

Guidelines on organization and operation of  
TRAINING SCHEMES AND CERTIFICATION  
PROCEDURES FOR OPERATORS  
OF PESTICIDE APPLICATION EQUIPMENT



# Contents

<b>1. INTRODUCTION</b>	<b>1</b>
<b>2. POLICY</b>	<b>2</b>
<b>3. RESPONSIBILITIES</b>	<b>2</b>
<b>4. TRAINING AND CERTIFICATION SCHEMES</b>	<b>3</b>
<b>5. PROFICIENCY TESTING AND CERTIFICATION</b>	<b>5</b>
<b>5.1 Organization of proficiency testing schemes</b>	<b>5</b>
<b>5.2 Scheme requirements</b>	<b>5</b>
<b>5.3 Certificates of competence and control</b>	<b>7</b>
<b>5.4 Approach to proficiency testing</b>	<b>9</b>
<b>6. TRAINING</b>	<b>10</b>
<b>6.1 Roles and responsibilities</b>	<b>10</b>
<b>6.2 Training standards</b>	<b>11</b>
<b>7. FINANCING</b>	<b>12</b>
<b>8. INTRODUCING AND SUSTAINING     A PROFICIENCY TESTING SCHEME</b>	<b>12</b>
<b>9. QUALITY ASSURANCE</b>	<b>13</b>

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## BACKGROUND

Since 1995 FAO-AGSE has worked to improve the safety and efficiency of pesticides through the publication of guidelines to assist member states to control the quality of the most commonly used types of application equipment. The first versions of the FAO guidelines on pesticide application equipment were approved for publication in May 1997 by; the FAO Panel of Experts on Pesticide Specifications, Registration Requirements, Application Standards and Prior Informed Consent; and the FAO Panel of Experts on Agricultural Engineering.

In 2001 a new, revised and expanded series of equipment-related guidelines was produced by FAO AGSE to improve pesticide safety, which includes this publication. The guidelines in this document consider the training, testing and certification of those who actually operate pesticide application equipment. Even the most well-designed and maintained applicators can do immeasurable damage in the hands of an unskilled operator and the importance of this guideline should not be under-estimated.

The series consists of the following other guidelines:

*Guidelines on minimum requirements for agricultural pesticide application equipment;*

An important objective of the guidelines on minimum requirements is to assist FAO and other agencies to ensure that applicators purchased are safe to users and to the environment as well as being efficient and durable in operation. Even the cheapest models should meet minimum standards of safety and durability.

They take into account applicators that are already on the market, many of which already meet the requirements. The prime objective therefore is that countries should adopt these guidelines immediately, to begin to eliminate substandard and unsafe sprayers from national markets and ultimately from the international scene.

*Guidelines on standards for agricultural pesticide sprayers and related test procedures;*

These guidelines are more demanding than the minimum requirements and provide more precise safety targets for spray equipment. They consist of detailed specifications and requirements, supported by test procedures to measure compliance with the proposed standards. The guidelines cover the major types of portable (operator-carried) and vehicle-mounted or trailed agricultural pesticide sprayers manufactured in or supplied to FAO member countries.

*Guidelines on procedures for the registration, certification and testing of new pesticide application equipment;*

These guidelines outline how governments can influence pesticide safety by controlling the quality of the pesticide application equipment manufactured in or imported into the country. By either incorporating into national legislation a requirement for manufacturers and importers to declare that application equipment meets standard of safety and durability or to be able to check compliance, it should be possible to gradually reduce and aspire to eliminate sub-standard equipment from the market.

*Guidelines for the organization of schemes for testing and certification of spray equipment in use;*

A further very important way of improving the safety and efficiency of pesticides is to influence the condition and efficiency of application equipment currently being used to apply pesticides on farms. These guidelines draw on international experience to present the requirements and to discuss the options and the considerations for a country that wishes to introduce this type of scheme.

