Review on Some Plants as Bio - Pesticides

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Accepted 2017-06-15; Published 2017-07-12

Abstract:

The study used Onion (Allium Cepa), Garlic (Allium Sativum L.) and Sour Orange (Citrus Aurantium) to assess their effectiveness as bio-pesticides. The study also revealed that plants play vital roles towards the storage of many food stuffs. The consideration for the used extracts of plants origin is that they were easily biodegradable, effective on some pests and considered safer in pest control operations as they minimized pesticide residues and also ensured safety of the consumers of the treated grains and the environment. Which in turn, the production of organic extracts of plant origin for pest control were easier and less expensive than the synthesized some of the complex chemical formations.

Key words: Allium Cepa, Allium Sativum L, Citrus Aurantium and Bio - pesticides

Introduction:

Human environment and Agricultural crops are under constant assault by insect pests, making insecticides essential to reduce losses. Synthetic insecticides such as organophosphates are important, effective tools in modern crop management. However, they pose serious threats to the environment and to people. Humans come in contact with dangerous pesticides on food, in Water and in the air near farms. This "pesticide drift" occurs when pesticide dust and spray travel by wind to places unexposed to pesticides. Almost 98 percent of sprayed pesticides do not reach their targets. They penetrate to groundwater, pollute streams and harm wildlife, including natural predators of the targeted pests. Older pesticides such as DDT killed bald eagles,
birds, fish and even people (Rajandra and Srirarjini, 2008). However, a truly extraordinary variety of alternatives to the chemical control of insects is available. Some are already in use and have achieved brilliant success. While, others are in the stage of laboratory testing. But still some are little more than ideas in the minds of imaginative scientists, waiting for the opportunity to put them to the test. All have this in common: they are biological solutions, based on the understanding of the living organisms they seek to control and of the whole fabric of life to which these organisms belong. Specialists representing various areas of the vast field of biology are contributing—entomologists, pathologists, geneticists, physiologists, biochemists, ecologists—all pouring their knowledge and their creative inspirations into the formation of a new science of biotic controls (Rajandra and Srirarjini, 2008). The perception that pesticides are harmful to human health and the environment has led to the implementation of more restrictive legislation dealing with allowable chemicals and residue levels. Other problems associated with excessive use of pesticides are the development of resistant strains to tiabendazole (Timmer and Duncan, 1999); (Bus et al., 1991; Eckert et al., 1994; Timmer and Duncan, 1999) . Nevertheless, Cockroaches are insects of the order Blattariae blattodea, of which about 30 species out of 4500 total are associated with human habitations, about four species are well known as pests. Cockroaches are one of the oldest groups of insects, indicating how successful they have been in adapting to changes in their environments. One of the reasons for this success may be related to diet--they are scavengers and will eat anything organic. They prefer food sources such as starches, sweets, grease, and meat products, but other items may include cheese, beer, leather, glue, hair, and starch in book bindings, flakes.

Cockroaches are one of the most commonly noted pest insects due to their population. Cockroaches are also the hardest insects on the planet because they have a capability to stay alive for a month without food (Food and Agricultural Organization, 2008). The main objective of this study, is to assess the usage of the selected plants as bio-pesticides.

**Bio-pesticide:**

Exploring the potential to utilize the pesticidal properties of plants has become a key focus of research in pest control. Some plants are known to contain bioactive metabolites, which show antifeedant, repellent and toxic effects on a wide range of insect pests (Mondal and Khalequzzaman, 2010). Many plants can protect themselves against insects by producing their own chemical defenses that are toxic or repellent (Shadia, 2011). Subsequently, here are the examples of the important bioactive plants; catnip, basil, artemisia, borage, dahlia, ginger, hyssop, chrysanthemum, lime, black pepper, clove, neem and garlic, and a host of others. These plants are known to contain organic compounds which possess bio-pesticidal properties in their bioactive components. Pest control or repelling organic extracts of plant origin offer protection with minimal impacts on the ecosystem and repel the insect pests from the treated materials by stimulating receptors (such as the olfactory receptor) of the insect. Repellent when effective causes the target pest to make an oriented movement away from the source of stimulus, and in cases where escape is not possible, over stimulation of the receptors leads to death of the pest. Plant extracts in powder or essential oil form from different bioactive plants are known to be effective repellents against different economic storage pests of grains, even for stored cereals (Owusu, 2001). Cereals
such as wheat, maize and rice, together comprise at least 75% of the world grain production and they are among the world's most important staple foods (Food and Agricultural Organization, 2008). Moreover, Insects are always present in field crops during cultivation and in storage of the produce, and can have a huge economic lose in production. Control of storage pests of agricultural products largely depend on synthetic pesticides, which has been widely since inception in 1950s. Over time, many of these chemicals have become extremely pervasive in the environment, in some cases, in consumed food as a result of their widespread repeated use. In spite of their efficacy, their repeated use for several decades have disrupted biological control systems, which have led to outbreaks of resistant insect pests, undesired effects on non-target organisms and environmental and human concerns. There have been notable concerns on the persistent use of synthetic chemicals for pest control bearing direct adverse effects on humans, wildlife, aquatic life and the environment at large. Apart from the negative effects of synthetic insecticides, in most remote rural areas their availability is unreliable, and are frequently adulterated (diluted to ineffective concentrations by unscrupulous traders), outdated (owing to their toxicity to people and the environment), and ineffective owing to rapid evolution of pesticide resistance (Rauh et al., 2011; Muñoz-Quezada et al., 2013; & Mills and Shah, 2014).

