

-SQA-SCOTTISH QUALIFICATIONS AUTHORITY

**Hanover House
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NATIONAL CERTIFICATE MODULE DESCRIPTOR

-Module Number- 0098038 -Session-1989-90
-Superclass- SC

**-Title- PESTICIDE APPLICATION BY GROUND CROP
SPRAYER**

-DESCRIPTION-

Purpose This module is designed to develop the knowledge and skills necessary to apply pesticides using a ground crop spray.

This module is aimed at any student who will be required to apply pesticides in a variety of different occupations. The module is intended to offer education and training to meet the requirements of the current legislation/regulations.

Preferred Entry Level A student must be at least 17 years of age prior to the commencement of this module and be in possession of a current drivers licence.

98037 Pesticide Application - Introduction
68061 Tractor Operations 2

Learning Outcomes The student should:

1. prepare a ground crop sprayer for work;
2. calibrate a ground crop sprayer;
3. operate a ground crop sprayer.
4. understand how to clean clothing, equipment and application equipment which may have been contaminated with pesticide.

Content/
Context

The content of this module should be varied according to the major topic of interest of the students and current Code of Practice produced by the Ministry of Agriculture, Fisheries and Food and the Control of Substances Hazardous to Health Regulations 1988.

Safety regulations and safe working practices and procedures should be observed at all times.

Corresponding to Learning Outcomes 1-4:

1. Knowledge of safe driving practice; including up and down hill, across a slope, over rough ground, desirability of 4 wheel drive on steep slopes, use of wheel weights to stabilise tractor, loss of traction/stability as tank empties and independent brakes coupled on a public road.

Preparation of prime mover for spraying; use of correct cab air filter, compatibility with sprayer, tyre pressures, wheel track widths, front weights, linkage category or drawbar position, accessibility of sprayer controls from driving position and use of hydraulic, pneumatic and electrical services.

Preparation of spraying equipment; stability of sprayer, cleanliness of sprayer, lubrication using manufacturers' instruction book, checking for mechanical defects such as free movement of the pump, filters, seized, worn or damaged components, weaknesses in clips.

Attachment of sprayer to prime mover - use of correct sequence, pump connection to power source, sprayer level, fitting of guards, sprayer tyre pressure.

Identification of sprayer controls and components including filling devices, agitation control, pressure/volume regulator, spray on/off, boom isolators and appropriate valve positions for liquid flow, spraying and agitation modes.

2. Preparation for calibration;

Part fill sprayer, check pump output, check sprayer for leaks and/or air locks, check antidrip system, check boom suspension and breakback devices, use of product label, selection of spray quality, selection of spray volume, acceptable speed range conducive with work rates, turbulence and drift, boom bounce and yaw.

Use of formula Speed: (km/hr) = 360 divided by time (seconds) to cover 100 meters.

Setting of nozzle output and spray quality;

Calculation of desired nozzle output:

volume rate (l/ha) x speed (km/hr) x nozzle spacing (m) divided by 600 = nozzle output (l/min)

Selection of appropriate nozzle, use of manufacturers handbook; British Crop Protection Council nozzle selection literature;

Selection of operating pressure;

Checking of nozzle output and spray patterns preferably using Agricultural Training Boards/British Crop Protection Council calibration procedures;

Recording for future use to include - nozzle tips fitted application volume, pesticide dose rate, spray pressure, spray quality, registration number of vehicle, gear selected, engine speed (rpm), vehicle speed, wheel diameter.

Variations when calibrating and using a handlance attachment including speed of walking in relation to ground conditions, height of lance/swath width/spot diameter and bush treatment.

3. Measurement and mixing of pesticide.

Approved techniques to be followed with due regard to safe practice and appropriate protective clothing;

Correct dose rate;

correct use of water supply;

Observance of chemicals manufacturers' instructions for mixing, agitation and tank mixes;

Measuring and mixing appropriate quantities for full and part tank loads;

Rinsing and storage of chemical containers (empty and part full whilst away from filling point).

Use of filling devices.

Safe and accurate spraying procedures in the field.

Security of pesticide packs in transit and on site.

Different marking systems and their use especially on headlands and corners to include tramlines, poles and trailing ropes.

Checking tank contents to avoid running out of spray in middle of site. If spray runs out in mid-field, marking end of spraying; re-entry procedures.

likely effects of spray drift to crops, persons, wildlife and environment.

Methods of reducing effects of drifting including:

- weather conditions
- spraying pressure
- nozzle change
- droplet sizes
- through incorporation of some chemicals
- need for boom not to overlap
- warning of neighbours
- risk to beneficial insects

Setting of boom, level and height correctly.

