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Bio-Pesticide from Custard Apple Seed

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Abstract: *The present investigation was conducted to evaluate the antibacterial and Insecticidal efficiency of traditional plant Annona squamosa. Seeds extract of plant Annona squamosa were prepared by methanol extraction method with different feed (custard apple powder) to solvent ratio of 1:1, 1:2, 1:3 and 1:4 as custard apple seed to the methanol. At ratio of 1:4 shows the 80- 85 % recovery of biopesticide which is optimum value. Tests of susceptibility for larvae and imaginal stage of mosquitoes were realized to determine mortality and LC50 of mosquitoes. Chemical identifications showed that these extracts contain alkaloids and flavonoids compounds that probably confer their biological Pesticidal proprieties. Pesticidal effects were observed with methanol extracts of seeds of Annona squamosa. The seed extracts of plants may be used as a natural Pesticide. Bio-pesticides are eco-friendly pesticides which are obtained from naturally occurring substances (biochemicals), microbes and plants. Not all-natural products are biopesticides. Some are chemical pesticides if they act on nervous system of the pest. Biopesticide reduces the pollution which make earth life safe, protecting the human and animal health. Quality of corps also clean due to bio or organic pesticides.*

Keywords: Bio-Pesticide, Custard Apple Seed, Extraction, Solvents

I. INTRODUCTION

Natural pesticides are a cheap and safer alternative for the products as well as human being who always exposed to pesticides during use. Pesticides include all materials that are used to prevent, destroy, repel, attract or reduce pest organisms. We can say that Pesticides are chemicals that we use to kill undesirable organisms. Biopesticides are certain types of pesticides that are derived from natural materials like plants (Botanical origin), bacteria, fungi and virus (Microbial origin) and certain minerals. When used as a component of Integrated Pest Management (IPM) programs these biopesticides can greatly decrease the use of conventional pesticides, while crop yields remain high. The Bio Pesticides control pests/diseases either selectively or with broad spectrum approach. Biopesticides are usually inherently less toxic than conventional pesticides.

Advantages of Biopesticides

1. Host specificity.
2. Ability to multiply in the target cells.
3. No problem of toxic residue.
4. No evidence or absence of resistance.
5. No problem of cross resistance.
6. Conventional technique or methods for applications.
7. Permanent control of pest or long persisting effect.
8. Ideally suited for integration with most other plant protection measures used.
9. No fear of environment pollution and hence eco-friendly.

Disadvantages or Limitation of Biopesticides

1. High selectivity or host specificity.
2. Requirement of additional control measures.
3. The correct time of application.
4. Delayed effect or mortality.

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5. Storage problem.
6. Difficulty of culturing in large quantities.
7. Short residual effectiveness.

II. LITERATURE REVIEW

Chand and McLaughlin (1990) have described squamosin as an extract from the Annona squamosa seed which was described as stereo chemically undefined15,24,28– trihydroxy-bis-tetrahydrofuran acetogenins. ANOSOM is a biological Pesticide based on botanical extract of Annona squamosa (Custard Apple). It contains squamosin (annonin) as active ingredient and is formulated as 1% Emulsifiable Concentrate (10,000 ppm). Anosom is non-phytotoxic and not toxic to higher animals. Registration data Package for Anosom is being submitted to the Indian Pesticides Regulatory Authority - Central Pesticides Board, Govt of India and the same is under process for registration. Squamosin (Annonin) present in Anosom revealed an inhibitory effect on the NADH-cytochrome reductase and complex I of insect mitochondria. Annonaceous acetogenins present in Anosom have pesticidal and/or insect antifeedant properties. [1] By studied Unripe and dried Fruits are used as antidysenteric. Bark act as powerful astringent, antidysenteric and vermifuge. Rootbark, leaves and stems are sources of many is quinoline alkaloids. Powdered seeds can also use to kill head-lice and fleas. Hence, the custard apple leaf, root and seed all act as an Pesticide that proves that the past study by various research papers. [3]. Chemical identifications showed that these extracts contain alkaloids and flavonoids compounds that probably confer their biological insecticidal proprieties. On adult mosquitoes, significant insecticidal effects were observed with methanol extracts of seeds of Annona squamosa. The seed extracts of plants may be used as a natural Pesticide. The present investigation was conducted to evaluate the antibacterial and Insecticidal efficiency of traditional plant Annona squamosa. Seeds extract of plant Annona squamosa were prepared by methanol extraction method at the ratio of 1:1. [5].