All the above guidelines cover aspects of equipment design, construction and maintenance and the aim of both the minimum requirements and the standards guidelines is to provide manufacturers and governments with a practical and consistent quality assurance system. Each member country can then decide on the form and speed of introduction of the respective guidelines into national practice and into legislation where appropriate.

A further two guidelines in the series cover application of pesticides using aircraft and field crop sprayers and tree and bush crop sprayers:

*Guidelines on good practice for aerial application of pesticides;*

*Guidelines on good practice for ground application of pesticides.*

These guidelines have been prepared to offer practical help and guidance to all those involved in using pesticides for food and fibre production or in public health programmes. They cover the main terrestrial and aerial spray application techniques.

## 1. INTRODUCTION

These guidelines do not aim to provide detailed procedures for training, assessment and certification schemes. The aim is to provide a general framework, which outlines the need for training and the assessment and confirmation of operator competence to improve the safety and efficiency of pesticides in farm use.

Pesticide application equipment is unique amongst farm equipment in that it is used to apply products, which are often toxic chemicals, in order to protect crops, and sometimes animals, from the effects of pests, diseases and weeds. It is essential that those who apply pesticides should be familiar, not only with the equipment they use, but also with the general principles of crop protection, integrated pest management (IPM) and with the products they apply.

The application of pesticides is often not considered in any detail in university and college curricula, especially in developing countries. Because application equipment involves chemicals and issues of toxicity and environment, the topic is frequently omitted from agricultural engineering courses. This in turn means that extension agents are weak in this area reinforcing the need for effective, practical training for those who apply pesticides.

This does not mean that those who are responsible within an organization for the sale, purchase and use of pesticides should not be trained and certificated as competent to play their part in controlling pesticides. This area responsibility is considered later in the document and these guidelines deal primarily with those people who actually handle and apply pesticides within agricultural production systems.

## 2. POLICY

There are numerous schemes and programmes in both the public and private sectors to train pesticide operators in the use, handling and application of pesticides. Many of these provide certificates of competence to those who meet the requirements of the scheme. However, especially in developing countries and countries with economies in transition, it is common for organisers to issue certificates to those who participated in courses, irrespective of their level of competence.

While many schemes have considerable local value, with this *ad hoc* approach, there is little control over the standards of proficiency achieved or over the granting of certificates. This is clearly unsatisfactory and it is preferable therefore that schemes should be mandatory, should have official status in law and should cover the required range of types of equipment.

Many existing government schemes, which deal with occupational standards, cover a number of other activities as well as pesticide application. They may include agricultural and forestry equipment or be run by an organization, which covers a range of other industrial equipment or processes. The application of pesticides however, fits best within an agency that deals with agriculture and other similar activities such as public health spraying and amenity and industrial pest control.

## 3. RESPONSIBILITIES

The authority, which has overall control over pesticides, should be inter-ministerial or at least interdisciplinary in character, as issues of health and safety, food and environmental protection, agricultural production and economic affairs will be involved. In order to help to meet this obligation, a designated board or agency is normally required to control pesticide hazard programmes and schemes.



In some countries, plant protection and consumer protection law does not embrace issues of pesticide application and this is a clear requirement. Whatever the situation, in all countries there is a need for a regulatory authority with statutory powers to control the use of, and exposure to, pesticides and this should include the assessment and certification of workers who operate application equipment.

In order to achieve this objective, the regulatory authority should appoint an official agency or board to undertake the organisation and administration of their pesticide application proficiency (certification) scheme.

Training authorities or officially appointed organisations who devise curricula and deliver training have an important part to play, and often have statutory rights to appoint/accredit trainers and training organisations and to maintain a professional register for them.

In most countries training is provided by a range of organisations, therefore if uniform standards are to be maintained at national or regional levels, then it is the proficiency testing and certifying body that ultimately will determine the nature of the scheme. Their decisions in defining the assessment process will indirectly shape the training course content, the criteria for compliance and the standards required, albeit in close consultation with the regulatory authority, training establishments and other interested parties.

