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Studies on the Effect of Tobacco Extract and Hot and Cold Water Immersion on the Coffee Berry Borer *Hypothenemus Hampei* (Ferrari) (Coleoptera: Curculionidae)

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ABSTRACT

Studies were conducted on the effect of hot and cold water treatment on berry borer infested coffee for disinfestations after harvest. Results showed that hot water immersion for 1 minute and cold water immersion for 48 hours killed all the pest stages of the borer. The extract of tobacco did not prove to be effective either in the laboratory or in the field.

Keywords: Coffee berry borer, Tobacco, Disinfesting berry borer.

1. Introduction

The coffee berry borer, *Hypothenemus hampei* (Ferrari) causes severe crop loss in the countries where it is found. In India pest was first noticed on a few plantations in the Nilgiri during early 1990 [1]. Cultural operations play a pivotal role in berry borer management coupled with biological, chemical and mechanical measures. Studies conducted earlier have proved that fumigation with Ethyl methyl bromide at 1:1 proportion and boiled water immersion for 2-3 minutes and cold water dip for 48 hours helps disinfesting the fruits [2]. Tobacco is well known for its insecticidal properties which has an active plant alkaloid, nicotine as an insecticidal component. Insecticidal properties were reported by [3]. Tobacco powder and extracts were used as agricultural insecticides and eradicate lice and ticks in animals [4].

2. Materials and Methods

This study is an attempt to disinfest the borer infested gleanings/offseason fruits and to study the effect of tobacco extract on the borer beetles which is an eco-friendly method and are economically viable.

2.1 Hot water treatment

The experiment was conducted at the Regional Coffee research Station, Chundale. Coffee berry borer infested fallen berries were collected from the RCRS farm after harvest and brought to the laboratory. 50 fruits each were tied to a piece of Kora cloth and dipped into boiling water for 1, 2, 3 and 4 minutes. All the treatments were replicated five times with 50 fruits per replication. Ten berries were split opened to record the percentage of mortality.

2.2 Cold water treatment

Samples of berry borer infested fruits were collected from the farm and subjected to cold water immersion for 24, 30, 40 and 48 hours. The treatment and replicates were maintained as in hot water treatment. Mortality of the borer stages were recorded by splitting open 50 infested berries.

2.3 Evaluation of tobacco extract

2.3.1 Laboratory trial: A trial was conducted in the laboratory with tobacco extract at different dilution against berry borer. The extract of tobacco was prepared by seeping 500 gram of tobacco waste in 4.5 litre water. Then 120 gm of detergent dissolved in 500ml water was mixed with the filtered solution of the tobacco extract. Two dilutions of the extract, one diluted 5 times and other 7 times with water were used. Adult female beetles of the borer were exposed to filter paper impregnated with the extract kept in petriplates.

A control batch also was maintained. All the treatments were replicated 8 times with 4 beetles each. Mortality if any was recorded 3rd, 12th, and 15th day after treatment.

2.5 Field trial: In this experiment tobacco extract at 5 times dilution only was tested against the berry borer in the field since 7 times dilution seldom caused any mortality in the laboratory. Four

infested plants were marked and two branches were selected in each plant. The total number of fruits per branch and the infested fruits were marked by paint to distinguish them from fresh infestation. A control group with the same number of plants and branches marked was maintained. The observations were recorded on the 10th and 20th day.

3. Results and Discussion

Table 1: Effect of Tobacco extract on berry borer

Treatment	Laboratory percentage mortality on			Field percentage mortality on	
	3 rd day	12 th day	15 th day	10 th day	20 th day
Tobacco extract at five times dilution	2.5	10	5	3.75	1.25
7 times dilution	5	10.1	5	-	-
Control	-	-	-	2.5	0.6
F- test	NS	NS	NS	NS	NS

Table 2: Effect of hot water treatment

Treatments	Hot water treatment(percentage of mortality)				
	R1	R2	R3	R4	R5
1 minute	100(90)	100(90)	100(90)	100(90)	100(90)
2 minute	100(90)	100(90)	100(90)	100(90)	100(90)
3 minute	100(90)	100(90)	100(90)	100(90)	100(90)
4 minute	100(90)	100(90)	100(90)	100(90)	100(90)

