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Full Length Research Paper

Comparative analysis of safety and effectiveness between organically produced insecticides and synthetically produced ones.

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Environmental degradation and need to prevent its occurrence prodded the current research of producing an environmentally friendly organically produced insecticide that will compete favourably with synthetically produced one at cheaper costs. Plant materials used as ingredients include Azardirachta indica, (Neem leaves) leaf extract, aqueous extract of garlic, onion and chili pepper, to produce the organophosphate insecticide and raid insecticides is used as the synthetic insecticide. Both were simultaneously applied to control insects' pests and ordinary water was used as control. The toxicity of the two was measured by the rate and time of the mortality of the insects and also the side effects observed. After random applications the synthetic insecticides were more effective. This may be due to the crude nature of the organically produced ones. If it can be improved upon and more researches are carried out it would be as good if not better. The corrosiveness of the synthetic insecticide is very high so also its side effects which the organic one does not have. With more research and governmental encouragement better improvements can be brought to the production of organic insecticides to make it better in functions than the synthetic ones since it proved to be more environmentally friendly, cheaper to produce and with less side effects.

KEY WORDS: Environment, Organic, Synthetic Azardirachta indica, garlic, onion and chilli pepper,

INTRODUCTION

The word insects come from the latin word "insectum" meaning "with" notched or divided body". Or literally "cut into", from the neuter singular past participle of insectare, "to cut into, to cut up", from in "into" and secure "to cut" (Chapman, 2006; Wilson, 2009), because insect appears in vertebrates within the Antropod, phylum that have a chitinous exoskeleton, a three part body (wad, thorax, and abdomen), three pairs of jointed legs, compound eyes and pairs of antennae. Insect have segmented bodies supported by exoskeleton, they hard outer covering made mostly of chitin. The segments of the body are recognized into three distinctive but interconnected units a head, a thorax and abdomen (Orkin 2009). The central nervous system of insect varies little among them. Despite the diversity of insect body from (there are over a million species), the central nervous system of insect are remarkably similar, they vary as

“astonishly little from the most primitive to the most advanced (Hughes et al., 2008). The nervous system of an insect can be divided into a brain and ventral nerve cord. The head capsule is made up of six fused segments, each with either a pair of ganglish or a cluster of nerve cell outside the brain (Craston, 2005). Some insects, like the house fly musca domestic, have all body ganglia fused into a single large thorax ganglion.

They are among the most diverse groups of animals on the planet including more than a million described species and representing more than half of all non-living organism (Gullan, and Cranston, 2005). The number of extent species is estimated between six and ten million (Chapman, 2006).

Taxonomy of insect

The traditional morphology based on appearance based systematic has usually given Hexapoda the rant of super class, (Gullan, and Cranston, 2005) and identified four group within it insect (Ectognatha), Springtails (collembolan), Protor; and Dipulara, the Latter three being groups together as Entognatha on the basis of internalized mouth parts. Many of the traditional appearance based on taxonomy have been shown to be paraphyletic, so rather than using ranks like subclass, suborder and infraorder, it has proved better to use monophyletic groupings (in which the last common ancestor is a member of the group). The study of the classification or taxonomy of insects is called systematic entomology (Catteneo, 2006).

According to Zhao-Peng (2012), Insecticides are agents of chemical or biological origin that control insects. Control may result from killing the insect or otherwise preventing it from engaging in behaviors deemed destructive. Insecticides may be natural or manmade and are applied to target pests in a myriad of formulations and delivery systems (sprays, baits, slow-release diffusion, etc.). The science of biotechnology has, in recent years, even incorporated bacterial genes coding for insecticidal proteins into various crop plants that deal death to unsuspecting pests that feed on them (Bradenburg 2007).

Natural or synthetic chemicals used to manage insects pests; they are important for disease control and providing food and fiber for a growing world population. Insect control with chemicals began about 2,000 years ago with the use of natural products, whereas the age of synthetic insecticides began with the introduction of dichlorodiphenyl trichloroethane (DDT) in the 1940s. Here the major classes of insecticides are covered, and important example compounds provided (Abdel et al., 2006). The discussion is organized topically by mode of action/target tissue. In addition to synthetic materials, natural products are addressed because their use is increasing in "organic farming." This entry then explores the development of plants or viruses genetically engineered to produce insect-selective toxins (Assad et al., 2006).

