BOTANICAL PEST CONTROL IN CABBAGE: POTENTIAL OF NEEM PRODUCTS IN IPM PROGRAMS IN PAPUA NEW GUINEA.

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ABSTRACT

PNG grown neem seed kernel extracts (NSKE) gave excellent control for Diamondback Moth and associated pests in cabbage. Discussing the mode of action, selective properties of neem as well as environmental aspects, the need to move from a solely chemical control approach towards an integrated pest management program is highlighted in this paper. A current constraint for the broad implementation of results in PNG is the availability and admittance for NSKE as well as commercial neem formulations.

INTRODUCTION

The idea to use neem tree (*Azadirachta indica* A. Juss.) for pest control originated from Asia. Centuries before the commercial synthetic insecticides were available, Indian farmers used neem leaves to protect their products from insect attacks. In PNG the N. C. D. Commission planted many trees in Port Moresby to beautify the city (Figure 1). Other neem trees were planted in the Markham valley by private people. Viewed mostly just as an ornamental, neem should also be recognized as a portential source for natural insecticides in PNG.

This article provides brief information about insecticidal properties of neem, particularly in the context of pest control in cabbage. Insect pests, especially leaf defoliating larvae of the Diamondback Moth (DBM) are a major constraint in the production of brassicas. Due to indiscriminate use of chemical insecticides DBM has rapidly built up resistance against commonly used chemicals. Utilization of neem would help to aleviate problems usually associated with the use of chemicals, such as insecticide resistance, chemical residues on food crops and enviromental hazards. It should be mentioned that an analysis of Boroko collected Neem seed kernel samples in Germany revealed a very high content of the active ingredient.

NEEM AS AN ELEMENT OF INTEGRATED PEST MANAGEMENT (IPM)

In comparison to most sythetic broad spectrum insecticides, neem products offer desirable features. Inspite of strong effects against a wide range of insect pests, neem products are widely selective because of limited side-effects on the natural enemies of pests. Furthermore, they are rapidly degradable and are not harmful for the enviroment or human health. Consequently neem offers crucial requirements for IPM Strategies controlling all important pests in cabbage.

An IPM program with neem could include commercial *Bacillus thuringiensis* formulations, biological control agents, such as the parasitoid *Diadegma semiclausum* to control the core pest DBM, and if not avoidable synthetic chemical insecticides with selective properties. Particularly neem in alternation with *Bacillus thuringiensis*-products would help to overcome chemical residues on the produce and bear a high potential in resistance management (Disthaporn 1992).

MODE OF ACTION OF NEEM COMPONENTS

Neem contains several active principles. Three major effects can be distinguished:

1) **Insect repellency:** Insect arrival decreases significantly on neem sprayed leaf surfaces. Consequently the number of deposited eggs is reduced.

2) **Antifeedant properties:** caterpillars reduce or stop feeding after ingesting small amounts of the spray deposit.

3) **Insecticidal properties:**

   Growth inhibition :

   growth and development of neem affected larvae is disturbed, leading to stoppage of feeding, molting disturbances and finally death after a few days.

   Fitness and fecundity reduction:

   Larvae exposed to sublethal doses die within the process of pupation or develop to malformed adults with a reduced activity and fecundity.

PREPARATION OF NEEM EXTRACT AND COMMERCIAL NEEM CONCENTRATES

The neem seed kernels have the highest content of active neem principles. Collected neem fruits are depulped and dried for further storage. After removing the shell 150 g kernels are ground with a coffee blender in the morning of the spraying day and suspended in a bucket with 5 litres of water. After 6 hours of extraction and repeated stirring, the suspension is filtered (for e.g. through a cotton sock). The volume of 5 l aqueous neem seed kernel extract (NSKE) is sufficient to treat ca. 100-200 cabbage plants.

In view of the relatively labourious NSKE preparation and the high amounts needed (at least 240kg / ha for several treatments during a vagetation period) utilisation of commercial shelfstable neem extract concentrates appear to be more practicable for this particular crop. Although quite expensive, usage by growers in and around Port Moresby would still be economic, due to the high prices cabbages fetch (K2 per head and up)

FIELD TRIALS AT LALOKI A. R.S.

Trials are currently conducted on neem products and other promising selective insecticides to evaluate their efficacy to control insect pests in cabbage. The following treaments, applied on a weekly basis were given to

English head cabbage:

- Local neem seed kernel extract, (15 g/ l) (NSKE)

- *Bacillus thuringiensis* (Delfin, Sandoz) (1.1 g/ l) (DEL)

- Chemical insecticide Atabron (ICI) (1.5 ml/l) (ATA)

- Unsprayed control (-) (CO)

It was obvious that NSKE achieved exellent yield and a superior 'cosmetic' standard, even better than the synthetic insecticide, Atabron (Fig. 2.)

OUTLOOK

At this stage the majority of trees in Port Moresby are apparently too young to bear fruits, Implementation on a large scale in PNG is therefore restricted, although larger amounts of local neem material can be expected to be available within the next few years. Growing best in a tropical climate with a dry season at low and mid altitudes, cultivation could be intensified in suitable areas, such as the National Capital District , coastal areas of the Central Province and in the Markham valley, Morobe Province. As it is known that DBM can develop resistance to sythetic insecticides very fast, neem would offer a great portential as a valuable biological control option besides *Bacillus thuringiensis*, currently the only available bioinsecticide. In view of the good results NSKE and commercial neem formulations achieved at Laloki A.R.S., an admittance for the PNG market would be desirable .

FURTHER READING

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Figure 1. **Neem trees at Taurama traffic lights, Port Moresby.**

Figure 2. **Qualitative results of three selective insecticides in head cabbage.**

(a) **Botanical insecticide: Neem seed kernel extract (NSKE)**

(b) **Microbial insecticide, *Bacillus thuringiensis* (DEL)**

Figure 2. **Qualitative results of three selective insecticides in head cabbage (continued..).**

(c) **Synthetic chemical insecticide, Atabron (ATA)**

(d) **unsprayed control (CO) - Laloki Agricutlural Research Station, September 1993.**