K.L.E.Society's

BASAVAPRABHU KORE ARTS, SCIENCE AND COMMERCE COLLEGE,

CHIKKODI – 591201 District – Belagavi (Karnataka state, India)

(ACCREDITED AT 'A' GRADE BY NAAC WITH CGPA OF 3.26 IN THE THIRD CYCLE)

Department of Zoology (2019 – 20)

PROJECT WORK COMPLETION CERTIFICATE

This is to certify that following five B.Sc Final year students have undertaken the project entitled **Study of Insect Pest Management** in-partial fulfillment of the syllabus of Rani Channamma University, Belagavi during the year 2019-20. Following five students have together successfully completed the said project under the guidance of Dr Sridevi I Puranik.

Sl. No	Gender	Name of the student	Fathers name	Roll Number	Exam Seat Number
1	Miss.	Akshata Walake	Anand	162	S1715613
2	Miss.	Sushila Hiremth	Ramayya	188	S1715810
3	Miss.	Preeti Wader	Laxam	236	S1715705
4	Miss.	Shweta Koli	Ashok	185	S1715792
5	Miss.	Laxmi Devangol	Mallappa	169	S1715659

Dr Sridevi I Puranik
PROJECT GUIDE

Dr N R Birasal
HEAD
DEPARTMENT OF ZOOLOGY

Prof U R Rajput
PRINCIPAL
KLES'S Basavaprabhu Kore
Arts, Science and Commerce College
CHIKODI - 591 201

Project Team Members

Sl. No.	Gender	Name of the Student	Fathers Name	Roll Number	Exam Seat Number
1.	Miss.	Akshata Walake	Anand	162	S1715613
2.	Miss.	Sushila Hiremath	Ramayya	188	S1715810
3.	Miss.	Preeti Wader	Laxam	236	S1715705
4.	Miss.	Shweta Koli	Ashok	185	S1715792
5.	Miss.	Laxmi Devangol	Mallappa	169	S1715659

ACKNOWLEDGEMENT

Primarily we would thank God for being able to complete this project with success. Then we would like to express our special thanks of gratitude to our principal **Prof. U. R. Rajaput** who gave permission to do this project & encourage us with his valuable guidance & also we extend our warm gratitude to the Head of the Department of Zoology **Dr. N. R. Birsal** sir who gave us the golden opportunity to do this wonderful project, on the topic "Study of Insect pest management " which also helped us in doing a lot of research & we came to know about so many new thing we really thankful to him.

Then we would like to thank our guide **Prof. S. I. Puranik,** Assistant Professor Dept. of Zoology for her valuable guidance which has helped us to complete this project & make it full proof success. Madam's suggestions & interactions has served as the major contributor towards the project.

Secondly, I would also like to thank our parents who helped us a lot in finalizing this project within the limited time frame. At last but not the least we would like to thank our college teaching and non-teaching staff and friends who have helped us a lot & made our project educative.

CONTENTS

INTRODUCTION

Pesticides are substances that are mean to control pests, including needs & these pesticides includes herbicides insect growth regulators Nematicides molluscicide bactericide antimicrobial fungicide pesticides are included to save as plant protection products which in general protect plant from weeds fungi or insects (Bruce *et al.,* 2019).

In general, a pesticide is a chemical/biological agent that deters incapacitates kills or otherwise discourages pests. Target pest can include insects, plant, pathogens, weeds molasses birds, mammals, fish, nematodes & microbes that destroy property cause nuisance / spread disease / along with this benefit, pesticides also have drawbacks, such as potential, toxicity to humans & other species (Gottlieb, 2019).

Initially by using this pesticide we can get high crop yield but the toxicity of this pesticides can be stored in this crop and the animals that will eat this crop they may be affected by the harmful disease (Wilches *et al.,* 2019). So, cause of all this more usage of pesticide is not good.

In insect pest management there are different methods to control pests as follows:

Physical Pest Control:

Physical pest control is a method of getting rid of insects and small rodents by killing, removing or setting up barriers that will prevent further distraction of one's plants (Mansour *et al.,* 2017). These methods are used in primarily for crop growing, but some methods can be applied to as well.

Types of Physical Pest Controls:

Barriers:

Row covers are useful for keeping insects out of one's plants, typically used for horticultural crops. They are made thin and light to allow plants to still absorb sunshine and water from the air.

