بسم الله الرحمن الرحيم

الآية

قال تعالى:

(أَنَّا صَبَبْنَا الْمَاءَ صَبّا(25) ثُـمَّ شَـقَقْنَا الْأَرْضَ شَـقّاً(26) فَأَنبَتْنَـا فِيهَـا حَبّاً(27) وَعِنَباً وَقَضْباً(28) وَزَيْتُونـاً وَنَخْلا(29) وَحَـدَائِقَ غُلْبـاً(30) وَفَاكِهَةً وَأَبّاً(31) مَّتَاعاً لَّكُمْ وَلِأَنْعَامِكُمْ(32))

صدق الله العظيم

سورة عبس الآيات (25-32)

DEDICATION

(To my lovely son (Mohammed

To my family

ACKNOWLEDGEMENTS

First of all, I render my gratitude and praise to the Almighty "Allah", who offered me the health, patience and ability to undertake this work.

I am greatly indebted to my supervisor Dr. Saif Eldin Mohammed Khair for his helpful guidance, advice and supervision throughout the study.

Thanks are extended to the members of the pesticides Alternatives Division, the Environmental and Natural Resources Research Institute, National Research Center for their kindness during plant extraction, preparation and the experiment. Special gratitude to Dr. Osman Elhaj Nassr and Dr. Abd Alla Abd Elrahim Satti.

Thanks are due to staff members of plant protection Department, Faculty of Agricultural studies, University of Sudan Shambat. Special thanks are extended to Dr Awad K. Taha for his kind assistance.

ABSTRACT

This study was conducted in the laboratory of Environment and Natural Resources Research Institute (ENRRI), National Research Center.

The study concerned the possibility of usage of aqueous leaves powder extract of periwinkle plant (*Vinca rosea*), the aqueous powder extract of mixure of (leaves, fruits and stems) of Hargal plant (*Solenostemma argel*), beside the organic methanol extract of leaves powder of cafure plant (*Eucalyptus camaldulensis*), in addition to the use of Nimbecidine 0.03% as a commercial product from Neem, which were used as pest control agents under laboratory conditions against the third larval instar of khapra beetle (*Trogoderma granarium* Everts) feeding on sorghum seeds. The evaluation was based on the mortality, the molting inhibition and anti feeding effect on the development of larvae at 2.5%, 5% and 10% concentrations for each of the different treatments, except for the Nimbecidine 0.03% commercial product which was used as 1.5ml/L 2ml/L and 2.5ml/L concentrations.

The highest concentrations (10%) for all botanical extracts gave the highest average of mortality beside Nimbecidine 2.5ml/L concentration. The *Eucalyptus* 1.28, gave the best mortality followed by the *Vinca* 0.85, then the Nimbecidine 0.80 and the Hargal 0.67 respectively. Generally, the mortality increased with the increase of concentration. The Nimbecidine gave low average of moulting 1.5 fallowed by *Eucalyptus* 2.28, then *Vinca* 2.42 and Hargal 2.71 respectively. Where as the loss of weight of the used seeds in the experiment, were, Hargal 0.837, *Vinca* 0.879, Nimbecidine 1.098 and *Eucalyptus* 1.358respectivelly.

ملخص الاطروحة

اجريت هذه الدراسة في معمل معهد ابحاث البيئة والموارد الطبيعية , المركز الـ قومي للبحوث . اختبرت الدراسة امكانية استخدام مستخلص مسحوق الاوراق المائي لنبات الوينكا *Vinca rosea* والمستخلص المائي لمسحوق مخلوط (الاوراق،الثمار والسيـ قان) لنبات الحرجل (*Solenostemma argel*) ، بجانب مستخلص الميثانول العضوي لمسحوق اوراق نبات الكافور (*Eucalyptus camaldulensis*) ، بالاضافة لاستخدام النيمبسيدين كمنتج مصنع (تجاري) من نبات النيم (Nimbecidine 0.03%) ، والتي استخدمت كعناصر مكافحة تحت ظروف المعمل ضد الطور اليرقي الثالث لخنفساء الخابرا (*Trogoderma granarium* Everts.) علي حبوب الذرة.

كان التـ قييم بناء علي الاثر الـ قاتل ، المثبط للانسلاخ والمانع للتغذية علي نمو اليرقة بتركيزات 2.5 % , 5 % و 10 % لكل من المعاملات المستخدمة, ماعدا النيمبسدين الذي استخدم بتركيزات 2ml / L ، 1.5ml/L و 2.5ml /L .

