



Plant Archives

Journal homepage: <http://www.plantarchives.org>
doi link : <https://doi.org/10.51470/PLANTARCHIVES.2021.v21.S1.329>

BIOINSECTICIDES FOR THE CONTROL OF MAJOR INSECT PEST ON VARIOUS CROPS : A REVIEW

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ABSTRACT

Numerous organic extracts display wide range of properties against insects, which are pests to various crops. The oils from these bio-extracts have long- lasting effects against insect vectors and act as insect repellents. Many reports demonstrate that chemical composition of organic extracts intervene in octpaminergic pathways of insect pests. Possessing the insecticidal properties, both *Cymbopogon* and *Mentha* species are bio-repellants and have an eco-friendly advantage over in-organic insect pest repellants.

Keywords: *Cymbopogon*, *Lemon grass*, *Mentha*, *Insecticide*, *Aphids*, *oil*.

Introduction

One of the problems posed to little scale farmers all over the world is that of insect pest damage to stored-grains and grain products which can be up to 20-30 % in the equatorial land (Nakatita, 1998).

Being chief category of chemicals prevailing in Mother Nature, bio-insecticides are risk free to humans and environment. They perceive less hazardous outcomes on crops and having entity of various biological mixtures; no immunity can be glimpsed in pests (insects) against them. Thus application of plant insecticides is a good plant protection with minimal number of risks (Pavela *et al.*, 2007).

Insecticides are primarily used in agriculture to safeguard crops from pests, diseases and to prevent homosapeins from vector borne diseases which includes D-fever, malaria (Nicolopoulous-stamati *et al.*, 2016). Considering bio-insecticides as insect repellants is an attempt to flourish alternatives for in-organic insect repellants. Use of organic insecticides is an old tradition in Europe and serves as an antagonistic factor for insect pests (Sukumar, 1991).

In present day world, increased tensity has overshadowed the menace of in-organic insecticides. Ample amount of negative health consequence can occur in humans by application of man-made insecticides on crops. It comprises of gastro-intestinal damage, neurological imbalance, respiratory diseases and vision problems (Sanborn *et al.*, 2007).

Largely, insect repellants including organic and in-organic block neural connecting pathways in insects and end by inevitable death of pests. Nevertheless an insecticide also indulges with fetal development, phospho-lipid anabolism

and blood catabolism (Freire *et al.*, 2015).

Insecticides such as pyrethrum functions in an analogous manner, but they get shattered in contiguity with sun-rays, which restrict its organic functionality. Man-made insecticides contain many adjuvants like cholinesterase, which cause immobility in pests and results in fast demise of the insect (Mnif *et al.*, 2011).

Owing the unique functions, insecticides choose and choke neural communicating pathways of the pest. The neural receptor among insects is termed as octopamine, which hydrolyses insect sense organs, without causing any harm to vertebrates, including homosapeins (Semchuk *et al.*, 1992).

Various plant species produce substances that protect them by killing the insects which consume them. Example, the oil secreted by Elm tree permutes the hormonal functioning of pests (bug) such that they shall not be able to eat, fly or move (Natural academy of science, 1992).

It is viable to make bio-insecticides from plants having insecticidal properties in order to safe-guard the crops. Organic insecticides possess many benefits over in-organic insecticides which incorporate low cost maintenance, eco-friendly, bio-degradable and easily accessible for developing countries (Mittal, 2005).

This review focuses on analyzing the insecticidal constituents of *Mentha* and *cymbopogon*, which are found across the globe, by concentrating on their chemical composition and the extracts from their leaves, stem, flowers and oils and their application as bio- insecticides on major insect pest.

Various methods have also been conducted either chemically or naturally to reduce Aphids population, with the aim to prevent spread of diseases caused by Aphides. However, it should be endeavored in Aphids control actions not to cause damage to humans and the environment by utilizing Aphids repellent plants, like lemongrass. The aim of the investigation is to determine the utilization of lemongrass extract as an insecticide. (Zulfikar *et al.*, 2019). Lemongrass leaves and stems are time and again used as a substitute for Malathion in fulfilling fogging activities. The extracts should be made within the sort of oil instead of liquid because they're easily soluble in diesel oil (Zulfikar *et al.*, 2019).

