632.95
B13
2006

ALUATION OF DIFFERENT BOTANICAL PESTICIDES AGAINST PACHYRRHYNCHID BEETLE INFESTING LIBERICA COFFEE

RESEARCH STUDY

RENCY MARIE H. BACOS
MARIEL A. MOJICA
MARIA ANGELA D. MUÑOZ

SCIENCE HIGH SCHOOL
CAVITE STATE UNIVERSITY
Indang, Cavite

April 2006

5

EVALUATION OF DIFFERENT BOTANICAL PESTICIDES AGAINST PACHYRRHYNCHID BEETLE INFESTING LIBERICA COFFEE

A Research Study Submitted to the Faculty
of Science High School, College of Education
Cavite State University
Indang, Cavite

In Partial Fulfillment of the
Requirements for Graduation

00000969

Evaluation of different botanical pesticides against pachyrrehynchid beetle
632.95 B13 2006
R-500

RENCY MARIE H. BACOS
MARIEL A. MOJICA
MARIA ANGELA D. MUÑOZ

April 2006

ABSTRACT

BACOS, RENCY MARIE H., MOJICA MARIEL A., MUÑOZ, MARIA ANGELA D.. Applied Research III (General Science Curriculum) Cavite State University Science High School, Indang, Cavite, March 2006 **"Evaluation Of Different Botanical Pesticides Against Pachyrrhynchid Beetle Infesting Liberica Coffee."** Adviser: Dr. Teddy F. Tepora.

A study entitled "Evaluation of Different Botanical Pesticides Against Pachyrrhynchid Beetle Infesting Liberica Coffee" was conducted at the Central Experiment Station of the Research Center and Crop Protection Laboratory at Cavite State University, Indang Cavite from January 2005 to March 2006.

The general objective of the study was to prevent, destroy, repel or mitigate Pachyrrhynchid beetle infesting Liberica coffee. Specifically, the study aimed to (1) evaluate the effect of different botanical pesticides against Pachyrrhynchid beetle in the nursery; (2) evaluate the toxicity of different botanical pesticides against Pachyrrhynchid beetle in the laboratory; (3) determine the most effective botanical in controlling Pachyrrhynchid beetle; and (4) determine the most effective concentration of the most effective botanical that will be best for controlling Pachyrrhynchid beetle.

The study focused on the evaluation of different botanical pesticides. The botanicals were evaluated in three series of experiment, namely: efficacy test, toxicity test and dilution test. In the first and second experiments, five treatments of botanicals and three replications per treatment were prepared. The treatments were: (1) T1 (control)-cymbush; (2) T2- wild sunflower; (3) T3- sapinit; (4) T4- madre de cacao; and (5) T5-neem. While in the third experiment, five concentrations of the best botanical (wild

sunflower) and three replications per treatment were prepared. (1) T_1 (10% pure extract of wild sunflower + 90% water); (2) T_2 (20% pure extract of wild sunflower + 80% water); (3) T_3 (30% pure extract of wild sunflower + 70% water); (4) T_4 (40% pure extract of wild sunflower + 60% water); and (5) T_5 (50% pure extract of wild sunflower + 50% water).

Four different botanicals namely: wild sunflower (*Tithonia diversifolia Helms L.*), sapinit (*Lantana Camara L.*), madre de cacao (*Gliricidia sepium)* and neem tree (*Azadirachta indica)*, and commercial pesticide, cymbush, were used as raw materials. The botanicals were chopped, pounded, extracted and strained. The extracts of the botanicals were applied to the treatments of the first two experiments: efficacy test and toxicity test. While the extract of the best botanical in the first and second experiments were used in the third experiment (dilution test) with different concentrations.

Among the botanicals used, wild sunflower (*Tithonia diversifolia Helms L.*) was the most effective in terms of preventing Pachyrrhynchid beetle in infesting Liberica seedlings in the nursery (efficacy test). While in the first test in the laboratory (toxicity test), the most effective in terms of killing the Pachyrrhynchid beetle was the wild sunflower. While in the second test in the laboratory (dilution test), the most effective concentration of wild sunflower in killing the Pachyrrhynchid beetle was T_5 (50% pure extract of wild sunflower + 50% water).

