London, p. 374.

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