

Discussion

G. S. LIM: You have previously identified 82 plant species toxic to insects. You now have six more. Are there plant species among the 82 already identified which are promising enough to justify more intensive research so that practical use could be made of these species. What is the point in identifying additional species?

B. MORALLO-REJESUS: The 82 plant species listed in the table were gathered from the literature, reports of farmers, and surveys of rural folk. Most of these claims are not substantiated by entomological assay. My purpose is to verify if indeed the plant materials are toxic to the reported insect species and to determine their toxicity to other major insect pests. After the basic toxicity studies, we are going to evaluate the possibility of using them in the field.

C. J. W. MAA: Your data show that all plant oils are volatile, so is malathion. Did you check how much active ingredient was still left in these extracts after such a long exposure — 24, 48, and 72 hours.

B. MORALLO-REJESUS: No, I did not study this.

A. SIVAPRAGASM: Have you tried using whole botanical - insecticidal plants together with cabbage to elucidate the repellent effect on DBM as opposed to using extracts from such plants?

B. MORALLO-REJESUS: No, I might do that experiment.

A. SIVAPRAGASM: In some of your slides you mentioned that 'the number of larvae visiting cabbage'. Can you explain what you mean by 'visiting'?

B. MORALLO-REJESUS: To determine the repellent effect, the number of larvae that went on to or 'visited' the treated leaves and left the leaves without feeding was noted.

M. SAKAI: What is the concentration of essential oil in raw plant material?

B. MORALLO-REJESUS: The essential oil recovered varied with the plant species and parts. For example, in *Lantana* the recovery from the flowers and leaves ranges from 0.10 to 0.30 ml and 0.10 to 0.15 ml/100 g dried material, respectively. The recovery from *Caesalpinia* flowers ranges from 0.20 to 0.50 ml and from the leaves it ranges from 0.10 to 0.20 ml per 100 g dried material.

M. P. FERINO: How much active ingredient could be extracted from one kilogram of plant material such as leaves or roots?

B. MORALLO-REJESUS: The active ingredients of the plants mentioned to be insecticidal are not isolated yet except for *Tagetes erecta*. The percent recovery from the roots of *T. erecta* was 0.04% for 5(3-buten-1-ynyl)2,2 bithienyl and 0.02% for alpha-terthienyl.

R. F. HOU: Can teflubenzuron be used safely in combination with microbial control agents, especially fungal insecticides?

C. P. DALEBOUT: Yes, the teflubenzuron and microbial insecticides are compatible.

P. WEBER: You mentioned that CME 134 has contact action against *Spodoptera littoralis*. Could similar action also be observed with DBM?

P. BECKER: A distinct contact activity of CME 134 has not been observed with DBM. If there is any such activity with DBM we expect it to be of negligible importance under field conditions.

C. N. SUN: In 1982 biochemists were unable to confirm the inhibition of chitin synthetase *in vitro* by diflubenzuron. Therefore, there might be other mechanisms for IGR's mode of action. Any comment?

P. BECKER: The effects that can be seen in the test insects after treatment with benzoyl urea compounds strongly support the hypothesis that insect growth regulators interfere with chitin synthesis indicating that chitin inhibition might be the major mode of action of IGR, although chitin synthetase was not inhibited in *in vitro* experiments by diflubenzuron.

K. SCHLUTER: Did you ever observe high efficacy of CME 134 against any insect species within 24 h after application which could indicate a second mode of action besides the chitin synthesis inhibition?

P. BECKER: Some results are available indicating that even one day after treatment high mortality rates can be obtained with CME 134 in field trials but since normally full activity is only visible about seven days after treatment we do not suspect any other major modes of action besides chitin synthesis inhibition and those activities reported in the paper. In such cases with rapid initial kill rates, weather conditions might have influenced metabolism and thus molting sequence.

D. S. LEWIEWICZ: What is the efficacy of CME 134 against sucking pests such as aphids?

SAGENMUELLER: It is not effective against sucking pests.

J. L. LIM: You stated that there is no residue of Hoe 522 on cabbage in your experiment. How long is the period between sampling and residue analysis?

A. SAGENMUELLER: My statement was referring to a trial in the Philippines on cabbage. The last application of Hoe 522 was made on 3 May, the sample was taken on 13 May, and the analysis was made on 8 June 1984.

J. HOFFMANN: Thailand is the first country in southeast Asia to introduce insect growth regulators (IGR) which may be used in IPM. Is there any chance to forcing farmers in heavily DBM infested areas to apply IGRs in conjunction with IPM?

VATTANATANGUM: No, but Thai authorities are trying to educate farmers by demonstration trials and by allowing them to choose their own method of pest control.

P. A. C. OOI: I observed that the economic threshold used in the trial was 0.01 larvae/plant. Could you please elaborate as to how this level was achieved?

M. IMAN: The economic threshold used in the trial was 0.1 larvae/plant, not 0.01 larva/plant. To achieve this level, we took 10 sampled plants/plot at random. If we found one larva or more within these sampled plants, then we had to apply the insecticidal treatment. At the most susceptible growth stage, one larva/plant will cause serious damage, the head will not develop, or head formation will be delayed for at least two to three weeks.