III. MATERIAL AND METHODOLOGY

Methanol CH3OH Chemical Formula CH3OH Appearance: Colorless liquid. Physical State: Liquid.
Molecular Weight: 32.04 gm/Mole.
Odor: distinctive odor that is somewhat milder and sweeter than ethanol.
Specific Gravity (Water = 1.0): 0.790 gm/liter at 20 Degree Celsius.
Solubility in Water (Weight %): Completely soluble.
Boiling Point: 64.6°C.
Vapor Pressure: 12.8 Kepa at 20 degree Celsius.
Vapor Density (Air = 1.0): 1.1 gm/l.

1. Methanol is soluble in water.
2. Highly flammable.
3. It is Flammable liquid.
4. It is volatile and light liquid.
5. Methanol is toxic in nature.
6. Methanol is primarily used as an industrial solvent for inks, resins, adhesives, and dyes.
7. Methanol is also used as an antifreeze for automotive radiators.

Safety Measures

- Exposure to excessive vapor causes eye irritation, head- ache, fatigue and drowsiness.
- Can be absorbed through skin.
- Swallowing may cause death or eye damage.
- High concentrations can produce central nervous system depression and optic nerve damage. 50,000 ppm will probably cause death in 1 to 2 hrs. Custard Apple Leaf Extract

Custard Apple leaf extract can also use as Pesticide. It is easy to prepare and easy to use. But the lower effect on the pest. So, the we need to prepare more effective pesticide for pest control. Followings are the easy step to prepare the pesticide or Pesticide from leaf extract.

1. Select the plant which is free from the diseases.
2. Clean and dried the leaf of custard apple.

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3. Make powder of the leaf after dried.
4. Take 4-5 liter of distilled water per kg of leaf powder.
5. Proper mixing with help of agitator.
6. Boiled the mixture 50-60 degree.

Filtrate the mixture with help of filter paper.
We can use filtrate direct application on pest.
Target Pest: - Aphids brown plant hopper, Caterpillar's coffee green scale cotton strainer diamond black month.
Custard Apple Seed Extract
Custard apple seed extract be another one method for preparation of pesticide. Pesticide from seed extract method more effective than Leaf extract. Followings are the easy step to prepare the pesticide or Pesticide from leaf extract

1. Select the plant which is free from the diseases.
2. Clean and dried custard apple Seed. Make powder of the of seed after dried.
3. Take 4-5 liter of distilled water per kg of Custard apple seed powder.
4. Proper mixing with help of agitator.
5. Boiled the mixture 50-60 degree.
6. Filtrate the mixture with help of filter paper.
7. We can use filtrate direct application on pest.
8. This Filtrate more effective than the Leaf extract.
9. Target Pest: - Ant's Aphids.

Custard Apple Seed Oil Extract

This is another one method of preparation of Pesticide from seed oil extract. This method is producing the more effective pesticide comparing with above two method. In this method we can use the solvent extraction process for seed oil extract. We can use the solvent for extraction process like Methanol, Hexane and Petroleum Ether. Oil which extracted from seed of custard apple contains Pesticide name Annonin. Target Pest: - All type of pest. (Diamond back moth pupae)

Comparison of Methods

Custard apple seed oil contains annonin which is the more effective bio pesticide than the pesticide that produce from the leaf extract and seed extract. For third method we use synthetic solvent which is effectively removes the oil from seed. In method 1 and 2 water as solvent which extract simple pesticidal contains which is less effective than oil extract.
Composition of custard apple seed (13)
Custard apple seed contains moisture and volatile matter, crude protein, crude fibre, Other, ash and oil contains 6.5%, 15.9%, 17.6%, 1.7%, 30.3% and
28% respectively.

IV. EXPERIMENTAL ANALYSIS

Raw Materials and Chemicals

1. Custard Apple Seed Powder
2. Solvent for Extraction (Methanol)

Selected Process

Selected process is the manufacturing of the Pesticide from the Custard Apple which is the last one method. Production pesticide by using 'Custard apple seed oil extraction' can be process lab based. ''Extraction is the separation technique in which separation can be take place with help of third component as solvent which miscible with one of the components''.

Experimental Process

1. Select the disease-free plant custard apple seed.
2. Take 250 gms or 1000 gms of custard apple seed.
3. Dried the Seed in sunlight.