Aphids

Aphids are little sap/juice sucking insects and individuals from super family Aphidoidea. Basic name incorporates green-fly and black-fly, while some others within groups can differ usually in color. Aphids are the most dangerous insect pest on cultured plants in temperate regions. Despite declining the plant by sucking juice/sap, they go about as vectors for plant infections and distort fancy plants with stores of honeydew and the consequent development of molds. As a result of their capacity to quickly increment in numbers by agamic generation, they are exceptionally booming life forms from an environmental position.

Review of Literature

An outline of the works of perceived specialists and past analysts gives proof about what is known and what is obscure. Since fruitful review depends on past information, this review has been keenly studied and this progression assists with taking out the duplication of what has been done. 10 to 25 % of the world's collected nourishment is obliterated annually by insects and rodents. Insects cause harm to put away grains and prepared items by falling their dry weight and dietary benefit. (Aitken *et al.*, 1979 and Hill, 1990).

The flour scarab, *Tribolium confusum* and *T. Castaneum* are one of the most genuine nuisances of put away grains and prepared oat items around the world. Control of put away item insects populaces is principally needy upon proceeded with utilizations of insecticides. (Sinha and Watters, 1985).

Tribolium Castaneum (Coleoptera: Tenebrionidae) is an across the board and ruinous auxiliary irritation which assault put away grain items (Aitken, 1975; Weston and Rattlingourd, 2000). Lemongrass oil has been looked on as to have different applications like antimicrobial (Inonyea *et al.*, 2001 and Naik *et al.*, 2010), calming, astringent (Lertsatitthanakorn *et al.*, 2000), carminative (Carbajal *et al.*, 1989), insecticidal (Rabbani *et al.*, 2006), cancer prevention agent and antifungal (Onawunmi, 1989).

To assess the poisonous quality and viability of lemon grass leaves and menthol extracts against the red rust insect *Tribolium Castaneum* under research centre condition, lemon grass leaves powder has been taken into account, which including its concentrates shows insecticidal potential and has been utilized in insecticidal splashes. Understanding of the bio insecticidal potential would be monetarily feasible alternative to farmers (Ojianwuna and Umoru, 2010 and Asawalam and Igwe, 2012).

Lemon grass, *C. citratus*, is a tropical plant and exists in assorted structures and cultivars. In India, it is regularly

found in the southern and northern district, where it is utilized as flavour, pot herbs and as neighbourhood medication. Lemon grass has been utilized in customary Indian medication for quite a while to treat fever, ailment, cerebral pains, and flu and stomach torment (Geetha *et al.*, 2014; Naguib, 2002 and Reena Lawrence *et al.*, 2015).

Secondary mixes from plants including alkaloids, phenolics, terpenoids and flavonoids influences insects (aphids) by disturbing their primary metabolic pathways and causes fast demise (Bell, 1986; Houghton, 1996 and smet *et al.*, 1986).

Elhag, 2000; Inyang and Emosairue, 2005; Oparaeke and kuhiep 2006, and yankanchi and Gadache,(2010) independently considered the natural impacts of lemongrass powder and concentrates against pest insects. The herbal insecticidal potential was found in lemon grass leaves and this bio insecticide can be utilized as powders and concentrates to reduce infestation.

Musa A.R.*et al.*, (2014) has detailed the larvicidal and insecticidal impact of camel grass (*cymbopogon schoenanthus*) oil on *Anopheles* aphids. The impact of camel-grass oil on *anopheles* aphids and its hatchlings was tried by them to access its repellence property. They recorded the highest demise rate of aphids at certain time interim. Capacity of the oil extracted on grown up aphides and hatchlings showed them the quick death rate. The quick death rate in regard of both larvae and grown-ups of *anopheles* aphids demonstrated high insecticidal properties of the substances mixes present in the oil of the lemon grass.

