

Effective use of Certain Phytochemicals from *Annona Squamosa* (Sitaphal) as Bioinsecticide

Dr Pratima Khare

Professor - Botany

Govt. Autonomous Girls P.G. College of Excellence, Sagar (M.P.)

Abstract -

Insects are serious pests on various crops and cause huge economic loss to the farmers. These attack wide variety of plants and are widely distributed in tropical, subtropical regions. To maintain the yield of crops, the pests should be kept away by using pesticide. Excessive use of synthetic pesticides for controlling pests increases the total cost of operation, in turn adversely affecting the health of human beings and polluting nature. Hence, an eco-friendly bio-pesticide is derived from custard apple seeds and leaves. In the present studies, oil from custard apple seeds and powdered leaves is extracted using hexane or methanol as a solvent and used as bio-pesticide to control the insect pests on the hibiscus plant. Results showed that the number of insect pests decreases day-by-day after spraying the extract solution on affected area of plant due to the presence of fatty acids in the oil. Fatty acid showed the toxicity against the insect pests.

Keywords - mealy bugs, custard apple seeds, extraction, fatty acids.

Introduction -

Pesticides are mixture of substances, used for preventing, destroying, or mitigating any pest, or for use as a plant growth regulator causing a range of harmful health effects in humans. Hence the safe and best alternative is to use biopesticide. Biopesticides are a cheap and safer alternative for the products, humans and for nature also. The various plant derived products from different plant families have been employed as pesticide. Custard apple (*Annona squamosa*) belongs to the Annonaceae plant family.

Oil extracted from it can be used as pesticide against a number of common pests like white mealy bugs, aphid, termite, mosquitoes, housefly etc. The oil extracted from custard apple seeds contain acetogenin a group of powerful respiratory system inhibiting toxic agents (phytochemicals), responsible to act as a biopesticide. The pesticide is produced by the extraction of oil from the seeds followed by distillation, using various solvents like hexane, methanol, petroleum ether etc. Studies are focused for the determination of some possible properties of seed extracts and powdered leaf extracts. Lastly, testing results for the sample are discussed. Annonaceae is a large family under the division of Mangnoliophyta comprising about 130 genera over 2300 species. *Annona squamosa* commonly known as Custard apple or sugar apple (sitaphal in hindi) is distributed in tropical and subtropical trees and shrubs. The plant range from 10 to 20 ft in height with irregular branches and zigzag twigs. The fragrant flowers are borne single or in groups of 2 to 4. The fruit is nearly round, oval or conical which gets separated when the fruit is ripe. The ripe fruit contains creamy white, sweet and delicious flesh. The seeds are scattered throughout the flesh, blackish brown, hard and shiny and are poisonous if chewed. The use of pesticides in agriculture is dated back to the beginning of agriculture itself and it became more popular with time due to increased pests parallel with decreasing soil fertility. Biopesticides gained lot of importance because of eco-friendly nature, keeping the environment clean and green and also less toxic compared to synthetic pesticides. Biopesticides are biochemical pesticides that are naturally occurring substances that control pests by nontoxic mechanisms. Biopesticides are living organisms or their products or byproducts which can be used for the management of pests that are injurious to plants. They pose less threat to the environment and to humans. The commonly used biopesticides are living organisms, which are pathogenic for the pest of interest. These include biofungicides, bioherbicides and bioinsecticides. There are few plant products also which can be used a major biopesticide source. Plant incorporated protectants include substances that are produced naturally on genetic modification of plants. Different biopesticides are prepared from cow urine extracts, fermented curd water, dashparni extract, neemcow urine extract, mixed leaves extract, chilli-garlic extract, tobacco with other plant extracts in cow urine, seed treatment with rhizome powder and cow's urine, papaya fruit extract, onion bulb extract, etc.

Materials & Methods -

- A. Materials/Instruments Soxhlet extraction unit, Simple distillation unit, Spray gun
- B. Extraction Solvents: n- hexane, Methanol
- C. Raw material: Custard apple seeds.