Fire:

For formers fire has been a powerful technique used to destroy insect that lie there. Unfortunately, this can present some drawbacks. Fire can make the soil much less effective or get rid of insects that are beneficial to the plants. Also, there is no guaranty that will actually solve the pest problems since there may be larvae below the surface of the soil.

Animals:

Dogs, cats and others animals have been historically used for the pest control.

The Rat Terrier is American dog bread with a background as a farm dog and hunting companion. Specifically bread for killing rats, today's rats Terrier is an intelligent and active small dog that is kept both for pest control and as a family pet cats are also valued for companionship and for their ability to vermin.

Temperature control:

Placing produce inside of cold storage container lengthiness how long the produce lasts while also handing the growth of insects inside of them. Another method to use to heat, as it will kill the insect larvae in certain types of produce .an example would be mangoes, where they are place into a hot water bath in order to kill eggs and larvae.

Chemical Pest Control:

Methods have been used for thousands of years by civilization which has much less knowledge than current population Sumerians found out that sulfur gives that great results in insect extermination.

Types:

Fungicides:

These are chemical compounds are organic organisms with bio cider properties. Which help for the destruction of fungi and fungal spores. Fungi may cause severe disruption of any agricultural process. The major active ingredients of almost any fungicide is sulfur, which may turn out to be 0.5% of what is contained inside some of the heavier fungicides.

Insecticides:

Insecticides are any chemical substances that are used for insect extermination. They successfully help to eliminate insects and any life stage, including larvaecides, eggs and larvae.

Nematicides:

Nematicides are a chemical pesticide which kills nematodes that parasitize on plants. The use of this chemical pesticide is very important for potato crops because of the soil borne nematodes. Off course Nematicides may be natural such as extracts of neem oil (Mariyappillai *et al.,* 2019). In case the Nematicides are natural. You can enhance their effect by manually inserting them deeper in the soil. Rainfall would also help but if the insecticides has been sprayed as a liquid.

Rodenticides:

These are chemical pesticides design specifically for the extermination of rodents such as rats and mice. Most rodents often sense the treat and observe the rodenticide for a long time before consuming it (Masciocchi *et al.,* 2017). This is known as a poison shyness and to reduce this, scientists now develop rodenticides with a very strong residual effect.

Biological Method of Pest Control:

This control or bio-control is a method of bio controlling pests such as insects, mites, weeds and plant daises using other organisms. It relies on predation, parasitism, and herb ivory, are other natural mechanisms but typically also involves an active human management role. It can be an important component of integrated pest management IPM programs (Ojumoola *et al.,* 2019).

Biological control can have side effects on biodiversity through attacks on no target species by any of the same. Mechanism, especially when a species is a introduces without through understanding of the possible consequences.

Types:

These are the three basic biological pest control strategies as follows:

Importation:

Importation or classical biological control involves the introduction of pest natural enemies to a new local where they do not occur naturally early instances were after unofficial and not based on research and some introduced species become serious pests themselves. To be most effective at controlling a pest a biological control agent requires a colonizing ability which allows to it to keep pace with changes to the habitat in space and time. Control is a greatest of the agent has a temporal persistence so that it can maintain its population even in the temporary absence of the target species and it is opportunities forger, enabling it to rapidly a pest population.

Augmentation:

Involves the supplement release of natural enemies that occur in a particular area, boosting the naturally occurring populations there. Inoculative release small number of control agents is released at intervals to allow them to reproduce, in the hope of setting up longer term control and thus keeping the pest down to low level, constituting prevention rather than cure. In inundated release in contrast, large numbers are released in the hope of rapidly reducing a damaging pest population. Correcting a problem that has already has arisen augmentation can be affective but is not guaranteed to work and depends on the precise detail of the interactions between pest and control agent.

Conservation:

This of excising natural enemies in an environment is the third method of biological pest control. Natural enemies are already adopted to the habitat and to the target pests and their conservation can be simple and cost effective, as when nectar producing crop plants are grown in the borders of rice fields. These provide nectars to support parasitoids and predators and plant hoper pests and have been demonstrated to be so effective that famers sprayed 70% less

insecticides and enjoyed yields similarly found to be present in tussock grasses by field boundary hedges in England but they spread to slowly to reach the centers of fields control.

DUPONT CORAGEN

Coragen helps in remarkable protection & optimize yields & quality in your fields by achieving consistent & long-lasting control of key pests. It protects over 100 vegetable corps as well as others such as tobacco, sweet corn, potato, strawberries, mint, hops & others from a broad spectrum of Lepidopteron pests, including fruitworms, ballworms, armyworms, loopels, borers, hornworms, diamondback moths, silverleaf whitefly nymphs (suppression), leafminer laroae Colorado potato beetles & others.

Coragen insect control handless immature & adult stages of key lepidopteron pests for excellent &crop protection. Coragen insect control has minimal impact on pollinations & others beneficial insects when used in accordance with the label making it an ideal fit in integrated pest.

Chemical Composition

It is composed of two main components:

1) Chlorantraniliplole 0.4% GR having the trade name Ferterra.

2) Chlorantraniliprole 18.5% SC having the trade name coragen.

Fig 3.1. Dupont coragen insecticide

Advantages

1) Protects vegetables, tobacco, sweet corn, potatoes, strawberries, mint, hops & other crops from a broad spectrum of lepidopeteran pests, including silver leaf white leaf nymphs, leaf miner larvae, Colorado potato beetles & others.

2) Fast protection: lepidopteran pests stop feeding within minute after exposure.

3) Minimal impact on bees & other pollination & ideal for IMP programs.

4) Single active to be used at rate & timing of choosing for resistance management & added flexibility.

Infected plant

Fig.3.2. Early shoot borer infestation in the sugar cane crop.

Early shoot borer (Chilo infescatllus)

The damage from early shoot borer causes yield losses up to 35%. The pest attacks the crop during the early growth stages, before the inter nodes formation. The damage occurs as the dead hearts; the base of the dead heart gets rotten and emits the offensive smell. After the pest manages to kill one shoot, it migrates to another. The crop is also vulnerable to the pest attack in the years of scant rainfall when the temperature remains usually high with low relative humidity.

EMBOZ

Fig. 4.1. Emboz Insecticide

It is produced by the bacterium stretomyces avermitilis, belongs to the avermectin family of compounds all of which exhibit toxicity for nematodes, arthropods, & several other pests. & it is derived from abamectin by replacement of an epi-amino-methyl group by a hydroxyl group at 4-position. & it is the mixture of 2 homologue compounds termed B1a & B1b which differ on the C-25 side chain by one methylene group. B1a contains a sec-butyl group which B1b has an isopropyl group. & emboz is a mixture containing of 10% B1b & 90% B1a.

Avermectine biosynthesis is classified into 3 stages. The formation of the polyketide derived initial a glycone, modification of the initial aglycone produces avermectine aglycone, & glycosylation of avermectins. & it is widely used for cotton & sugar cane plants.

Chemical Composition:

1. 2, 4-dichlorophenoxyacetic acid.
2. Aldrin /dieldreine.
3. Atrazine.
4. Chlorodane.
5. Chloredecone

6. Endosulfan
7. Endrin

Advantages

- It is widely used I controlling lepidopterous pests (order of insects that as larvae are caterpillars & as adults have 4 broad wings including butterflies, moths, & skippers).
- It has been shown to possess a greater ability to reduce the colonization success of engraver beetles & associated wood bores in loblolly pines.
- It is the greatest reduce against these species with respect to the amount of larval feeding, length, & number egg gallevies.

Infected Plants

Fig.4.2. Maize is affected by insect Indian meal moth.

Indian meal moth (Plodia interpunctella)

Nature of damage

This insect is a pest only of stored grain and does not infest maize in the field.

Description and life cycle:

Moths about 1 cm long which have 3 bands (a narrow reddish brown one and a wider one of the same color separated by a whitish band). Can be observe around infested grain stores. The moths lay their eggs on the surface of stored grain, one can find a dense silken webbing produced by light yellowish larvae, which eventually. Acquire a greenish or pinkish tint. Full grown larvae leave the inside of the grain and pupate in white, silken cocoons on the outside of the infested grain mass.

CHANDIKA 505

Chemical composition:

Chlorophyll a. (purity 94%) 50% W/W, cypermethrin a. (purity 92%) 5% W/W, emulsifiers A (A blend of calcium salt of alkyl benzene sulfonic acid & polythonar propoxy ethers of fatty alcohol) 2.4% W/W, Aromatic hydrocarbon (Aromax) QS. Total 100.00% W/w.

Fig 5.1. Chandika 505 insecticide

Recommendation:

It is recommended for the control of Aphide, Jassid, thrips, whitefly, American bollworm, spotted bollworm, and pink worm etc. on cotton.