The poisonous quality reactions of lemongrass powder and menthol extracted from mentha leaves in opposition to red-rust beetle has a viable potency in lessening quantity of *Tribolium Castaneum*. The menthol extricate is a good bio-material against this pest, due to its bio-insecticidal properties (Manonmani *et al.*, 2018).

Effects of Cymbopogon Citratus on Pest Insects

Utilization of in-organic insecticides on various crops to sway away insect pests causes insects to develop resistance and influences the atmosphere by being dangerous to animals and humans consuming the crops (PRADO, 2003). In the current era divergent attempts has been made globally to consider botanical insecticides for dominating insect pests. Bio-insecticide is a substitute to insect pest control in an eco-friendly manner; influencing only targeted breed, by affecting their immune system response(LIU *et al.*, 2000) and make them an epitome in pest management framework (Ismaw, 2006, Koul *et al.*, 2008).

Cymbopogon (lemon grass) possess a resistant character which repels pests. T oils play a vital role and act as metabolite with synergistic mixture of sesquiterpenoids and monoterpenoids. It is unhealthy to pest insects because of their odorous, lipophylic and volatile properties, by touching off their behavioural responses, bring about on spot disturbance of physiological pathways connected with neuro-endocrine system (Prates *et al.*, 2002 and Gracia *et al.*, 2004).

Apart from being accountable for myiasis in vertebrates, Diptera Muscoid is accountable for crop infestation, by acting as a carrier of pathogens like bacteria, viruses, protozoa cysts, fungi etc. *cymbopogon-citratus* leaves contain components like citracal and cineole, which

are strong repellents for house-flies and hence can have efficacious outcomes on other insects including Aphids. (Sinthusiri *et al.*).

Mentha as an Insecticide

Primary agricultural products like pulses, cereals are destroyed by insect pest in humid regions. Maize weevil, *Tribolium* species, *S. oryzae* set off most of the cereals and pulses to loss. In-organic insecticides provide temporary relief by fumigation, but with time and by atmospheric switches, insect (pests) developed resistance towards fumigation and effected crop quality, which proved harmful for humans as well. The oils obtained from leaves of *Mentha-Citrata* and *Mentha Spictata* which contains components like Linalyl acetate, Carvone, Menthol acts as an effective insect repellent by disrupting the metabolic rate of major insect pests and ensuring the fast demise of pests, without having a profound effect on human health as well (Chaudhary, 1997).

Different *Mentha* species including *Mentha hypocalyx* and its main constituents which are Methyl-acetate, menthol, limonene and menthone has high repellent properties against *Lasioderma Serricorne* (insect) which is one of the major pests to crops. These constituents of *Mentha Hypocalyx* acts on muscular functioning of the insect block their physiological functioning receptors and results in high mortality of pests. Likewise, these extracts can have an effect on other insects and act as an insecticidal repellent on other crop pests as well (Kedia *et al.*, 2014).

Commercially important *Mentha-pulegium*, a species of Genus *Mentha* is found in Turkey. Its ingredients which are extracted from its stems act as a strong repellent for Mushroom Scatopsid flies. Its ingredients comprise of borneol, menthone, cineole and pulegone possess strong insecticidal properties and can prove strong insecticidal repellent for other pests respectively (Gurkan and Fedai, 2013). The compiled analysis found that around the globe, the breed of Genus *Mentha* contain heterogeneity in chemical constituents which can act as good insect repellents on various crops. 8-cineole, beta caryophyllene, menthon, pulegone are utmost important oil constituents in various *Mentha* species and act as repellents by blocking neurotransmitters, primary and secondary metabolic pathways and show their potency against in-organic insecticides.



Fig-1: Aphid



Fig. 2: Lemon grass



Fig. 3: Mentha

Conclusion

Lot of reports are available which can control insect pest in an eco friendly manner. The viability level of lemon grass oil and Mint oil which can be extracted from their grasses respectively can be utilized in repulsing action and Death rate on Aphids (Insects). Both Mint and lemon oil removes displayed insecticidal properties, anyway Mint oil is more effective than lemon-grass oil as a bug spray.

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