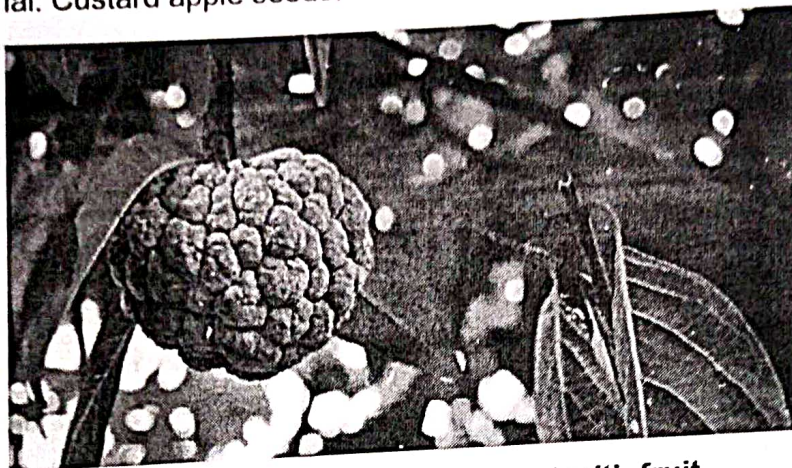


Fig. 1: Annona squamosa plant with fruit

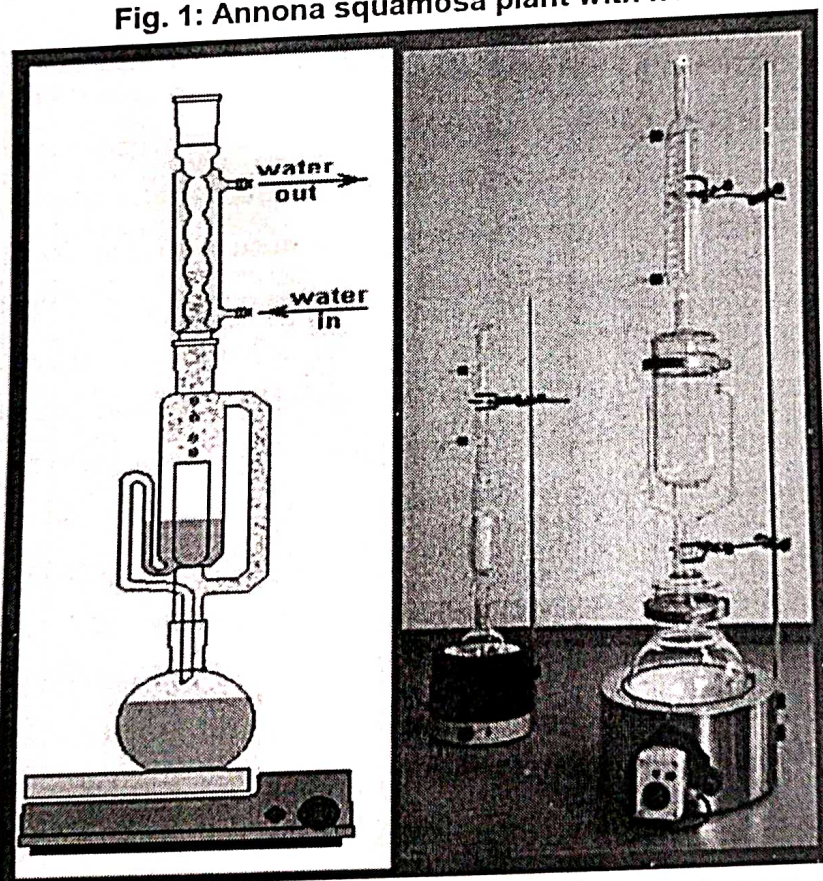


Fig.2. Experimental set-up for extraction of oil from custard apple seeds

Biopesticide is produced from custard apple seeds by using simple grinding and extraction methods. Soxhlet extraction is used when the desired compound has a limited solubility in a solvent, and the impurity is insoluble in that solvent. Custard apple seeds are collected from the ripened custard apples, freed from dirt by washing with water and then sun dried to remove moisture. Custard apple seeds are crushed and grounded to powder with the help of grinder to separate the kernel from the hulls. The kernels are grounded to powder with the help of mixer. Same experiment is repeated with leaves powder. Then this powder is mixed with hexane or methanol solvent to extract oil from seed kernels. During extraction solvent is used in the ratio of 15ml/g of seed kernels powder. Temperature was maintained about 65°C - 70°C during extraction with continuous stirring about 3-4 hours. After extraction, sample is filtered out to remove solid material as residue and filtrate contained the oil extracted with solvent. This filtered sample is proceeded to the simple distillation. After distillation, solvents distilled out while the oil extracted remains in distillation chamber.

E. Preparation and application of biopesticide:- The obtained extracts of oil and powdered leaf is tested for its pesticidal properties by standard methods. After testing the various properties of the oil, it is applied on white mealy bugs on the hibiscus plant surface. Before applying the oil on insects pests infested plant surface pre preparation of the blank solution is done. The blank solution is prepared by mixing 5 % of labolene soap with 95 % of water. To 100ml of blank solution 25ml of the custard apple seeds extracted oil is added and sprayed on the pest attacked hibiscus plant surface with a spray gun. The effect of the biopesticide is studied from Day 1 to Day 6 and the reduction of the insect pests is observed.