**Garlic (Allium sativum L.):**

*Allium sativum* L. commonly known as garlic, is a species in the onion family *alliaceae*. Its close relatives include the onion, shallot, leek, and chive. Garlic has been used throughout recorded history for both culinary and medicinal purposes. It has a characteristic pungent, spicy flavor that mellows and sweetens considerably with cooking. Garlic is easy to grow and can be grown year-round in mild climates. In cold climates, cloves can be planted in the ground about six weeks before the soil freezes and harvested in late spring. Garlic plants are not attacked by pests. Garlic is claimed to help prevent heart disease (including atherosclerosis, high cholesterol, and high blood pressure) and cancer. Animal studies, and some early investigational studies in humans, have suggested possible cardiovascular benefits of garlic (Murtala et al., 2008).

**Brief History of Garlic in Nigeria (Allium Sativum L.):**

Garlic (*Allium Sativum L.*) is believed to have originated from central Asia and later spread to the Mediterranean and was later carried to the western world probably by the Spanish, French and Portuguese. The crop spread to Africa and Nigeria probably through the activities of English colonialists and Arab traders. It is observed to be growing in the Fadama areas of Sokoto, Kano, Borno, and some irrigation projects mainly under irrigation during dry season between November to March when the temperature is low (Murtala et al., 2008).

**Importance of Garlic (Allium Sativum L.):**

Garlic (*Allium sativum L.*) leaf extract has been successfully used to increase *Tylenchulus semipenetrans* mortality at high concentrations in laboratory conditions. Garlic has indirect effects on nematode populations because it disrupts their mobility, food absorption and reproduction (Fadzirayi et al., 2010). Garlic oil has been shown to offer significant protection against free living soil inhabiting nematodes. Garlic makes an excellent economical,
non-toxic pesticide for the garden. It has natural fungicidal and pesticidal properties that work effectively to control pests. For maximum efficacy in pest control, avoid using any chemical fertilizers. Fertilizers diminish the capacity of vital ingredients in garlic to fight pests. Aphids, ants, termites, white flies, beetles, borers, caterpillars, slugs and army worms are some of the pests that can be suitably controlled using garlic (Block, 2010).

**The Onion (Allium cepa):**

The Onion (Allium cepa), a monocotyledonous plant of genus Allium used as vegetable and spice. The name may be referred to as whole onion or the singleness as a bulb. The plant is interconnected to the lily botanically; chemically it is less piquant cousin of garlic in taste, but it is distinctive in its lachrymatory properties. It is occasionally used topically to treat insect stings, but personal knowledge suggests it lacks any significant anti-allergy properties. Consequently, it has mild anti-microbial qualities and has been used in injury treatment. A specific sulfenic acid, 1-propenesulfenic acid, formed when onions are cut, is rapidly rearranged by a second enzyme, called the lachrymatory thing synthase giving syn-propanethial S-oxide. The gas diffuses all the way through the air and, on contact with the eye; it stimulates sensory neurons creating a stinging, painful sensation conducted a research about the feasibility of onion to produce an insecticide from its trips. The New Zealand onion industry responded to the initial failure of insecticides by developing and implementing an insecticides resistance management strategy and research to improve onion trips control (Food and Agricultural Organization, 2008).

**Sour Orange (Citrus aurantium):**

Sour orange (Citrus aurantium), belong to the fruit tree family Rutaceae. The fruit of the Sour Orange is a small, round lime, a little bigger than the size of a thumbnail, about 30 mm (an inch) in diameter. Similar to other citrus fruits, the Sour Orange is high in vitamin C, and the juice can be an excellent vitamin basis. The lively ingredient D-limonene destroys the wax coating of the insects’ respiratory system. As soon as applied directly, the insect succocates. Sour Orange is a smooth and slightly spiny plant, growing to a height of 3 to 5 meters. Leaflets are elliptic to oblong-elliptic, 4 to 8 cm long. Petioles are narrowly and scarcely winged, about a cm long. Flowers are axillary, solitary, rarely in pairs, white, and short-stalked. Fruit is yellow when ripe, nearly spherical, 2 to 3.5 cm diameter, 6- to 7-celled, and thin-skinned. The skin or peel is green to yellowish green or yellow, loosely adhering to the flesh. The flesh contains a few light orange seeds. It also shows that Sour Orange juice can kill varroa mite. Varroa mites are external parasites of bees. The mites, which are about the size of a pinhead, use specialized mouthparts to attack developing bee larvae. The Varroa Mite is a parasitic mite that can cause serious trouble to beekeepers and their bees alike (Timmer and Duncan, 1999).

**Orange oil:**

Orange oil is vital oil produced by cells within the peel of an orange fruit. It is extracted or vapor distilled as a by-product of orange juice production, producing cold-pressed oil. It is composed of mostly (greater than 90%) d-limonene, and as a result frequently used in place of pure d-limonene, which can be additional extracted from the oil by distillation. Orange oil can be used in natural pest control Green pesticide, and can execute individual and colonies of ants and get rid of their “scent- pheromone trail” indicators to disrupt re-
infestation. Orange oil appears as a yellow-orange liquid that smells strongly of the orange fruit. It is almost completely made up of a substance called d-limonene and is classified as an essential oil. It is this chemical that gives the orange fruit its distinct smell and taste. It comprises almost 1% in volume of the total rind of an orange. Although its appearance and smell closely resembles to that of orange juice, it is non-edible and will cause digestive problems and extreme stomach aches if directly consumed due to its high concentration of the slightly toxic d-limonene. Consuming small amounts of it from substances like orange juice has been shown to produce no effect on human health (Timmer and Duncan, 1999).

References:


