The Pharma Innovation Journal 2021; 10(2): 721-723

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating: 5.03
TPI 2021; 10(2): 721-723

www.thepharmajournal.com
Received: 07-12-2021
Accepted: 16-01-2021

M Kavitha
Citrus Research Station, Dr. YSR Horticultural University, Petlur, Nellore, Andhra Pradesh, India

C Madhumathi
Citrus Research Station, Dr. YSR Horticultural University, Petlur, Nellore, Andhra Pradesh, India

L Ranjith Kumar
Citrus Research Station, Dr. YSR Horticultural University, Petlur, Nellore, Andhra Pradesh, India

Corresponding Author:
M Kavitha
Citrus Research Station, Dr. YSR Horticultural University, Petlur, Nellore, Andhra Pradesh, India

Efficacy of different antibiotics for the management of bacterial canker in acid lime caused by *Xanthomonas citri* (Hasse)

M Kavitha, C Madhumathi and L Ranjith Kumar

Abstract
Bacterial canker is one of the major constraints for the production of acid lime in Andhra Pradesh. Even though Petlur selection -1 is tolerant to bacterial canker survey reports revealed that every year 30-35% disease severity was noticed and it is up to 60 per cent in the local variety of acid lime. Streptomycin 100ppm with COC 3000 ppm was recommended but in recent years the efficacy of streptomycin (100ppm) was reduced, it may be due to the development of resistance in the canker pathogen to the antibiotic streptomycin (100ppm). Hence we are planned to evaluate the efficacy of two antibiotics like Bactrinol and bacteriomycin on canker severity of acid lime at the farmer's field of petlur village at Venkatagiri mandal for three consecutive years *i.e* 2013-14, 2014-15 and 2015-16. In this connection, 10 treatments were planned with three replications and for each replication three plants were selected. The antibiotics were used in alone and in combination with copper oxychloride in different concentrations. The data on disease severity was recorded by using a 0-5 scale. Further fruit yield and fruit weight per plant was also recorded. Pooled data of three years revealed that the canker severity was economically low *i.e* 7.32 per cent on leaves and 6.54 per cent on fruits when bacteriomycin (200ppm) sprayed in combination with copper oxychloride (3000ppm) and it was statistically on par with the treatment of streptomycin (200ppm) + COC (3000ppm) treatment and recorded 7.29 per cent and 6.61 per cent PDI on leaves and fruits respectively. Average yields also higher in these two treatments (2009 and 2038 fruits /plant respectively). Hence we can suggest that the streptomycin bactericide used at 200 ppm with COC for effective management of canker.

Keywords: Efficacy, antibiotics, management, bacterial, canker, *Xanthomonas citri*

Introduction
Citrus are distributed throughout the world. Different species of citrus are cultivated in every states and union territories of India. The crop is suffering from different kinds of biotic and abiotic stresses. Citrus canker caused by *Xanthomonas axonopodis* pv. citri (Hasse) Vauterin *et al.* (Xac) is one of the most serious threats having international importance. Acid lime [*Citrus aurantiifolia* (Christm.) Swingle] is the most susceptible one, and up to 50-60% yield reduction has been recorded from different parts of the world (Das, 2003)

Citrus canker is a disease affecting citrus species caused by the bacterium *Xanthomonas citri* (Hasse). Major diseases constraining the production of citrus are citrus canker, citrus greening, citrus tristeza and citrus nematode disease. Among them citrus canker, caused by *Xanthomonas citri* is one of the lethal disease in affecting all type of citrus crops (Prakash and Karemgam, 2012) [7]. Citrus canker is a characterized by the occurrence of conspicuously raised necrotic lesions on leaves, twigs and fruits (Schubert *et al.*, 2000) [11]. Further, Nikhil *et al.* (2013) [5] reported Corky pustules developed on leaves, twigs, thorns and fruits were turn light tan to brown corky cankers, which were rough to touch. Often a water socked margins developing around the Necrotic tissue. The infection causes lesions on the leaves, stems, and fruit of citrus trees, including lime, oranges, and grapefruit. While not harmful to humans, canker significantly affects the vitality of citrus trees, causing leaves and fruit to drop prematurely; a fruit infected with canker is safe to eat, but too unsightly to be sold. Plants infected with citrus canker have characteristic lesions on leaves, stems, and fruit with raised, brown, water-soaked margins, usually with a yellow halo or ring effect around the lesion.

