J. Mycopathol. Res. 43(1) : 125-127 (2005)

Evaluation of some systemic fungicides against *Fusarium semitectum* causing postharvest fruit rot of litchi

B. SAHA AND S. A. K. M. KAISER
Department of Plant Pathology, Bidhan Chandra Krishi Viswavidyalaya, Mohanpur 741 235, West Bengal

Three systemic fungicides, namely bavistin, benlate and topsin M were tested against *Fusarium semitectum* Berk and Rav causing postharvest fruit rot of litchi. *In vitro* study showed complete inhibition of growth of the pathogen at 400 ppm with bavistin followed by benlate (450 ppm) and topsin (600 ppm.) *In vivo* study by preharvest spray also showed that bavistin was the best in its action in reducing the fruit rot incidence in storage irrespective of the number of spray used. However, a better result was always obtained when the fungicides were applied twice.

Key words : Evaluation, fungicide, *Fusarium semitectum,* postharvest rot, litchi

INTRODUCTION

The different fungal species associated with the postharvest fruit rot of litchi (*Litchi chinensis* Sonn.) reported so far from India are *Aspergillus, Alternaria, Botryodiplodia, Colletotrichum, Cylindrocarpon, Pestalotia* and *Fusarium* (Prasad and Bilgrami. 1969, 1973 ; Sinha, 1976. Recently, Saha (1997) has recorded three fungi associated with the postharvest fruit rot on different varieties of litchi from West Bengal. Among them *Fusarium semitectum* Berk and Rav has been found to be major one as it is widely prevalent over different litchi growing zones of this state resulting high percentage of fruit rot in the market. Some workers have been successful in controlling a number of postharvest fruit rot pathogens of litchi by using both systemic and nonsystemic fungicides (Prasad and Bilgrami, 1973 ; Brown *et al.*, 1986, Wong *et al.*, 1991 ; Schutte *et al.*, 1992). But knowledge on this aspect is scanty in respect of *F. semitectum* causing postharvest fruit rot of litchi.

MATERIALS AND METHODS

The study was undertaken during May-June of 1996 and 1997 in the Plant Pathology Research Laboratory of Bidhan Chandra Krishi Viswavidyalaya, Kalyani. From an ecological point of view the existing weather conditions in the Gangetic plains and red and lateritic zone of West Bengal are conducive for the development of *Fusarium* rot of litchi fruits (Saha, 1997).

The systemic fungicides used in the present study were (i) bavistin (carbendazim 50% WP) [methyl 1 H – benzimidazole – 2 yl carbamate], (ii) benlate (benlate 50% WP) [methly – N (butylcarbamanoly) – 2 – benzimidazole carbamate] and (iii) topsin M 70 WP (thiophenate methyl 70% WP) [dimethly 4, 4–0 phenyl enebis (3-thio-allophanate)]. *F. semitectum* was isolated from the affected fruits of litchi (var. Bombai) on PDA medium at 29 ± 1°C, and its pathogenicity was confirmed by inoculation experiment. Efficacy of these fungicides against *F. semitectum* was first tested in the laboratory (*in vitro*) followed by their test on litchi fruits (*in vivo*). Methods adpoted for different experiments related to the efficacy were mentioned below.

Effect on mycelial growth of the pathogen

Linear growth of mycelium was studied by using different concentrations (ppm) of the fungicides prepared by adding the requisite quantity to 1 liter of sterilied PDA medium, aseptically. Twenty ml of this medium was then aseptically poured in each of the sterilized 10 cm petriplates and was allowed to solidify. The plates were inoculated at the centre with 6 mm disc of the pathogen from the growing culture. Such inoculated plates were replicated five times and incubated at 29 ± 1°C. The linear growth of the mycelium was recorded after 5 days.

Effect on fruit rot incidence by artificial inoculation

For this purpose, the fungicides were applied separately to ripening fruits in the orchard @ 1000 ppm of water by spraying. Two sets of trees were kept for each treatment. In one set, the fungicides were sprayed once 18 days before harvest, while in the others those were sprayed twice similarly as before and at 10 days interval. The fruits were harvested during the last week of May and were inoculated separated by hypodermic needle method (Banik, 1995) with 0.1 ml of the fungal suspension of the pathogen. Each treatment contained 10 fruits with 5 replications. For comparison, control was kept by inoculating fruits with water and without any fungicide. The inoculated fruits were stored under ambient conditions. Data on the fruit rot incidence were them recorded after 8 days (as litchi fruits are highly perishable and could not be stored beyond this period) on percentage basis (% fruit rot) complying the methods described by Banik (1995). The inoculated fruits did not exhibit any significant variation in respect of fruit rot incidence during the two years of testing and, therefore, the average of two years date were taken.

The storage temperature varied from 28-34°C, while the RH varied from 60-80%. Normal agronomic practices were followed and no other plant protection measure was undertaken in the orchard during the entire fruit season.

RESULTS AND DISCUSSION

In vitro study by the food poisoning method of PDA medium by using different doses of the fungicides showed that linear growth of the pathogen gradually decreased with the increase in the fungicidal dose (Table 1). Complete inhibition of linear growth was recorded at 400 ppm with bavistin followed by benlate (450 ppm) and topsin M (600 ppm) *In vitro* study revealed that bavistin was better in its action than benlate and topsin M.