التركيز (10%) في كل المعاملات اعطي اعلي نسبة موت في جميع النباتات بالإضافة إلى التركيز 2.5ml/L للنيمبسيدين . الكافور 1.28 ، يليه الوينكا 0.85 ، ثم النيمبسيدين 0.80 و اخيرا الحرجل 0.67 ، عموما متوسط الموت يزيد بذيادة التركيز .

تاثير المعاملات علي الانسلاخ فـ قد كان النيمبسيدين هو الافضل اعطي اـ قل متوسط للانسلاخ (1.5)، يليه الكافور (2.28) ، ثم الوينكا (2.42) و اخيرا الحرجل (2.71).

بينما كان الفـ قد في وزن الحبوب المستخدمة في التجربة الحرجل (0.837)، الوينكا ((0.879 ، النيمبسيدين ((1.098 و الكافور (1.358) علي التوالي .

CONTENTS

Titles	Page No
الآيـة	I
Dedication	II
Acknowledgements	III
English abstract	IV
Arabic abstract	V
Contents	VI
List of tables	IX
List of figures	XI
List of plates	XII
CHAPTER ONE : INTRODUCTION	1
CHAPTER TWO : LITERATURE REVIEW	4
(.KHPRA BEETLE, *Trogoderma granarium* (Everts 2.1	4
Classification 2.1.1	4
Description 2.1.2	4
Distribution 2.1.3	5
Host range 2.1.4	6
Damage 2.1.5	6
Biology 2.1.6	7
Potential Environmental Impact 2.1.7	9
Storage methods 2.1.8	10
Economic importance 2.1.9	10
Chemical methods 2.1.10	12
Chemical control 2.1.10.1	12
Control by natural products 2.1.10.2	13
Biological control 2.1.10.3	14
Physical control 2.1.10.4	14
Mechanical control 2.1.10.5	15
Preventive control measures 2.1.10.6	15
PEREWINKLE, *Vinca rosea* (*Catharanthus roseus* 2.2 ((L)Don	15
Classification 2.2.1	15
Ecology and distribution 2.2.2	16
Function of alkaloids 2.2.3	16
Alkaloidal content of *Vinca rosea* 2.2.4	18

Traditional use 2.2.5	18
Pesticidal properties of *Vinca rosea* 2.2.6	19
ARGAL (*Solenostemma argel* Del.)Hayne 2.3	20
Classification 2.3.1	20
Distribution 2.3.2	21
Botanical description 2.3.3	21
Locality 2.3.4	21
Medical and pharmacological activity 2.3.5	21
Insecticidal activity 2.3.6	23
(CAFURE, (*Eucalyptus camaldulensis* Dehn 2.4	24
Classification 2.4.1	24
Distribution 2.4.2	24
Description 2.4.3	24
Ecology 2.4.4	25
Economic importance 2.4.5	25
Chemical construction 2.4.6	27
Medical use 2.4.7	27
Cafure as biocide 2.4.8	28
NEEM 2.5	31
Classification 2.5.1	31
Distribution 2.5.2	32
Description 2.5.3	32
Ecology 2.5.4	32
Economic importance 2.5.5	33
Chemical constituents 2.5.6	34
Extraction methods and formulations 2.5.7	35
Medical use of the neem 2.5.8	36
Neem as biocide 2.5.9	36
Commercial products from neem 2.5.10	39
Nimbecidine 0.03% from neem 2.5.10.1	39
Chemistry of Nimbecidine 0.03% 2.5.10.2	39
CHAPTER THREE:MATRIALS AND METHODS	41
Insect culture 3.1	41
Preparation of the botanical extracts 3.2	42
Periwinkle, *Vinca rosea* (L) leaves powder 3.2.1	42
Preparation of the Hargal *(Solenostemma argel*) leaves, fruit and stems powder 3.2.2	42
Preparation of the Cafure (*Eucalyptus camaldulensis* Dhen.) leaves powder 3.2.3	42
Preparation of the aqueous extracts 3.3	43
The aqueous solution of Periwinkle plant leaves and (Hargel plant (leaves, fruits and stem 3.3.1	43