Older lesions have a corky appearance, still in many cases retaining the halo effect. The bacterium propagates in lesions in leaves, stems, and fruit. The lesions ooze bacterial cells that, when dispersed by windblown rain, can spread to other plants in the area. Infection may spread further by hurricanes. The disease can also be spread by contaminated equipment, and by transport of infected or apparently healthy plants.

Due to the latency of the disease, a plant may appear to be healthy but actually, be infected. Citrus canker bacteria can enter through a plant's stomata or wounds on leaves or other green parts. In most cases, younger leaves are considered to be the most susceptible. Also, damage caused by citrus leaf miner larvae (*Phyllocnistis citrella*) can be sites for infection to occur. Within a controlled laboratory setting, symptoms can appear in 14 days following inoculation into a susceptible host. In the field environment, the time for symptoms to appear and be discernible from other foliar diseases varies; it may be on the order of several months after infection.

Lower temperatures increase the latency of the disease. Citrus canker bacteria can stay viable in old lesions and other plant surfaces for several months. *Xanthomonas citri* can form a biofilm for attachment on the host. The biofilm is the result of the production of extracellular polysaccharides (xanthan). The biofilm ensures the virulence and epiphytic survival of *X. axonopodis* pv. *citri* before the development of citrus canker. The bacteria are said to be readily dispersed by splashed rain and wind and the quantity of *X. citri* declines after the first event of wind-blown rain dispersal. Apart from that, the bacteria also favour warm weather. Because of its economic importance, and urgent need to developed suitable location specific management practices to mitigate the problem. Hence, the present work was carried out to identify the suitable antibiotics for management schedule in context to citrus canker.

Materials and Methods

A field experiment was conducted in a local variety of acid lime against bacterial canker caused by *Xanthomonas citri* at farmers fields of dakkili Mandal, Nellore district for three consecutive years 2013-14,2014-15 and 2015-16. Two antibiotics like Bactrinol and Bacteriomycin were tested alone and in combination with copper oxychloride in two different concentrations i.e 100 and 200ppm. The experiment was laid in RBD design. Total 10 treatments with three replications were adopted in the experimental plot. For each replication three plants were taken for recoding the disease severity. Each treatment was carried out three times after initiation of the disease at 20 days intervals. Data about the disease severity on leaves and fruits were recorded along with yield data.

0-5 scale (Kale *et al.*, 1994) [3]

0: No visible symptoms
1: 1-5% infected area
2: 6-15% infected area
3:16-30% infected area
4: 31-50% infected area
5: More than 50% infected area

Treatment Details

T_1: Bactrinol-100 (100ppm)
T_2: Bactrinol-100 (200ppm)
T_3: Bacteriomycin (100ppm)
T_4: Bacteriomycin (200ppm)
T_5: Bactrinol-100 (100ppm) + COC(3000ppm)
T_6: Bactrinol-100 (200ppm) + COC(3000ppm)
T_7: Bacteriomycin (100ppm) + COC(3000ppm)
T_8: Bacteriomycin (200ppm) + COC(3000ppm)
T_9: Streptomycin sulphate (200ppm) + COC(3000ppm)
T_{10}: Control

Results and Discussions

Experimental results of three years i.e 2013-14,2014-15 and 2015-16 pooled research data (Table 1) revealed that the per cent disease incidence (PDI) on leaves and fruits were recorded after 10 days of the last spray, least PDI was observed in plants treated with the spray combination of Bacteriomycin (200ppm) + COC (3000ppm) (T8) followed by plants sprayed with Streptomycin Sulphate(200ppm) + COC(3000ppm) (T9) with values of 7.29 and 7.32 per cent respectively on leaves and 6.61 and 6.54 per cent on fruits respectively.

The maximum PDI of 55.38 on leaves and 31.89 on fruits was observed in the untreated control (T10). Plants treated with the spray combinations framed in Treatment T9 were recorded higher yields i.e 2038 fruits per plant followed by plants treated with treatment T8 (2009 fruits/plant) as compared to untreated control where they could record only 1023 fruits /plant (Table 1). The obtained results conformed with Leite *et al.* (1990) [4] had reported the effective suppression of citrus canker by copper sprays. Rangaswani (1957) [8] found streptomycin sulphate effective to check citrus canker at 1 mg per ml *in vitro* and also reported 1 gram streptomycin or 2.5 gram of phytomycin per litre of water were effective under field conditions. Patel and Padhya (1964) [6] observed that three sprayings with a mixture of sodium arsenite and copper sulphate both at 100 ppm during the season were effective in checking the spread of the disease. Streptomycin and streptochlor, Ziram were found to be effective against *X. citri* (Rangaswami and Soumini Rajagopalan, 1973) [9]. Plants treated with the spray combination of 2- bromo-2-nitro propane 1, 3 diol (Bactrinashak) + Streptomycin Sulphate + Tetracycline Hydrochloride + COC for four times with 30 days interval recorded the per cent disease incidence of 16 and 14 on leaves and twigs respectively. (Jahir Basha *et al.*, 2017) [2] A significantly minimum canker necrotic spot and highest disease control was achieved with Bordeaux mixture and copper Oxychloride (Sareh heydarpanah *et al.*, 2019) [10].