Evaluation of these fungicides as preharvest spray showed that the fungicides significantly reduced the fruit rot incidence irrespective of the number of application (Table 2). However, bavistin was the best in its action followed by benlate and topsin M, and a better result was always obtained when the fungicides were applied twice. A significant difference was also recorded among the test fungicides on the reduction of fruit rot incidence.

Table 2 : Effect of preharvest spray of different systemic fungicides on the incidence of postharvest fruit rot of litchi incited by *F. semitectum* in storage

Fungicide	Mean percentage of fruit rot after 8 days in inoculation		Mean
	Sprayed once	Sprayed twice	
Bavistin	24.60 (44.80)	15.60 (24.63)	19.83 (34.71)
Benlate	39.60 (29.33)	13.43 (23.20)	26.51 (26.26)
Topsin	47.93 (39.00)	17.50 (21.50)	32.72 (30.25)
Untreated (control)	48.90 (44.36)	48.90 (44.36)	48.90 (44.36)
Mean	40.12 (39.12)	23.85 (28.42)	

SE (m) - 1.34
CD (at p = 0.05)
1. For treatment (fungicide) = 2.86
2. For factor (Number of spray) = 2.02
3. For interaction = 4.04

Some workers also reported the usefulness of systemic fungicides against the postharvest fruit rot pathogens of litchi. Brown *et al.* (1986), for example, observed that postharvest porochloraz dips @ 0.125 – 0.25 g / liter of water were effective in reducing the fruit rot against *C. gloeosporioides* and *Phomopsis anonacearum,* while Wong *et al.* (1991) reported that hot benomyl (benlate) dips were effective in reducing the fruit rot incidence in storage. Schutte *et al.* (1992) further reported that

Table 1 : Efficacy of different systemic fungicides against linear growth of *F. semiteetum* on PDA medium

Fungicide	Liner growth (mm) at different concentration (ppm) after 5 days. (mm/ppm)										
Bavistin	37.5/100	30.2/150	25.6/200	18.9/250	12.5/300	4.6/350	0.0/400				
Benlate	42.6/100	35.5/150	29.7/200	22.5/250	16.3/300	10.6/350	5.4/400	0.0/450			
Topisn	96.4/100	87.3/150	76.5/200	66.6/250	54.2/300	43.5/350	32.5/400	23.6/450	11.2/500	4.2/550	0.0/600

the combination of different systemic fungicides such as punch C flusilazol, punch X flusilazol and carbendazim were most effective in the control of fruit decay in storage. The present study indicates that the systemic fungicides bavistin, benlate and topsin M may be utilized in the control of *F. semitectum* of litchi fruits. However, the present study in an exploratory one. Further study is necessary on this aspect on residual toxicity of the fungicides as well as on physiological and biochemical changes in fruit quality before final recommendation for their application of fungicides on litchi fruits.

ACKNOWLEDGEMENT

We are thankful to Dr. R. S. Dhua, Department of Postharvest Technology, Bidhan Chandra Krishi Viswavidyalaya for his help.

REFERENCES

Banik, A. K. 1995. *Studies on pre and postharvest treatments of mango with special references to major diseases.* Ph. D. Thesis, Department at Horticulture, Bidhan Chandra Krishi Viswavidyalaya, West Bengal, India, pp. 55-61.

Brown, S. I. ; Scott, K. J. and Mayer, D. G. 1986. Control of ripe fruit of litchi by postharvest Porochloraz dips. *Singapore Journal of Primary Industries* (1984) **12**(1) : 40-49.

Prasad, S. S. and Bilgrami, R. S. 1969. Investigation on diseases of litchi — I, Phylosphere mycoflora of *Litchi chinensi. Indian Phytopath,* **22** : 507-510.

Prasad, S. S. and Bilgrami, R. S. 1973. Investigation on diseases of litchi — III, Fruit rots and their control by postharvest treatments. *Indian Phytopath.* **26** : 517-522.

Saha, B. 1997. Disease situation of litchi (*Litchi chinensis* Sonn.) at pre and postharvest stages in the Gangetic plains of West Bengal. M. Sc. (Ag.) Thesis. Department of Plant Pathology, Bidhan Chandra Krishi Viswavidyalaya, West Bengal, India, pp. 49.

Shina, S. K. 1976. *Further studies on the diseases of litchi.* Ph. D. Thesis, University of Bihar, Muzaffarpur.

Schutte, G. C. ; Batha, T. and Kotze, J. M. 1992. Control of browing of litchi fruits by fungicide dips and paper sheet impregnated with Na-metabisulphite. *Litchi Yearbook-South African Litchi Growers Association* (1990, published in 1993), **3** : 10-14.

Wong, L. S. ; Jacobi, K. K. and Giles, J. E. 1991. The influence of hot benomyl dips on the appearance of coal stored Lychee (*Litchi chinensis* Sonn.). *Sciential Horticult.* **46** : 245-251.

(Accepted for publication December 22, 2004)