

ECOLOGICAL MONITORING METHODS

FOR THE ASSESSMENT OF PESTICIDE
IMPACT IN THE TROPICS

Edited by

Ian F. Grant and Colin C. D. Tingle

DFID Department for
International
Development



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METHOD SHEETS

Pesticide application: mastering and monitoring

Measuring droplets and deriving VMD and NMD

Measuring swath width of ULV sprayers

Collection technique for measuring sprayer flow rate

The loss technique for flow rate measurement

Calibration of ULV sprayers

Calibration of high-volume sprayers

Making magnesium oxide-coated slides

Use of fibre drift samplers

Use of rotary magnesium oxide sampler

Environmental parameters

Meteorological methods; temperature; humidity; rainfall; wind speed

Physico-chemical measurements in water

Turbidity

Measurement of current

Classification of aquatic substrates

Vegetative cover and shade

Soil texture

Soil moisture, water-holding capacity, soil pH

Sampling for pesticide residue analysis

Sampling soil for residues

Sampling water for residues

Sampling sediment for residues

Sampling terrestrial vegetation for residues

Sampling aquatic vegetation for residues

Sampling fish for residues

Sampling birds and small mammals for residues

Sampling amphibians and reptiles for residues

Sampling invertebrates for residues

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Soil nitrification

Soil respiration (long-term *in situ*)

Soil respiration (semi-continuous)

Earthworm activity estimation

Earthworm population estimation

Soil algal cover

Litter bags (microbial decomposition)

Terrestrial invertebrates

Sweep netting

Pitfall trapping

Food baiting for ants

Baiting for termites

Malaise trapping

Water traps

Butterfly transects

Trunk trapping

Funnel or sheet traps

Soil cores

Litter bags for soil fauna

Flotation for extraction of invertebrates from soil cores

Tulgren funnels for extraction of invertebrates from soil cores

Termite colony health assesment

Aquatic invertebrates

Heel sampling

Artificial substrates

Sweep net (aquatic)

Cylinder or box sampling
Drift sampling
Plankton sampling
Emergence traps
Grab sampling

Fish

Sampling catch from local fisherfolk
Seining
Gill netting
Trapping (e.g. box traps)
Spearing
Hooking
Physico-chemical measurements
Lengths and weights
Gonad condition
Fecundity analysis
Analysis of stomach contents
Collection of scales, otoliths and bones for ageing
Preservation of fish for reference and identification

Amphibians and reptiles

Visual encounter surveying (amphibians and reptiles)
Quadrat and transect block microhabitat sampling (amphibians and certain reptiles)
Patch sampling (amphibians and fossorial reptiles)
Complete species inventorying (amphibians and reptiles)
Breeding site surveying (amphibians)
Quantitative sampling of amphibian larvae (and aquatic reptiles) – pond seining
Quantitative sampling of amphibian larvae (and aquatic reptiles) – dipnetting
Quantitative sampling of amphibian larvae (and aquatic reptiles) – trapping

Birds

General reminder
Bird shapes
Timed point counts
Transect counts
Territory mapping
Nest density
Feeding behaviour and diet assessment

Small mammals and bats

Line trapping
Grid trapping
Bat survey

PREFACE

The tenth anniversary of the United Nations Conference on Environment and Development (UNCED) has just passed. Agenda 21, which sets out comprehensive strategies and programmes to counter environmental degradation and promote sustainable development, was adopted as a legal document by the Conference on 13 June 1992. Strategies for agriculture and health advocate the use of target-specific and readily degradable pesticides or the use of biological control agents as an alternative to the use of toxic pesticides. The vast majority of countries around the world are signatories to this agreement and thus committed to developing policies that minimize adverse pesticide impacts. Legislation governing pesticide use and mandatory environmental assessment is well established in most countries, although implementation is often an uphill struggle in the face of food shortages and disease outbreaks.

Agenda 21 also calls for appropriate environmental impact assessment (EIA) of projects likely to have a significant impact on the environment and it stresses the need for national capacity in toxicity testing, exposure analysis and risk assessment, all of which require considerable investment in resources and training. We hope that this handbook will help developing countries to develop their capacity in ecotoxicological monitoring and enable them to meet their commitments under Agenda 21.

It will also be of value to students undertaking higher education courses in natural resource management, applied ecology, ecotoxicology and other related disciplines.

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One of our contributing authors, Mike Lambert died on 18 July 2004 aged 62 after a two year fight against plasmacytoma. Mike was a widely travelled and experienced herpetologist who championed the user of 'herps' as indicators of environmental health. His contribution to this publication will be one of many legacies to environmental field workers in many parts of the world."

Many people were involved indirectly through assistance provided at project level, including staff from government ministries, departments, universities and aid agencies. To them, who number in excess of one hundred, this is a collective thank you.