#### **4. TRAINING AND CERTIFICATION SCHEMES**

Training and certification schemes for application equipment operators should provide quality-assured, harmonised programmes backed by legislation. Their common objective is to ensure that operators meet the standards set by the certification authority, (drawn up in consultation with the regulatory authority and the industry).

In many cases, training and proficiency certification schemes are separate but highly inter-dependent programmes. There may be a case for these two functions to be performed by one agency, however, the independent nature and integrity of the proficiency testing and the granting of a certificate must be closely safeguarded.

There are examples of effective schemes in countries run by organisations other than government. These include:

- hospitals;
- regional administrations;
- plantation companies;
- farmer cooperatives;
- agrochemical and applicator manufacturers;

Many of these schemes make a considerable contribution, however, rarely do they cover the complete range of equipment needed in a country or area and certification of competence comes as something of an afterthought following on from training.

However, there is no reason why schemes on any scale cannot be operated effectively by independent local organizations in that the requirements for quality, consistency, objectivity and control remain the same, irrespective of scale. However, the impact of smaller-scale initiatives is likely to be limited compared to state, national, or regional government-backed schemes, which can benefit from economies of scale and wide uniformity. Given that any well founded scheme can be readily expanded and transferred from one area, country or region to another, the more uniformity and agreement there is across schemes, the greater is the potential benefit.

## 5. PROFICIENCY TESTING AND CERTIFICATION

### 5.1 Organization of proficiency testing schemes

The requirement is for the scheme to be run by a professional, government-appointed authority. The body designated to run a scheme is required to perform the following principal functions:

- design the scheme (with wide consultation);
- administer the scheme (to include publicity, documentation, certificates, databases);
- set standards for assessing proficiency;
- maintain the complexity of the tests and the training required at a realistic level;
- accredit master trainers to train assessors;
- maintain a register of accredited assessors;
- maintain regular interchange with training standards agencies and training providers;
- maintain quality and objectivity;
- monitor the performance and impact of the scheme;
- maintain the relevance of the scheme by constant update and revision;
- maintain an electronic database of candidates, certificates, and assessors, to help monitor and run the scheme;
- provide an internal quality assurance unit, which is periodically audited by an outside professional body.
- collect fees and financial administration.

### 5.2 Scheme requirements

A fundamental element of any scheme is that the candidates must be competent in their general knowledge of pesticides, crop protection and hazards, **before** they are eligible to be assessed for competence in the operation of a pesticide applicator.

Testing for competence with any equipment is preceded by an assessment of the candidate's general awareness of and competence with pesticides. Typical requirements in a general (basic) module should include:

- legislation
- crop protection principles
- environmental protection
- good crop protection practice and integrated pest management
- basic pesticide product knowledge
- understanding hazards and risks
- safe practices and emergency procedures
- health care
- record keeping

Once the candidate has met the standard required for the basic module then he/she can apply to be assessed for one or more types of applicator. The following list illustrates the main types of application equipment, arranged in a simple series of modules. Other additional application categories can be incorporated into the scheme as required e.g. boat-mounted applicators.

#### A. Portable (operator carried) applicators

1. Lever operated knapsack sprayer
2. Motorized knapsack sprayer
3. Compression sprayer
4. Motorized mistblower
5. Rotary atomiser
6. Thermal and cold fogger
7. Granule applicator

#### B. Vehicle-mounted or trailed (tractor) pesticide applicators

1. Field crop (horizontal boom) sprayer
2. Air assisted sprayer for tree crops (for orchards and plantations)
3. Broadcast air assisted sprayer (e.g. cannons)
4. Granule applicator

### C. Aircraft

1. Fixed wing
2. Helicopter
3. Mixer/loader (an operator task certification)
4. Field marker (an operator task certification)

### D. Others

1. Seed treatment
2. Large-scale batch treatment
3. Large-scale continuous application (conveyor belt)

## 5.3 Certificates of competence and control

The certificate of competence is very important and its value and integrity must be protected by the scheme administrators. The certificate proves that the user is competent to use the equipment or to carry out the tasks (e.g. aerial application pesticide ground crews) specified on the certificate, safely and without supervision.