Table 3: Effect of cold water treatment

Treatments	R1	R2	R3	R4	R5	Mean
24 hour	96(78.46)	94(75.82)	96(78.46)	94(75.82)	92(73.57)	94.4(76.31)
30 hour	94(75.82)	96(78.46)	98(81.87)	96(78.46)	98(81.87)	96.4(79.06)
40 hour	100(90)	100(90)	100(90)	100(90)	100(90)	100(90)
48 hour	100(90)	100(90)	100(90)	100(90)	100(90)	100(90)

CD @ 1 % - 3.06

CD @ 5 % - 2.22

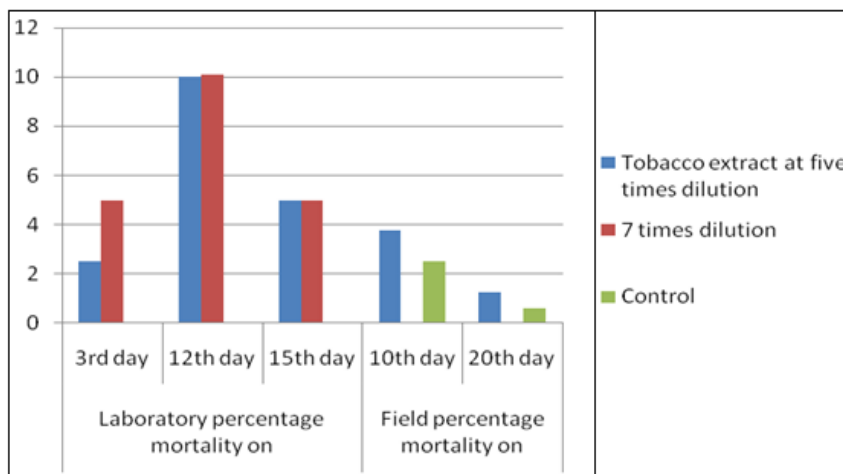


Fig 1: Effect of Tobacco extract

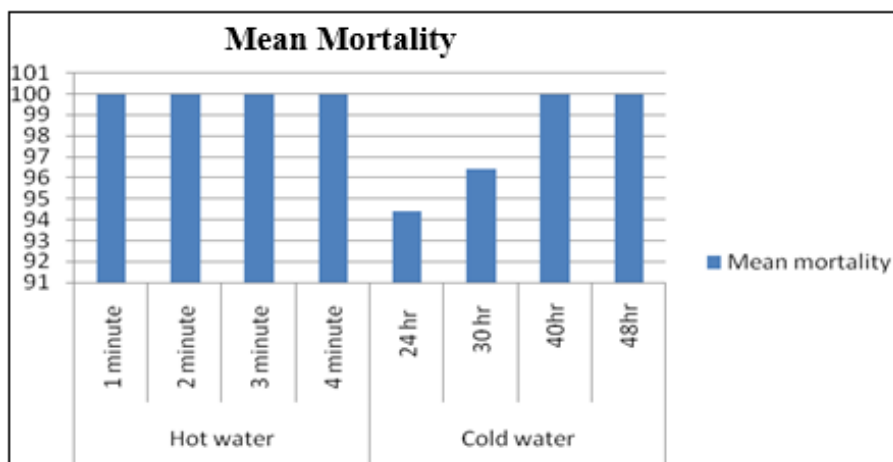


Fig 2: Effect of hot and cold water

Efficacy of tobacco extract in the field trial and laboratory is provided in Table 1. In both the concentrations tested the resultant mortality was as low as 10% in the laboratory. While in the field a maximum of 3.75% only was recorded. So from the table it is clear that tobacco extract did not provide any hope for the control of this pest.

The result revealed that hot water treatments (Table 2) were effective even in one minute duration with cent percent mortality of all pest stages. Rahman *et al* in 1998 found that a 2 minute dip in boiling water kills the adults, and the quality of coffee is not affected by this. A 24 hour immersion resulted in cold water (Table 3) 94.4% mortality. 40 and 48 hour dipping in cold water resulted in cent percentage mortality.

4. Conclusions

From the study conducted it is evident that hot water immersion for a one minute ensures complete disinfestation as all the borer stages are destroyed. In coffee plantations collection of small quantities of off-season fruits and its disinfestation becomes an easy practice by adopting this technique. It is also found that coffee subjected to boiling water treatment dries faster compared to the normal coffee. This being an eco-friendly measure is acceptable to both organic and inorganic growers. Coffee in large quantities especially gleanings and left over fruits with heavy infestation can be done by dipping sacks with infested coffee in large vessels with boiled water. Perusal of table 1 indicates that tobacco extract though found to give some degree of control in the laboratory, was ineffective in the field.

5. References

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