

FIELD DETECTION OF RESISTANCE IN BEETLE PESTS TO CONTACT INSECTICIDES

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INTRODUCTION - THE NEED FOR RESISTANCE TEST PROGRAMMES

Few contact insecticides are cleared for use in food storage practice. The increasing cost to chemical manufacturers of obtaining clearance suggests that new insecticides are unlikely to become readily available. Continued effectiveness of insecticides in present use is therefore highly desirable, and this might be aided by the gathering of data on the resistance status of major grain pests. Early detection of resistance might permit action to prolong the effective life of an insecticide. Additionally, demonstration of the absence of resistance may provide insecticide users with confidence regarding the continued local efficacy of particular chemicals

ADAPTATION OF THE STANDARD FAO TEST FOR FIELD USE

A standard laboratory-based technique recognised by FAO for the detection of insecticide resistance in stored product beetle pests has been available for many years but little used, particularly in developing countries. A major constraining factor has been the problem of preparing accurate standardised insecticide solutions for application to filter papers on which test insects are exposed.

An investigational programme at the Natural Resources Institute (NRI), has demonstrated that the problems associated with local preparation of insecticide solutions and treatment of filter papers in some countries, may be overcome by supplying papers pre-treated with the discriminating doses of insecticide. The detection of resistance to insecticides using such papers is then a much simpler procedure. Treated papers sealed in foil/plastic wrappers have been found to remain effective for six months when refrigerated. Discriminating doses of some insecticides in current use have been determined and have been used to treat papers included in resistance test kits. A list of these doses is given in the table below. A programme to determine discriminating dose values for other insecticides is continuing at NRI.

Suggested discriminating doses for some insecticides

Insecticide	Insect species	Discriminating Dose %
fenitrothion	Tribolium castaneum	0.5
	Sitophilus oryzae/ zeamais	0.8
pirimiphos methyl	Tribolium castaneum	0.7
	Sitophilus oryzae/ zeamais	2.0

DEVELOPMENT AND FIELD ASSESSMENT OF A RESISTANCE TEST KIT

Components of the test kit

The test kit is designed to permit detection of resistance without the need for laboratory facilities, but adopting much of the original FAO methodology.

Components of the test kit include:

Foil/plastic packs containing:

- 1) filter papers treated with discriminating doses of insecticide
- 2) filter papers treated with solvents only for control use

Plastic rings and ventilated covers for containing insects on filter papers

Small brush or forceps for transferring insects.

Instructions for using the kit.

Pre-treated filter papers which enable the detection of resistance without laboratory facilities form the basis of the field test kit. The papers, together with non-breakable plastic rings (in place of the glass variety usually employed in laboratory test programmes), offer the potential for self-contained kits to be mailed to users. Plastic rings which may adsorb insecticide, have been found to be re-useable, provided they are well washed and scrubbed with detergent followed by overnight soaking in water.

Trials carried out in Africa and in SE Asia using the test kit, assessed the practical aspects of resistance detection, and the likelihood that the kit might encourage test programmes in situations previously constrained by problems of accurate treatment of papers with insecticide. The trials indicated that the test kit was easy to use after minimal training, and would be likely to encourage development of resistance screening programmes. Establishing in one instance in SE ASia that resistance was not the cause of incomplete insect control, ably demonstrated the usefulness and versatility of the test kit under practical field conditions.

COLLABORATION BETWEEN THE NATURAL RESOURCES INSTITUTE AND GIFAP

The chemical manufacturers' association GIFAP has expressed concern regarding problems of insect resistance to chemicals through the formation of various Insecticide Resistance Action Committees (IRAC). The IRAC Stored Products Group has collaborated with NRI in the later stages of development of the resistance test kit, and has provided support and advice. Financial support from IRAC has also been forthcoming through the supply of one thousand plastic rings for inclusion in test kits. Future collaboration between NRI and IRAC is proposed in the development of a two-year programme to encourage wider testing for insect resistance in stored product pests, particularly in developing countries in Africa and Asia.

REFERENCE

ANON, (1974) Recommended methods for the detection and measurement of resistance of agricultural pests to pesticides. Tentative method for adults of some beetle pests of stored cereals with lindane and malathion. FAO method NO. 15, Plant Protection Bulletin, FAO 22 127-137.

**DETECTION AU CHAMP DE LA RESISTANCE DES COLEOPTERES RAVAGEURS
AUX INSECTICIDES DE CONTACT**

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RESUME

Le "Overseas Development Natural Resources Institute" (l'Institut pour le Développement Outre-mer des Ressources Naturelles) a récemment adopté les normes de la FAO concernant la méthode de détection de la résistance des ravageurs rendant la mesure possible sans passer par le laboratoire. Dans le passé, peu d'études sur la résistance avaient été entreprises, dans les pays en voie de développement, en raison notamment, des difficultés associées au traitement insecticide des feuilles de papier filtre. Les filtres traités et scellés dans des emballages en matière plastique demeurent efficaces pendant 6 mois, conservés à basse température, permettant ainsi la fourniture à l'utilisateur potentiel de papiers tous préparés.

Des doses discriminantes d'insecticide ont été mesurées pour les substances utilisées en usage courant et des anneaux en matière plastique ont remplacé efficacement le verre. A l'aide de ces composants, il est maintenant possible de fournir un kit servant à la détection sur le terrain de la résistance des insectes aux insecticides de contact. Un intérêt pour cette méthode a été exprimé par le GIFAP, par l'entremise de l'"Insecticide Resistance Action Committee", l'IRAC, (Comité d'Action contre la Résistance aux Insecticides). Une collaboration entre le Sous-comité des Denrées Stockées de l'IRAK et l'ODNRI a abouti à la formalisation d'une méthode de terrain et à la conception d'un kit. Il faut espérer que les possibilités de mesures de la résistance offertes par ce kit encourageront le développement de programmes de mesures plus vastes, particulièrement dans les pays en voie de développement.