The aim of the regulatory authority should be to establish and maintain the integrity of the scheme by ensuring appropriate, consistent and uniform assessment/test procedures so that the equipment owners and users consider the resulting certificate to be valuable because it provides a number of tangible benefits:

- authorization for the user to legally use the applicator(s) in crop protection;
- potential benefit to the activity for which the applicator(s) is used;
- improved employment opportunities for the candidate;
- increased public confidence.

### *Certification for individual sprayer types*

A further important principle is that certification of proficiency in the use of application equipment must be granted for specified applicator types. For example, it is not acceptable that an operator assessed as competent in the use of a lever-operated knapsack sprayer should be authorised to operate all portable sprayers.

Operators of field crop, boom sprayers who wish to obtain authorisation to use twin fluid nozzles should not be authorised based on their competence with hydraulic nozzles. However, in this case the module is so similar that the hydraulic nozzles and the twin fluid nozzle should be designated as variants to the main “field crop horizontal boom sprayer” module.

On successful completion of the competence tests by a candidate, an official certificate of competence should be issued, which indicates the type(s) of sprayer (including variations) for which the candidate is authorised. The results of the tests and other information from the testing protocol documents should be submitted by the assessor to the testing authority to be entered onto a central database.

### *Validity period*

Operator proficiency certificates should have a validity of no more than 3 years, whereupon users must either be re-assessed or demonstrate that they have undertaken sufficient training/updating in any area specified by the regulatory authority to remain on the register of certificated operators.

### *Assessors*

The testing authority should select, train and accredit official assessors for the scheme. Assessors must also ensure that their knowledge is up-dated periodically to keep abreast of new developments and to update and maintain the uniformity of the testing scheme.

Candidate assessors are likely to be people who are very familiar with pesticides and application. Assessors will be usually part-time and are likely to come from the crop production industry (e.g. farmers and growers), from teaching establishments or the supply industry. They will usually be people who are regularly involved in pesticide use and spray application in their daily work. Irrespective of their source, assessors should meet the following requirements:

- reliable people with appropriate vocational training or experience;
- high level of technical knowledge, skills and experience in the relevant areas;
- specific detailed knowledge of the pesticide application categories for which they are accredited as an assessor;
- hold a certificate of competence themselves (specifying the types of applicator) issued by the testing authority;
- Hold a pedagogic qualification in assessing candidates within 1-2 years of being appointed as an assessor.

Master assessors who train and accredit the official assessors should meet all the above requirements, possess a high level of technical knowledge and experience and be of high a professional calibre.

#### **5.4 Approach to proficiency testing**

Schemes will vary; however, there are several central issues, which are common to all:

- tests should be realistic, practical, reproducible and indisputable;
- methodology and protocols employed should be technically acceptable, uniform and professionally implemented;
- tests conducted by different assessors should consistently produce the same results;

- tests should be practically based focussing on the candidate's performance of practical skills and safety awareness and not on their ability to complete a written exam;
- tests should be objective and open and the candidate should be informed of any faults and remedial action required;
- fees should be affordable to the candidates and financially viable for the testing authority.

### *Balance in the scheme*

Schemes should seek to strike a balance between the importance of the issue/ parameter, the complexity of the test and the cost implications. A scheme that employs excessive testing or which severely restricts the number of candidates evaluated in a year runs the risk of rendering the scheme unpopular and financially non-viable. On the other hand, a test series that is too simple or lacks precision is unlikely to be of value.

## **6. TRAINING**

### **6.1 Roles and responsibilities**

In order to meet the requirements of the proficiency testing service and be awarded a certificate of competence, candidates must possess the necessary knowledge and skills. Provided the requirements of proficiency tests are clearly published and available, it could be argued that there is no need for training schemes. This assumes that application equipment users have the necessary knowledge and are competent in the relevant subject areas.