TABLE OF CONTENTS

	Page
BIOGRAPHICAL SKETCH	iii
ACKNOWLEDGEMENT	v
ABSTRACT	viii
LIST OF TABLE	xiii
LIST OF FIGURES	xiv
LIST OF APPENDIX TABLES	xv
LIST OF APPENDIX FIGURES	xvii
INTRODUCTION	1
Statement of the Problem	3
Objectives of the Study	3
Importance of the Study	4
Scope and Limitations of the Study	4
Time and Place of the Study	4
REVIEW OF RELATED LITERATURE	5
Botanical description of coffee	5
Liberica Coffee *(Coffea Liberica L.)*	6
History of Barako coffee	6
Botanical description of Barako coffee	7
Characterisritcs of Liberica bean	8
Importance of Barako coffee	9

Insect Pests of Coffee 10
Scales and Mealybugs 10
Aphids (*Toxoptera aurantii*) 11
Beetle 12
Pachyrrhynchid Beetle 13
Control of Pests and Diseases 13
Chemical Pesticides 13
Cymbush 14
Botanical Pesticides 15
Wild Sunflower *(Tithonia diversifolia Helms L.)* 16
Sapinit *(Lantana Camara L.)* 16
Neem Tree (*Azadirachta indica L.)* 18
Madre de Cacao (*Gliricidia sepium)* 22
METHODOLOGY 25
Materials 25
Methods 25
Procurement of the Materials 25
Preparation of the Treatments 26
Experimental Design 26
Efficacy Test 26
Toxicity Test 27
Dilution Test 28
Application of the Treatments 29

Efficacy Test 29

Toxicity Test 30

Dilution Test 30

Statistical Analysis 30

Data Gathered 30

Efficacy Test 30

Toxicity Test 31

Dilution Test 31

RESULTS AND DISCUSSIONS 32

Population Count of Pachyrrhynchid Beetle on Liberica seedlings Treated with Different Botanical Pesticides 32

Percent Mortality of Pachyrrynchid Beetles as Affected by Different Botanical Pesticides 38

Percent Mortality of Pachyrrhynchid Beetle Treated with Different Concentration of Wild Sunflower 42

SUMMARY, CONCLUSIONS AND RECOMMENDATION 46

Summary 46

Conclusions 48

Recommendations 48

BIBLIOGRAPHY 50

APPENDIX TABLES 54

APPENDIX FIGURES 73

LIST OF TABLE

Table		Page
1	Characteristics of Liberica bean	8

LIST OF FIGURES

Figure		Page
1	General view of the efficacy test	27
2	General view of the toxicity test	28
3	General view of the dilution test	29
4	Population count of Pachyrrhynchid beetle treated with different botanical pesticides at 1, 2, 3, 4, 5, 6, 7, and 8 weeks after treatment	32
5	Liberica coffee sprayed with different botanical pesticides 8 weeks after treatment	37
6	Percent mortality of pachyrrhynchid beetles as affected by different botanical pesticides at 2, 4, 6, 8, 10 hours after treatment	38
7	Mortality rate of pachyrrhynchid beetles as affected by different botanical pesticides 10 hours after treatment	41
8	Percent mortality of pachyrrhynchid beetle with different concentration of wild sunflower at 2, 4, 6, 8, 10 hours after treatment	42
9	Mortality rate of pachyrrhynchid beetle as affected by different concentration of wild sunflower 10 hours after treatment	45

