THE POTENTIAL OF USING PLANT EXTRACTS AS AN ALTERNATIVE TO METHYL BROMIDE FOR CONTROL OF SOIL BORNE PESTS

By

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Introduction

A few decades ago, a farmer in Africa grew his crops in the field without pesticide usage. His modest harvest was also stored without storage pest control chemicals. The farmer used nature's in-built mechanism to protect his crops from the devastating effects of pests. The practice is still prevalent in the rural peasant farming in Africa albeit it faces the threat of being forsaken due to lack of support from the scientific community. Furthermore, with advent of chemical pesticides, coupled with crops specifically bred for the capacity to give high yields and other desirable agronomic characteristics, a few of the large scale African farmers have become dependent on pesticides to control pests and diseases which attack their crops.

This paper will highlight the potential of traditional use of plant extracts as alternative to methyl bromide to control soil-borne pests, and more specifically, Root-Knot nematodes.

1. Control of Root-Knot nematodes with *Tagetes* spp..

A case study recently undertaken by the author has clearly demonstrated that Root-Knot nematodes infesting rose plants, grown on commercial scale for export markets, could be controlled by use of an extract from a *Tagetes* spp. The extract does not only reduce the number and size of visible cysts on infested roots but the roots assume a normal and vigorous growth. The major difference between a Tagetes extract and a chemical pesticide like Furadan or Nemacur lies on the response of the nematode-infested roots to the treatment. Furadan and Nemacur may give a higher degree of control of Root-Knot nematodes than the plant extract. However, roots treated with Furadan and Nemacur appear hardened and their growth become retarded unlike roots treated with Tagetes extract which appear normal with enhanced growth after treatment. Tagetes extract appear to give a "tonic effect" to the growth of the roots, and to the plant in general.

Tagetes extract is also effective against soil-borne pests in general e.g. grubs and slugs.

2. Control of Root-Knot nematodes with Neem

Extensive work has been done and reported in India regarding the nematicidal properties of the neem tree (*Azadiricata indica*). The neem cake, which is obtained after the neem oil has been pressed out of the seed, is used to control a wide range of pests including Root-Knot nematodes. Recently, a technically improved method of extraction of the active principle has been patented in the U.S.A. indicating that there is an expected potential of global commercial use of neem as a pest control product.

3. Control of Root-Knot nematodes in tobacco seed-beds with Fishbean

Fishbean extract is known to have nematicidal activity against nematodes and a wide range of soil-borne insect pests. Research investigations have been on the drawing board in Malawi to verify and provide a scientific evidence of efficacy of Fishbean against Root-Knot nematodes in tobacco seed-beds.

4. Control of Root-Knot nematodes with Pot marigold *(Calendula officinalis)*

Pot marigold has been demonstrated in India to have nematicidal properties against Root-Knot nematodes on tomato. Since Pot marigold is easily grown, investigations on the possibility of applying the extract for control of other soil-borne pests would be a practical proposal.

5. Control of Root-Knot nematodes with natural plant extracts in conjunction with solarization.

In several countries like Israel, U.S.A., South Africa, Togo and Nigeria, soil solarization has been demonstrated to be an effective technology against soil-borne pests including Root-Knot nematodes. To enhance the efficacy of solarization, in conjunction with plant extracts, elaborate investigations are required to elucidate the synergetic action of this technology against Root-knot nematodes. Investigations may be broadened to cover other aspects of control of various soil-borne pests using this technology.

Basic reasons for discouraging excessive use of chemical pesticides for pest control in cases where alternatives effective natural plant extracts exist.

Adminitedly, chemical pesticides have revolutioned agricultural production in both developed and developing countries. However, dependence on chemical pesticides may be inappropriate for the following reasons.

1. Pesticides are expensive to use particularly in the developing countries.

2. Pesticides are hazardous to human health. The United Nations' World Health Organization (WHO) has estimated that there are about one million cases of poisoning by pesticides each year with 20,000 people dying from poisoning. The vast majority of poisoning and death from pesticides occur in the developing countries. There are about 700 pesticide related deaths in Kenya a year.

3. Pesticides pollute the environment including water supplies.

4. Pesticides kill beneficial insects along with the pests they are supposed to control.

5. Pesticide residues in sprayed crops may render the crop unsuitable to human and livestock use and may impede the crop from the export market.

6. Continued use of chemical pesticides leads to pests developing resistance to these chemicals.

In view of the above, there is a growing need to:

- create awareness amongst scientists of traditional and non-chemical (natural) methods available for pest control.

- make a comprehensive inventory of available traditional and non-chemical methods for pest control

- carry out, in collaboration with local farmers, demonstration projects and to develop technologies for management of traditional and non-chemical methods of pest control

- encourage the farming community to use non-chemical method and environmentally friendly pesticides for pest control.

- carry out research projects, in collaboration with local farmers, to evaluate the effectiveness of traditional and non-chemical methods, alone or in integrated Pest Management (IPM) strategy, for pesticides.

- enhance the responsibility of growers to use traditional and non-chemical methods in controlling pests as opposed to dependence on pesticides.

- stimulate the Government of sovereign states to regulate and adopt stringent environmentally safe approach to chemical pesticide usage in the country.

One of the possible approaches to achieve the above goals is for the developed countries with advanced technological know-how to collaborate with the developing countries on a win-win basis to delve into the potential of using natural plants extracts as pesticides, and specifically as alternatives to methyl bromide.

In Africa, and indeed in other developing countries, the large scale farmers who produce tobacco, cutflowers, strawberries, and coffee for export are dependent on methyl bromide largely because marketing of this pesticides is aggressive and is supported by scientific data. Most farmers are not aware of natural plant extracts that could be used to alleviate pest and disease incidences. This situation needs redress.