Drug therapy:

Atropinise, the patient immediately & maintain full atropinization by repeated doses of 2-4mg. at 5-10min interval for hours together. The need for further atropine administration is indicated by the continuation of symptoms. As much as 25-50mg may be required in a day. The extent of the salvation is useful criterion to follow in adjusting the dosage of atropine. Administer 1-2gm of 2 P.A.M. Diluted in 10cc distilled H20 and injected intravenously very slowly taking 5-10min.

Precautions: Avoid inhalation & skin contact. Destroy empty containers.

Infected Plant

Fig.5.1. Cotton Plant Infected by Bollworm.

Cotton Bollworm

Cotton bollworm larvae damage bolls and squares. Larvae chew holds into the base of bolls and may hollow out locks. Moist frass usually accumulate around the base of the ball. Larvae may also chew shallow gouges in the boll surface, which can become infected with rot organisms.

DHANVAN-20

Is an organic – phosphate insecticide it is effective against various sucking boring & leaf feeding insects on paddy, sugarcane, cotton, pulses, oilseeds, vegetable & fruit trees. It is also used for termite control in building forestry & field crops (Onstad *et al.*, 2019).

Chemical composition:

1. Chloropyriphos technical 21.5 (based on 94% a. I W/W)
2. Solvent (aromex) -72.5%W/W
3. Emulsifier (anionic – alkyl aryl)
4. Sulphonate, non – ionic –polyoxy
5. Ethylene other

Fig.6.1. Dhanvan-20 Insecticides

Precaution:

Use gloves, goggles, gas mask & protective clothing while handling apply only in the detection of wind.

Storage:

Store in its original pack under lock & key out of the reach of children & animals, in a dry & cool place away from open flame.

Disposal:

Empty container must be broken & buried ½ meter deep in soil away from habitation & not left in the open to prevent its reuse.

Symptoms of poisoning:

Headache giddiness, nausea, vomiting blurred vision excessive lachrymation and salivation.

Antidote:

Atropinize the patient immediately and maintain full atropnization by repeated doses of 2 to4mg at 5 to 10min interval, administer 1 to 2gm of 2-P.A.M diluted in 10ml distilled water intravenously very slowly takens 10 to 15 min.

First-Aid:

Wash the contaminated skin & irrigate eyes with normal saline, Gastric lava with 5% sodium bicarbonate if ingested.

Infected Plant

Fig.6.2. Maize plant is infected by the insect wire worm.

Wire Worm

Many species of families Elateridae (melanotus, Agriotes, and are among the important

genera) and Tenebrionidae (Eleodes species).

Nature of damage:

Patchy seedlings emergence, wilting and tilllering of seedlings, and lodging of older plants are signs of wire worm injury, although these symptoms may also be associated with other soil insects. In pastures, hay crops, and cereal crops, large wire worm population may develop, injuring the base of the stem, cutting the roots, and boring into the large roots of older plants. Heavy infestation will reduce the root system and cause plants to lodge.

Description and life cycle:

A careful search of the soil surrounding wire worm damaged seed or seedlings will expose segmented, thin, cylindrical worms, which when recently hatched are small (10mm long), soft, and white and when mature are 40mm long shiny, smooth. , deep yellow or brownish, and hard but flexible. After hatching the larvae begin searching for and feeding upon seeds and roots. Within several months to several years, the larvae into white, soft pupae inside cells in the soil, from which they eventually emerge as adults "click beetles" because, when turned upside down, they make an audible clicking sound in flipping themselves back over. The beetles are active fliers, have a hard, elongated, somewhat flat shell, and are brownish to almost black and from 0.5 to 2 cm in length. Female beetles burrow into the soil to lay eggs.

HILBAN 20 EC:

Hilban is a broad-spectrum insecticide with contact and stomach action. Non-systematic but penetrate deeply into the plant tissues. For the control of insect pests of paddy, beans, grams, sugarcane, cotton.

Control of aphids, thrips, beetles, lepidopterous larvae in ornamentals, fruits and vegetables, cotton, paddy, oil seeds, sugarcane, groundnut, mustard, brinjal, cabbage, onion, apple, citrus, tobacco etc. Highly effective against soil grubs and termites (Phillips, 2019).

It is also recommended for termite control in crop fields and can be used in building constructions for Termite proofing.

Fig 6.1. Hilban 20 E.C Insecticides

Dosage: 5ml in a liter of water and spray.

Caution: Poison, take precaution while using.