Aim and Objectives

- To determine the toxicity of organic and synthetic insecticides on insects.
- To determine the resistance and persistence of insects against the two insecticides.
- To produce organic insecticides.
- To comparatively determine the effectiveness and safety of the insecticides on insects.

MATERIALS AND METHODS

MATERIALS

The material used for this experiment is as follow: Many types of insects such as cockroaches, beetles, spiders and crickets, were caught around Ozoro town in Isoko- North Local Government Area of Delta State in Nigeria. Chemicals used are Organophosphate and Concentrated Isopropyl, measuring cylinder, protective goggles, Nose masks, hand gloves, tissues, raid and spray bottle were all bought in Onitsha market in Anambra State of Nigeria. The practicals were conducted in the Biology laboratory of Delta State Polytechnic Ozoro.

METHODS

Measure into the measuring cylinder is 1 litre of

Containers	Nature of container	Number of insects in each container
A	Airtight	20
B	Airtight	20
C	Hole for ventilation	20
D	Hole for ventilation	20
E	Airtight	20
F	Hole for ventilation	20
G	Airtight	20
H	Hole for ventilation	20

Containers	Nature of container	Type of insecticide	Number of insects in each container
A	Airtight	Organophosphate	20
B	Airtight	Raid	20
C	Hole for ventilation	Distilled water	20
D	Hole for ventilation	Organophosphate	20
E	Airtight	Raid	20
F	Hole for ventilation	Organophosphate	20
G	Airtight	Raid	20
H	Hole for ventilation	Organophosphate	20

dilute concentrated Isoprophyl and 100ml of organophosphate. 100ml of organophosphate into 1 litre was used to dilute 1 litre of concentrated Isoprophyl and shake it vigorously.

Insect Collections

Forty (40) of each insects (cockroaches, spider, beetle and crickets) making a total number of one hundred and sixty insects were collected. Five insects of each listed species above were kept in eight different containers making a total number of 20 insects in each containers labeled A, B, C, D, E, F, G and H. it shown below in tabular form. Table 1

Method of application of insecticide

Two type of insecticide were used in the application method which is prepared Organophosphate insecticide and the raid synthetic insecticide and a control (distilled water) was also used on the insect.

The container labeled A: was sprayed with Organophosphate insecticide which was made airtight.
Container B: was sprayed with Raid synthetic insecticide and was made airtight.
Container C: was sprayed with distilled water (the control) was administered and air was allowed to enter.
Container D: was sprayed with organophosphate and was made airtight.
Container E: was sprayed with the Raid insecticide and was made airtight.
Container F: was sprayed with organophosphate insecticide and air was allowed to enter.
Container G: was sprayed with Raid insecticide and was made airtight.
Container H: was sprayed with the prepared Organophosphate insecticide and air was allowed to be enter.

INSECTICIDE APPLICATION ON INSECT

Insecticide applied an insect are shown in a table Above

Application of insecticide	5 minutes of mortality	10 minutes of mortality	15 minutes of mortality	20 minutes of mortality	25 minutes of mortality	30 minutes of mortality
Organophosphate	25	50	10	15	-	-
Raid	10	40	50	-	-	-
Distilled water	-	-	-	--	-	15
Organophosphate	20	30	40	5	-	5
Raid	50	5	15	25	50	-
Organophosphate	30	40	5	15	-	-
Raid	5	15	10	25	20	5
Organophosphate	30	40	5	15	-	-

Time of application of insecticide and the toxicity of the insecticide on insect was also determined during the insecticide application on insect.