Results and Discussion -

After the extraction and separation of oil by simple distillation oil samples are analyzed for determination of percentage oil, density, acid value and colour appearance. The extracted oil obtained is tested for its pesticidal properties by Gas Chromatography (GC). Test result shows the presence of fatty acids series; palmitic acid, stearic acid, lauric acid in custard apple seeds oil. As concern of pesticide formulation for this product, we can prefer the liquid formulation because here the active ingredient is from oil has a liquid form.

Conclusion -

Recently attacks of white mealy bug on fruits as well as on horticultural crops are very high, which decreases the yield by 38 %. To maintain the crops yield pesticide should be used but not the synthetic pesticide. It should be replaced by bio-pesticide.

Following are the conclusions finished in the current studies.

1. Recovery of oil by using hexane solvent is 19% while using methanol as solvent is only 9%.
2. Presence of fatty acids in the oil lead to the reduction of insect pests on the affected area of the plant.
3. Biopesticide thus formed is eco-friendly.
4. This biopesticide does not diminish earthworms and maintain the soil fertility

References -

1. SIKDAR D.C. "BETTER YIELD WITH LESS SPRAY OF BIOPESTICIDE", AGRO-BIOS, VOL.3, PP.15-16, 2005.
2. SIKDAR D.C. "EXTRACTION OF ECO-FRIENDLY BIOPESTICIDE FROM CUSTARD APPLE SEEDS AND ITS EVALUATION ON PESTS", J. RESOURCE UTILIZATION AND INTELLIGENT SYSTEM, VOL. I, PP. 344348, 2006.
3. SIKDAR D.C. "BENEFIT FROM LESS PESTICIDES", SCIENCE & TECHNOLOGY, DECCAN HERALD, MONDAY, FEBRUARY 14, PP.3, 2005.
4. SIKDAR D.C. AND KARTHIGEYAN ET ALL, "ECOFRIENDLY BIOPESTICIDE" SCIENCE & TECHNOLOGY, INDIAN EXPRESS, THURSDAY, JUNE 26, PP.1, 2002.
5. Singh A., "Synthetic Pesticide" Fruit Physiology and Production, Vol.1, pp.340-361, 1980.
6. Weir R.G. and Creswell G.C., "Plant Nutrient Needs", Tropical Fruits and Nut Crops, Vol.1, pp.1-4, 1995.