LIST OF APPENDIX TABLES

Appendix Table		Page
1	Percent mortality of pachyrrhynchid beetle treated with different botanical pesticides 1 week after treatment	55
2	Percent mortality of pachyrrhynchid beetle treated with different botanical pesticides 2 weeks after treatment	56
3	Percent mortality of pachyrrhynchid beetle treated with different botanical pesticides 3 weeks after treatment	57
4	Percent mortality of pachyrrhynchid beetle treated with different botanical pesticides 4 weeks after treatment	58
5	Percent mortality of pachyrrhynchid beetle treated with different botanical pesticides 5 weeks after treatment	59
6	Percent mortality of pachyrrhynchid beetle treated with different botanical pesticides 6 weeks after treatment	60
7	Percent mortality of pachyrrhynchid beetle treated with different botanical pesticides 7 weeks after treatment	61
8	Percent mortality of pachyrrhynchid beetle treated with different botanical pesticides 8 weeks after treatment	62
9	Percent mortality of pachyrrhynchid beetle treated with different botanical pesticides 2 hours after treatment	63
10	Percent mortality of pachyrrhynchid beetle treated with different botanical pesticides 4 hours after treatment	64
11	Percent mortality of pachyrrhynchid beetle treated with different botanical pesticides 6 hours after treatment	65
12	Percent mortality of pachyrrhynchid beetle treated with different botanical pesticides 8 hours after treatment	66
13	Percent mortality of pachyrrhynchid beetle treated with different botanical pesticides 10 hours after treatment	67

14 Percent mortality of pachyrrhynchid beetle treated with different concentration of wild sunflower 2 hours after treatment 68

15 Percent mortality of pachyrrhynchid beetle treated with different concentration of wild sunflower 4 hours after treatment 69

16 Percent mortality of pachyrrhynchid beetle treated with different concentration of wild sunflower 6 hours after treatment 70

17 Percent mortality of pachyrrhynchid beetle treated with different concentration of wild sunflower 8 hours after treatment 71

18 Percent mortality of pachyrrhynchid beetle treated with different concentration of wild sunflower 10 hours after treatment 72

LIST OF APPENDIX FIGURES

Appendix Figures		Page
1	Wild Sunflower (*Tithonia diversifolia Helms*)	74
2	Sapinit (*Lantana camara L.*)	75
3	Madre de Cacao (*Gliricidia sepium*)	76
4	Neem (*Azadirachta indica L.*)	77
5	Cymbush	78
6	Extract of Wild Sunflower (*Tithonia diversifolia Helms*)	79
7	Extract of Sapinit (*Lantana camara L.*)	80
8	Extract of Madre de Cacao (*Gliricidia sepium*)	81
9	Extract of Neem (*Azadirachta indica L.*)	82
10	Liberica coffee sprayed with different botanical pesticides one week after treatment (Efficacy Test)	83
11	Liberica coffee sprayed with different botanical pesticides two weeks after treatment (Efficacy Test)	84
12	Liberica coffee sprayed with different botanical pesticides three weeks after treatment (Efficacy Test)	85
13	Liberica coffee sprayed with different botanical pesticides Four weeks after treatment (Efficacy Test)	86
14	Liberica coffee sprayed with different botanical pesticides five weeks after treatment (Efficacy Test)	87
15	Liberica coffee sprayed with different botanical pesticides six weeks after treatment (Efficacy Test)	88
16	Liberica coffee sprayed with different botanical pesticides seven weeks after treatment (Efficacy Test)	89

EVALUATION OF DIFFERENT BOTANICAL PESTICIDES AGAINST PACHYRRHYNCHID BEETLE INFESTING LIBERICA COFFEE

Rency Marie H. Bacos
Mariel A. Mojica
Maria Angela D. Munoz

A research study presented to the Faculty of the Science High School, College of Education, Cavite State University, in partial fulfillment of the requirements in Applied Research under the supervision of Dr. Teddy F. Tepora.

INTRODUCTION

Liberica coffee *(Coffea Liberica L.)* is an evergreen shrub or tree that grows to about 15 feet high. It has large glossy leathery oval-shaped dark green leaves and produces scented star shaped white flowers. The flowers are followed by fruits that each contains the red-brown coffee beans (seeds). The coffee beans are fermented and roasted. They are the source of the familar adult beverage encountered the world over (Sayre, 2001).

The "Barako" become a generic name for all coffee grown in the region, but the real "Barako" is the liberica coffee bean that is almost uniquely Filipino as it is grown in only three other countries outside of the Philippines. It is therefore the "real taste of the Philippines". It has a strong flavor and distinctive aroma, and is therefore described as a truly macho coffee as it takes its name from the Tagalog word for the strong wild pig that lives in the area. The true Philippine "Barako" coffee is now exported to Australia in beans or grounds, which helps the Philippine economy (Peplow). Coffee was infested by various insects, which destroy the growth of this coffee. Therefore, it must be protected.