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Use of Suitable Fungicides for the Control of Gummosis Caused By (*Phytophthora* sp.) on Nagpur Mandarin in Satpura Plateau of Madhya Pradesh, India

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A B S T R A C T

Phytophthora sp. cause the most serious and economically important soil borne disease of citrus in Madhya Pradesh, India. They are the most damaging soil borne fungi that attack citrus plant at any age. Gummosis (*Phytophthora* sp.) of citrus is major problem in citrus orchards worldwide. Very little is known about the incidence and importance of Gummosis on bearing citrus tree. Measures for controlling citrus trunk lesions caused by *Phytophthora* sp. are largely preventive. When infection does occur, application of a fungicide to the infection site after removal of the bark is the recommended treatment. Fungicide treatment for control of Gummosis (*Phytophthora* sp.) was made 10 - 12 year age Nagpur Mandarin orchard at Sausar block of chhindwara district of Madhya Pradesh in year 2014-15 with study object Use of suitable fungicide for the control of gummosis caused by (*Phytophthora* sp.). Study indicates that Development of the lesion stared from September. Inhibition in the development of lesion was recorded as compared to check where no paste was used. Bordeaux paste 1.0 percent amended with mustard oil was most effective.

Introduction

Phytophthora spp. causes the most important soil and water-borne diseases of citrus these pathogens are worldwide in distribution and cause significant citrus production losses in the high rainfall subtropics, including the first and second largest citrus production areas in the Chhindwara district of Madhya Pradesh, India. Losses due to *Phytophthora* spp. may occur in seedbeds from damping-off; in nurseries from foot rot and root rot; in groves from foot rot, fibrous root rot, brown rot of fruit, and from further spread of the pathogen to adjacent fruit in packing boxes. This is one of several well-known gumming diseases of citrus. Gum formation on the trunk or branches is a characteristic symptom. Gum exudes from blisters containing gum pockets, usually located on the trunk. The main symptom of citrus gummosis is oozing of gum from the affected parts on the trunk. Infected bark remains firm with small, longitudinal cracks through which abundant amber-colored gum is exuded. During the summer, gum deposits dry and stick to the

bark, making the symptoms of gummosis very noticeable. The wood beneath the blister shows a pink-orange color. Several factors such as freeze damage, high water table and salt accumulation contribute to the disease. Gummosis is believed to be a condition of weak and injured trees and is reported to be infectious.

This also known as brown rot gummosis is caused by one or more species of the fungus *Phytophthora*. This disease can affect the root system, the trunk below and above ground, branches, leaves, blossoms and fruit. It is especially troublesome during prolonged rainy periods. Trees with the bud union beneath or close to the soil and trees in poorly-drained locations are highly susceptible.

Foot rot becomes a more serious problem under unusual conditions such as those that occur following hurricanes. Healing is slower if infection occurs below ground level. The fungus may wet soils. This infection results in poor health of the tree, a thin canopy, failure to make new growth and poor fruit production. *Phytophthora spp.* also may attack nursery stock and young orchard trees during rainy weather. Examination of the crowns of infected trees shows symptoms similar to those described for older trees.

Phytophthora foot rot can best be controlled by preventative practices, including use of resistant rootstock and planting in well-drained land. Sour orange is the most resistant rootstock for this disease.

Phytophthora fungi are present in almost all citrus orchards. Under moist conditions, the fungi produce large numbers of motile zoospores, which are splashed onto the tree trunks. The *Phytophthora* species causing gummosis develop rapidly under moist, cool conditions.

Materials and Methods

The following Material and method were used in the present investigation entitled "Use of Suitable Chemical for the control of Gummosis caused by *Phytophthora* sp. on Nagpur Mandarin in Satpura Plateau of Madhya Pradesh". The experiments were carried out in the J. N. Krishi Vishwa Vidyalaya, Jabalpur (M.P.) Zonal Agricultural Research Station Mohagon Hawali Farm at Sausar Block of Chhindwara District of Madhya Pradesh. The fungicidal paste was applied on the main trunk up to 4 feet height with the help of locally made brush Kunchi. In control no paste was used. Application of paste on the trunk started from Month of August till December 2015. Total four applications were at 30 days interval and lesion size was recorded.