DOSAGE OF APPLICATION OF INSECTICIDES

Variation in dosage produces a range of effectiveness of the insecticide on insects. At optimum ratio (of effective insecticide) a heavy kill produced (Yu, 2008) at lower rate, smaller kill are achieved and at higher rate kill scarcely increases, but phytoxicity results, some insects such as beetles, it is possible to increase dosage to such an extent that kills the insects. Dosage may be accumulative. The dosage of insecticide are reliable to acts as nerve poison, muscle poison, desiccants, growth regulator and or stimulants on insect and examples of insecticide include, Endosulphan, malathion, Beta–cyfluthrin. Like Endosulphan, a non systemic organophosphate insecticide is effective against beetles, aphids e.t.c while malathion insecticide are widely used for mosquitoes eradication and has low human toxicity (Yu,2008)

RESULTS

The experiment carryout in the laboratory the following results were obtained in a tabular form is shown below.

EFFECTIVENESS OF INSECTICIDE ON INSECTS INPERCENTAGE(%)

Table 3:

DISCUSSION

The result obtained from the experiment was observed that organophosphate insecticide was less active than the Raid synthetic insecticide because the effectiveness and the toxicity on the insect were very high which the insects were not able to resist it. For the prepared organophosphate is very active on the insects although its affect the insect adversely. The entails in the experiment as at 10 minutes organophosphate insecticide killed 10 insects in the airtight container and 8 insects in the hole for ventilation container while Raid killed 16 insect in airtight container as in 10minutes and 1 insect in the hole for ventilation. For the control which was sprayed with distilled water there was no reaction until it entail 30minute before 3 insects were killed and this is due to improper ventilation in the container. Although all the insecticides worked well and killed insects in agreement with the work of Orkin (2009), there are concerns about the risk of chemicals to the environment which again is very expensive in addition to being harmful to both man and the environment which is in agreement to the work of Orkin (2009).

CONCLUSION

This research was able to confirm the mechanism of insecticides production in different insecticide used in this work. It has also shown that organophosphate insecticides are very effective and has high toxin on insect, which causes harm to their nervous system and thereafter kill the insects. It also has effect on human's health which has adverse effect on human health.

RECOMMENDATIONS

The chemicals used in producing insecticides are costly and unavailable in the market. Therefore, the government should encourage the use of

organophosphate insecticides. During the preparation of the insecticides, the person producing it should protect himself because the harmful chemical used for producing insecticides has an adverse effect on human's health and also purchaser should be enlightened on how to apply the insecticides which if not applied properly can cause adverse effect such as cattarh, Cough.

REFERENCES

Abdel Bag AO, Ahmed AAM and Ali AM (2006). Impact of pesticides and other chemicals on the environment. Workshop on Post Conflict National plan for Environmental Management in Sudan, 18 – 20 July, 2006. Friendships Halls Khartoun Sudan.

Assad YOH, Bashir NHH and Eltoum CMA (2006). Evaluation of various insecticides on the cotton whitefly, Bemisia tabaci (Genn.); Population Control and development of resistance in Sudan, Gerira Resistance Pest Management Newsletter, 15(2):7-12

Brandenburg RL (2007) wildlife and pesticide peanuts. North Carolina co-operative extension service retrieved.

Cattaneo et al. (2006). Insecticide use has waned in some crops with recent advent of transgenic verities of insecticidal toxins.

Champman AD (2006). Numbers of living species in Australia and the world. Canberra Australian biological study ISBN 978-0-642-56850-2

Gullan PJ, Cranston PS (2005). The insect: An outline of entomology (3 ed). Oxford; Black well publishing. 1-4051-1113-5

Hughes William OH, Oldroyd, Benjamin P, Beekman, Madeleine, Ratnieks, Francis LW (2008). "Ancestral Monogamy shows kin selection is key to the evolution of Eusociality". Science (American Association for the advancement of Science) 320 donor (5880); 1213 – 1216. Bibcode; 2008Sci….320. 1213A doi:10. 1126/Science.1156108, PMID 18511689

Orkin O (2009). Segments of insect's body are recognized into the three distinctive but interconnected units, head, thorax and abdomen

Wilson CO (2009). Threat to Global Diversity. Retrieved 17th May, 2009.

Yu (2008). Multiple formulation of each used in a variety of application.

Zhao-Peng (2012) "possible connection between imidaclopida induced changes in rice lugens stal (Hemipter a: Delphacidae)" Pesticide Biochemistry and Physiology 102(3): 213. Doi: 10.1016 lj. Pest bp 2012. 0048-3575