The organic solution of Cafure plant (leaves) oil extract 3.3.2	43
Bio-assay 3.4	45
Periwinkle (*Vinca rosea*) and Hargel (*Solenostemma* 3.4.1 (*argel*) water extracts (aqueous extracts	45
Cafure (*Eucalyptus camaldulensis*) organic extract 3.4.2 ((Methanolic extract	45
Nimbecidine 0.03% 3.4.3	46
Statistical analysis 3.5	48
CHAPTER FOUR : RESULTS	49
Insecticidal effect of *Vinca*, Hargal, *Eucalyptus* and 4.1 Nimbecidine 0.03% on khapra beetle larvae (*Trogoderma granarium* Everts.) mortality	49
Effect of *Vinca rosea* water (aqueous) extract on 4.1.1 mortality	49
Effect of *Vinca rosea* water (aqueous) extract on molting 4.1.2	49
Effect of *Vinca rosea* water (aqueous) extract on weight 4.1.3 (loss of Dura (sorghum	49
Effect of *Solenostemma argel* water (aqeous) extract on 4.2.1 mortality	53
Effect of *Solenostemma argel* water (aqeous) extract on 4.2.2 molting	53
Effect of *Solenostemma argel* water (aqeous) extract on 4.2.3 (weight loss of Dura (sorghum	53
Insecticidal effect (volatiale ingredient) of *Eucalyptus* plant 4.3 (leaves on khapra beetle larvae (*Trogoderma granarium* Everts	57
Effect of *Eucalyptus camaldulensis* organic extract 4.3.1 (volatile ingredient) on mortality larvae of *Trogoderma .granarium* Everts	57
Effect of *Eucalyptus camaldulensis* organic extract 4.3.2 (volatile ingredient) on molting larvae of *Trogoderma .granarium* Everts	57
Effect of *Eucalyptus camaldulensis* organic extract 4.3.3 ((volatile ingredient) on weight loss of Dura (sorghum	57
Effect of Nimbecidine 0.03% on mortality of larvae of 4.4.1 (khapra beetle (*Trogoderma granarium* Everts	61
Effect of Nimbecidine 0.03% on molting of larvae of 4.4.2 (khapra beetle (*Trogoderma granarium* Everts	61
Effect of Nimbecidine 0.03% on weight loss of Dura 4.4.3 ((sorghum	61
CHAPTER FIVE : DISCUSSION	65
CONCLUSION	73
REFERENCES	74

LIST OF TABLES

Titles	Page No
Table (1): Effect of different concentrations of *V. rosea* on the mortality of the 3rd instar larvae of Khapra beetle at .month	50
Table (2): Effect of different concentrations of *V. rosea* on the moulting of the 3rd instar larvae of Khapra beetle at .month	51
Table (3): Weight loss in 2ogm of Dura sorghum treated with different concentrations of *V. rosea* and infested by the .3rd instar larvae of Khapra beetle at month	52
Table (4): Effect of different concentrations of *S.argel* on the mortality of the 3rd instar larvae of Khapra beetle at .month	54
Table (5): Effect of different concentrations of *S.argel* on the moulting of the 3rd instar larvae of Khapra beetle at .month	55
Table (6): Weight loss in 2ogm of Dura sorghum treated with different concentrations of *S.argel* and infested by the .3rd instar larvae of Khapra beetle at month	56
Table (7): Effect of different concentrations of *E. camaldulensis* on the mortality of the 3rd instar larvae of .Khapra beetle at month	58
Table (8): Effect of different concentrations of *E. camaldulensis* on the moulting of the 3rd instar larvae of .Khapra beetle at month	59
Table (9): Weight loss in 2ogm of Dura sorghum treated with different concentrations of *E. camaldulensis* and .infested by the 3rd instar larvae of Khapra beetle at month	60
Table (10): Effect of different concentrations of Nimbecidine on the mortality of the 3rd instar larvae of .Khapra beetle at three weeks	62
Table (11): Effect of different concentrations of Nimbecidine on the moulting of the 3rd instar larvae of .Khapra beetle at three weeks	63

Table (12): Weight loss in 2ogm of Dura sorghum treated with different concentrations of Nimbecidine and infested .by the 3rd instar larvae of Khapra beetle at three weeks	64
Table (13): Effect of 10% concentration of *Vinca rosea* water extract on the 3rd instar larvae of Khapra beetle .change to the adult within 14 days	68

LIST OF FIGURES

Titles	Page No
Fig (1): Chemical structure of Cafure	30
Fig (2): Active components in Neem	38

LIST OF PLATES

Title	Page No
(.Plate (1): Periwinkle Plant (*Vinca rosea* L	17
Plate (2): Hargal Plant (*Solenostemma argel* Del.) Hayne	22
(.Plate (3): Cafure Plant *(Eucalyptus camaldulensis* Dehn	26
Plate (4): Soxhlet extractor	44
Plate (5): Exeperimentel design showing fumigation of the .seeds and larvae of (*T. granarium* Everts.) with Cafure oil	47