Table 1: Effect of different antibiotics on the severity of bacterial canker of acid lime (pooled data of three years.)

S. No	Treatments	Canker severity (%)		Average yield /plant	
		Leaf	Fruit	No of fruits	Fruit weight(kg)
1	Bactrinol-100(100ppm)	36.22(36.99)	18.42(25.34)	1170	1170
2	Bactrinol-100(200ppm)	31.36(34.05)	17.17(24.46)	1227	1227
3	Bacteriomycin-100ppm	29.47(32.80)	13.89(21.78)	1400	1400
4	Bacteriomycin-(200ppm)	19.50(26.20)	11.45(19.70)	1570	1570
5	Bactrinol-100(100ppm)+COC(3000ppm)	24.68(29.68)	16.02(23.59)	1465	1465
6	Bactronol-100(200ppm)+COC(3000ppm)	20.91(27.19)	12.19(20.16)	1766	1766
7	Bacteriomycin-(100ppm)+COC(3000ppm)	15.25(22.64)	9.57(17.92)	1798	1798
8	Bacteriomycin-(200ppm)+ COC(3000ppm)	7.29(15.62)	6.54(14.67)	2009	2009
9	Streptomycin sulphate(200ppm)+COC(3000ppm)	7.32(15.58)	6.61(14.61)	2038	2038
10	Control	55.38(48.10)	31.89(34.24)	1023	1023
S.Em±		1.15	1.01	16	12
CD @ 5%		3.47	3.06	48	36

Fig 1: Canker symptoms in experimental field

References

1. Das R, Mondal B, Mondal P, Khatua DC, Mukherjee N. Disease intensity of citrus canker on acid lime in relation to abiotic and biotic factors. Journal of Agrometeorology 2012;14:107-111.
2. Jahir Basha, Prabhu CR, Ganiger C, Soniya MC. Efficacy of Antibiotics and Bactericides for the Management of *Xanthomonas citri* (Hasse) Causing Citrus Canker. International Journal of Current Microbiology and Applied Sciences 2017;6:1760-1768.
3. Kale KB, Kolte SO, Peshney NL. Economics of chemical control of citrus canker caused by *Xanthomonas campestris* Pv. Citri under field conditions. Indian Phytopathology 1994;47:253-255.
4. Leite Jr RP. Citrus canker: Prevention and control in the state of Parana. Fudacao IAPAR, Circular Instituto Agronomico do Parana 1990, 61.
5. Nikhil PN, Thomas FB, Jianwei Q, Mark A. Estimation of citrus canker lesion size using hyperspectral reflectance imaging. Int. Agri. Engi. J 2013;22(3):41-45.
6. Patel MK, Padhya AC. Sodim arsenite, copper sulphate spray for the control of citrus canker. Curr. Sci 1964;33:87-8.
7. Prakash M, Karmegam N. *In-vitro* antibacterial activity of certain plant extracts against plant disease causing bacteria isolated from citrus plant. Int. J Curr. Microbiol. Appl. Sci 2012;1(1):1-11.
8. Rangaswami G. Development of resistance to streptomycin in *Xanthomonas citri* and *X. malvacearum*. Curr. Sci 1957;26:185-6.
9. Rangaswami G, Soumini Rajagopalan CK. Bacterial plant pathology, 291 pp. Tamil Nadu Agric. Univ., Coimbatore 1973.
10. Sareh Heydarpanah, Rasool Rezaei, Seyed Mohsen Taghavi, Habiballah Charehgani. Efficacy of different copper compounds in the control of *Xanthomonas citri* ssubsp. *Citri* pathotypes A and A. Journal of phytopathology 2019. https://doi.org/10.1111/jph.12869
11. Schubert TS, Miller JW. Bacterial citrus canker. Gainesville, Florida, FDACS, Division of Plant Industry, USA 2000.