Results and Discussion

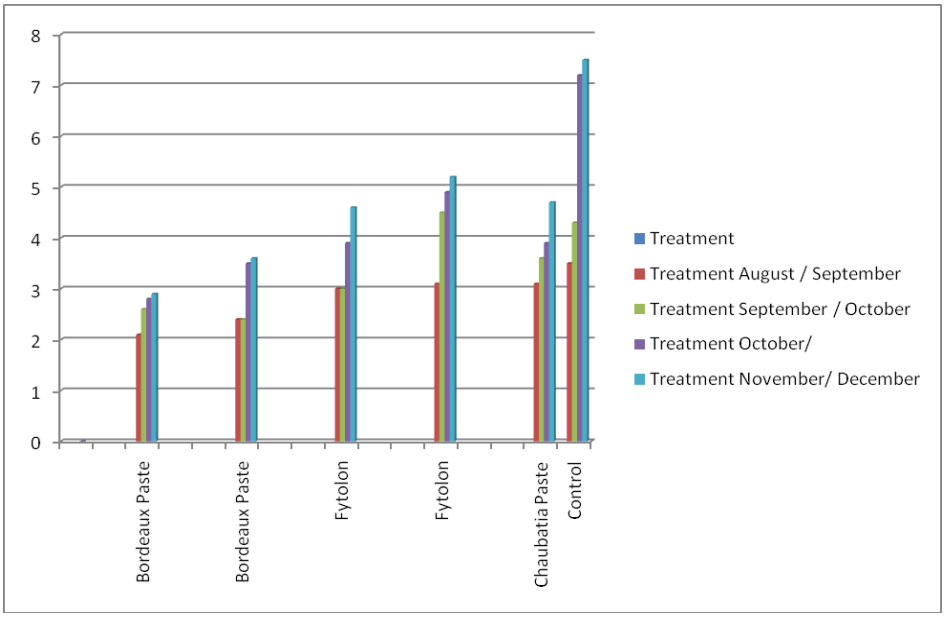
The experiment was conducted under field condition in chemical were the viz. Bordeaux paste (amend with mustard oil 1.0 %), Bordeaux paste (amend with mustard oil 0.5 %), Fytolon (amend with mustard oil 0.3 %), Fytolon (amend with mustard oil 0.8%), Chaubatia paste (amend with mustard oil 1.0 %) were applications on tree trunk along with an un-amended control.

The observation was recorded. Results presented in table 1 indicate that development of the lesion stared from September. Inhibition in the development of lesion was recorded as compared to check where no paste was used. In case of Bordeaux paste 1 percent only 0.8 cm increase was recorded during September to December respectively 2.1 cm, 2.9 cm (Fig. 1).

Table.1 Influence of the fungicidal treatment on the development of the lesion size on the main trunk of Nagpur Mandarin plant at Village Mohagaon Hawali Sausar

Treatment	Common Name	Percent / Concentration	Development and size of the lesion (cm)				Percent development of the lesion
			August / September	September / October	October/ November	November/ December	
Copper Sulphate Preparation (Amended with mustard oil 5 %)	Bordeaux Paste	1 %	2.1	2.6	2.8	2.9	38.00
Copper Sulphate Preparation (Amended with mustard oil 5 %)	Bordeaux Paste	1 %	2.4	2.4	3.5	3.6	45.80
Copper oxychloride Preparation (amended with mustard oil)	Fytolon	0 .3 %	3.0	3.0	3.9	4.6	53.33
Copper oxychloride Preparation	Fytolon	0.3 %	3.1	4.5	4.9	5.2	67.74
Copper carbonate Preparation	Chaubatia Paste	1 %	3.1	3.6	3.9	4.7	45.16
No Chemical	Control	0 %	3.5	4.3	7.2	7.5	114.28

Fig.1 Development and size of the lesion (cm) on the main trunk of Nagpur Mandarin Plant



While in trees pasted with Bordeaux paste 0.5 percent it was 1.1 cm followed by 1.6 cm in fytolon and Chaubatia paste and 2.1 cm in Fytolon 0.3 percent with mustard oil as compared to 4.0 cm in check. Bordeaux paste 1.0 percent amended with mustard oil was most effective. The disease development was maximum during September and November 2015.

The lack of increase in productivity of citrus trees at sites in response to the increased gummosis densities brought about by fungicide treatment is difficult to explain.

Fungicide treatment significantly reduced populations of gummosis with the untreated control. But the benefits of treatment were not great in most cases.

In conclusion, the present study indicates that Development of the lesion stared from September. Inhibition in the development of lesion was recorded as compared to check where no paste was used. Bordeaux paste 1.0 percent amended with mustard oil was most effective.

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