Symptoms of poisoning:

1) Head ache
2) Vomiting
3) Nausea

Infected Plant

Fig. 6.1 Aphids Infected to Wheat Plant.

Aphids

These insects can literally suck the life out of a fruit full wheat harvest.
Aphids can live in wheat, sucking the sap from the plant, North Carolina state university explain. The damage of taking this sap is to fold. First it directly damages the plants lively hood by interfering with its ability to gate sustenance.\secondly, aphids can also pass the barley yellow dwarf virus to the plant (Pfeiffer *et al.*, 2017).

NCSU pointed out that aphids can affect a variety of cereals, but the English grain aphids and the bird cherry oat aphids are the only once with an impact on smaller grains like wheat. These pests can colonize wheat plants in the spearing or travel from nearby grain and infect wheat as late as the fall (Ware, 2019).

Seed treatments are typically the best defense against aphids and the diseases they could spread. A treatment with imidacloprid or thiamethoxam or often use to stop the colony from the developing in the first place.

RESULT

The many insects harm the crops which is economically and also a commercial disadvantage and the insects affects the crops may be in larval stage or in germination stage or in bloom period.

1) The major insect which harms the maize is wireworms, Indian meal moth and black ear wings they harm maize when it is in third or fourth leaf stage.

2) The major insect which harms the cotton plant are cotton bollworm and pink bollworm. They harm the cotton plant in the larval stage.

3) The major insect which harms the Wheat plant are Aphids and Army worms, they also harm the wheat plant during the larval stage.

4) The major insect which harms the sugar cane is borers and they infect the sugar cane during the germination phase.

5) The major insect which harms the sorghum plant in sorghum midge and they infect the sorghum plant during the bloom period.

This insect economically cause very much loss which decreases the level of production of crops.

CONCLUSION

It was a wonderful experience to study about "Study of Insect Pest Management" There, because in the class rooms we can only imagine. Going for this project we get to know how the pests or insects can be controlled by using pesticides in order to increase the crop yield and learn the methods to control the pests or insects like chemical method, physical method, biological method, and Natural method etc.

This project helped us to understand grasp the concepts clearly about how the pest or insect harming crop in agricultural field and extend our thinking capacity.

REFERENCES

Bruce, A., Wilkins, R. V., Albin, C. E., & Arthur, F. H. (2019). Sanitation Improves Stored Product Insect Pest Management. *Insects*, *10*(3).

Gottlieb, D. (2019). Agro-chronobiology: Integrating circadian clocks/time biology into storage management. *Journal of stored products research*, *82*, 9-16.

Wilches, D. M., Laird, R. A., Floate, K. D., & Fields, P. G. (2019). Control of Trogoderma granarium (Coleoptera: Dermestidae) using high temperatures. *Journal of economic entomology*, *112*(2), 963-968.

Mansour, R., Grissa-Lebdi, K., Suma, P., Mazzeo, G., & Russo, A. (2017). Key scale insects (Hemiptera: Coccoidea) of high economic importance in a Mediterranean area: host plants, bio-ecological characteristics, natural enemies and pest management strategies–a review. *Plant Protection Science*, *53*(1), 1-14.

Mariyappillai, A., Arumugam, G., & Elangovan, S. (2019). New Agronomic Ideas of Ecofriendly Pest Management by Insectivorous and Murderous Plants. *Available at SSRN 3500787*.

Masciocchi, M., Dimarco, R. D., & Corley, J. C. (2017). Pest management of social insects in urban settings. *International Journal of Pest Management*, *63*(3), 205-206.

Ojumoola, A. O., Raimi, K. M., & Adesiyun, A. A. (2019). Diversity and abundance of diurnal insects associated with dry season Amaranthus hybridus L. in the University of Ilorin, Nigeria. *Agro-Science*, *18*(2), 8-14.

Onstad, D. W., & Crain, P. (Eds.). (2019). *The Economics of Integrated Pest Management of Insects*. CABI.

Pfeiffer, D. G., Johnson, C. S., Yoder, K. S., & Bergh, C. (2017). Commercial Small Fruits: Disease and Insects. p. 2-1–2-28. In: 2016 Pest Management Guide for Horticultural and Forest Crops.

Phillips, L. (2019). Insects: know your friends from your foes. *Farmer's Weekly*, *2019*(19039), 40-41.

Ware, D. (2019). *Biotechnology and Insect Pest Management*. Scientific e-Resources.