This situation however, is far from the truth and it is unusual for a candidate to take a proficiency test without having received at least some preparatory training. To ensure that the regulatory authority, through the proficiency testing service, achieves its goal, it must ensure that it has capable,



professional trainers and training providers who fully understand the proficiency testing scheme and keep up with technical and other new developments. Therefore, to have a successful proficiency scheme, there should be a parallel, high-quality training scheme.

## **6.2 Training standards**

Training can be provided by a wide range of organisations and individuals and in order to meet the needs of the users of pesticide application equipment, there is a requirement for consistent and high-quality training standards to be established and maintained.

A rational approach is for the regulatory authority to appoint or officially recognise an independent training standards organisation under the relevant plant protection law.

A training standards organisation should be responsible for the following:

- developing and maintaining a curriculum, which will satisfy the needs of the proficiency-testing scheme;
- establishing and maintaining standards of training;
- maintaining a professional register of accredited trainers and training organisations;
- evaluating each accredited trainer on a regular basis (2 years) as part of the requirement to remain on the professional register of accredited trainers;
- ensuring that courses related to pesticide application are compatible with other requirements for skills development and worker training;
- maintaining close dialogue with the proficiency testing service;
- maintaining a central database and monitoring the overall training provision.

## 7. FINANCING

Operator proficiency testing schemes aim to be as close to self-financing as possible and the most obvious route to achieve this is through charging a fee to the candidate to be assessed. This charge should not be confused with the fees charged by training agencies to prepare candidates for the proficiency tests.

Many, new training and proficiency testing schemes are initiated with official funding or start-up finance to provide:

- the scheme design;
- the infrastructure and core staff;
- publicity and promotion to explain the need for and operation of the scheme;
- the network of accredited assessors and trainers;

Co-funding with partners from the private sector: farmers' organisations, agro-chemical and equipment industries and professional bodies may provide an alternative approach in some countries.

To ensure the continued existence of these schemes it is important that, in the planning stages, the likely cash flows are accurately predicted, based on a clear understanding that test numbers will take time to build up. It is also important to ensure that for proficiency testing, the fees charged for the different categories of pesticide application equipment are realistic for the participating farm communities.

## 8. INTRODUCING AND SUSTAINING A PROFICIENCY TESTING SCHEME

These guidelines outline the principal considerations and options available to countries that do not yet have controls in place to regulate the use of pesticide application equipment on farms. The following sequence, although

not exhaustive, serves to provide a summary guide on the way forward for governments, which may be considering the introduction of mandatory operator proficiency testing in their country.

1. Incorporate a requirement for “the compulsory certification of users of pesticide application equipment” into the appropriate legislation, in the interests of protecting the food produced, the safety of operators and the environment.
2. Establish or identify the appropriate regulatory authority, which should be multi-disciplinary and with the necessary statutory powers.
3. Decide and set up the proficiency testing authority, which will be responsible for the execution of the scheme.
4. Design the scheme.
5. Define categories of pesticide application equipment targets and priorities (aircraft, vehicle-mounted, trailed and portable) to initiate the scheme.
6. Determine the fee levels, financial viability and start-up options.
7. Procure adequate funding to launch the scheme.
8. Decide on and publicise the details of the scheme.
9. Train and organise the core staff who will administer the service and who will train and certify the assessors and monitor the scheme.
10. Accredite the assessors.
11. Initiate, operate and monitor the scheme.

## **9. QUALITY ASSURANCE**

To ensure the success of any proficiency testing scheme, there is an overriding requirement to establish from the outset, that integrity and value will be maintained. In schemes, which are financially viable and efficiently administered, achieving this goal will be greatly assisted by incorporating a system of strict quality control. This will help to ensure that:

- testing standards remain high but realistic for the country or region;
- methods and procedures remain uniform across all test centres;
- international developments are followed and schemes adjusted when necessary.

Quality assured testing schemes for users of application equipment are well within the reach of many countries. These schemes can provide powerful tools to contribute significantly to the safety of operators and the environment and to assist in the overall control of pesticides in commercially viable, quality assured and sustainable agricultural production systems.