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4. Make powder of the seed with help of crusher.
5. Take Solvent for extraction as Methanol or Petroleum Ether 1:3 or 1:4 Ration.
6. Feed the mixture in agitated vessel.
7. Agitation required up to 30 min for complete extraction process.
8. After that stop agitation and stable it for two distinct layers.
9. It will take 1 – 2 hrs. for settling
10. Upper layer called as Extract phase which contains Pesticide with solvent.
11. Lower layer called as Residue which can be send to disposal.
12. Pesticide and Solvent can be separated by using simple distillation column.

V. RESULTS AND DISCUSSION

Observations

We can select the both solvents methanol and petroleum ether. Both solvents have low B. P. which can easily separate from the oil after extraction process. In the observation we carried out the experiment by using the seed powder to solvent ratios like 1:1, 1:2, 1:3 and 1: 4. Calculate extraction yield after separation of solvent from oil.

Extraction Balance

Methanol + Seeds = Extract phase + Raffinate phase

Distillation Balance

Feed (Solvent + Pesticide) = Distillate + Residue

% Recovery = (Oil Separated by distillation/ Oil in Feed) * 100

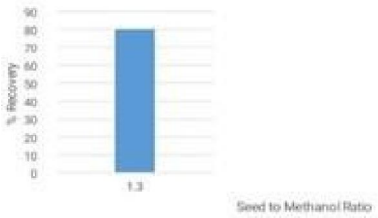

Fig. Graph of seed to Methanol Ratio vs % Recovery

Observation table shows the % Recovery of biopesticide produce from the custard apple seed powder. As the ration of feed to solvent increase the % recovery also increase. For 1:4 ratio has highest recovery of biopesticide which is up to 85 %. Above 1:4 ratio increases the cost of solvent and negligible increase in recovery. Hence, ratio for feed to solvent will be 1:4 as an optimum ratio.

ECONOMICS OF BIOPESTICIDE

1. The natural pesticide produced from custard apple seed oil proves itself efficient.
2. It advantageous, cheap and safety to handle.
3. We can recover by using various solvent is available and can easily recover from solvent.
4. This pesticide material can make easily available for every former thought the India without taking much more efforts.
5. The raw material will be very cheap which minimizes the total cost of processing along with solvent recovery.
6. The bio Pesticide from seed oil is effective and ecofriendly.
7. It will help to reduce the environmental pollution air as well as soil.
8. Scope of bio Pesticide in India is high.
9. This will beneficial for farmers as well as producer.
10. Cost of production for custard apple biopesticide is low comparing with synthetic pesticide.

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VI. FUTURE SCOPE AND OPPORTUNITIES

1. As per report, consumption of bio pesticide in 2017-18 in all India consumption was 6560 tons which increase to 7505 tons in year.
2. India is the second one under agricultural land of
3. 159.7 million of hectares hence there is the opportunities for the bio pesticide.
4. There was the pollution from problem due to the synthetic Pesticide which can be reduce by bio pesticide.
5. There are numbers of diseases for human as well as animal can be avoiding with biopesticide uses.
6. Biopesticide will protect the earth life.
7. Past from years India was use natural medicines so the raw material can easily available in India for production of bio Pesticide or bio pesticide.
8. Some state like Uttaranchal and Sikkim have declared as an organic so will be wide scope for bio Pesticide.
9. Due to rich diversity for organic farming in India.

VII. CONCLUSION

The natural pesticide produced from custard apple seed oil proves itself efficient which is cheap and less toxic. We can recover the pesticide from the seed by using various solvent is available in market. This biopesticide material can make easily available for every former thought the India without taking much more efforts. The raw material will be very cheap which minimizes the total cost of processing along with solvent recovery. This will be for alternative choice of synthetic pesticide. The process of mfg. is economical than other bio pesticide. The bio Pesticide from seed oil is effective and ecofriendly. It will help to reduce the pollution air as well as soil. There are various processes are available to produce Pesticide from custard apple seed. Scope of bio Pesticide in India is high. This will beneficial for farmers as well as producer. The % Recovery of biopesticide produce from the custard apple seed powder is more than 80%. As the ration of feed to solvent increase the % recovery also increase. For 1:4 ration has highest recovery of biopesticide which up to 85%. Above 1:4 ratio increase the cost of solvent and negligible increase in recovery. Hence ratio for feed to solvent will be 1:4 as optimum ratio.

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