Personal hygiene whilst spraying.

Replacement of blocked nozzles.

Replacement of blocked filter.

Folding booms to avoid contamination and injury.

Common faults and their rectification including - foaming in the tank

- poor nozzle pattern
- nozzles spluttering
- no spray
- loss of spray
- uneven pattern
- blocked nozzle
- leakage

4. Cleaning and decontamination of sprayer Safe cleaning site Thorough washing with water and suitable recommended additive Use of built-in system if provided Safe disposal of tank washing water Flushing of booms and filters Time of cleaning
 - end of day
 - changing pesticides
 - end of spraying operation
 Cleaning of filters, nozzles and flow regulators
 Preparation of sprayer for medium/long term storage.
 Cleaning and storage of protective clothing.

Suggested Learning and Teaching Approaches	<p>Most, if not all, of the work in this modules should be undertaken in a practical situation using examples of simulated pesticides appropriate to the interests of the students.</p> <p>Manufacturers' operators instruction books and calibration charts/calculators should be available at all times as should Health and Safety Executive leaflets, ATB trainee guides, Ministry of Fisheries and Food, leaflets and Codes of Practices, Forestry Safety Council guides and BCPC Nozzle Selection handbooks.</p> <p>Due to the practical nature of the module a programme of formative assessment should be followed.</p> <p>Care should be taken to ensure that the operation of the prime move and/or equipment does not in any way endanger the candidate, examiner, equipment and/or the environment.</p> <p>Candidates should not be credited with the Learning Outcome if these conditions are not met.</p> <p>All equipment used must be of the standard required under current Health and Safety Legislation.</p> <p>Candidates must wear protective clothing appropriate to the risk whenever carrying out work on the sprayer eg. checking filters, replacing nozzles etc.</p>
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Assessment Procedures	<p>Acceptable performance in the module will be satisfactory achievement of all the Performance Criteria specified in the Learning Outcome.</p> <p>The following abbreviations are used below:</p> <p>LO Learning Outcomes IA Instrument of Assessment PC Performance Criteria</p> <p>LO1 PREPARE A GROUND CROP SPRAYER FOR WORK.</p> <p>PC The student:</p> <p>(a) correctly prepares the prime mover for spraying; (b) prepares the sprayer for use in accordance with manufacturers instructions; (c) correctly attaches the sprayer to the prime mover; (d) adheres to all appropriate safety regulations and safe working practices.</p>
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IA Practical Exercise

The student will be set an exercise which will test the skills required to follow all appropriate procedures to prepare a ground crop sprayer and appropriate prime mover for spraying.

The student will be asked to complete the exercise for one situation using one ground crop sprayer and one prime mover for one pesticide.

Satisfactory achievement of the Learning Outcome will be demonstrated by the student completing all items in the following checklist:

- (a) prepares prime mover for spraying;
- (b) checks that the prime mover is compatible with sprayer;
- (c) uses the correct cab air filter;
- (d) checks the tyre pressures;
- (e) checks the wheel track width;
- (f) checks front weights;
- (g) checks linkage category/drawbar position;
- (h) checks hydraulic/pneumatic/electrical services;
- (i) stabilises sprayer prior to working on it;
- (j) cleans the sprayer;
- (k) lubricates the sprayer in accordance with manufacturers handbook;
- (l) checks for mechanical faults;
- (m) attaches sprayer to prime mover in correct sequence and coupling of hose lengths;
- (n) checks sprayer tyre pressures;
- (o) identifies sprayer controls.

LO2 CALIBRATE A GROUND CROP SPRAYER.

PC The student:

- (a) checks forward speed of outfit;
- (b) puts water into sprayer correctly;
- (c) checks nozzles and adjusts or replaces as necessary;
- (d) uses a calibrated vessel to measure output from nozzles;
- (e) varies pressure to make small adjustments;
- (f) adheres to all appropriate safety regulations and safe working practices.

IA Practical Exercise.

The student will be set an exercise to test the skills required to follow the procedures to calibrate a ground crop sprayer.

The student will be asked to complete the exercise for one situation using one sprayer and one pesticide.

Candidates will be expected to follow the ATB/BCPC calibration procedure.

Satisfactory achievement of the Learning Outcome will be demonstrated by the student gaining all items on the following checklist:

- (a) puts water into sprayer correctly;
- (b) runs prime mover at correct pto speed;
- (c) visually checks all nozzles for:
 - (i) - even spray pattern;
 - (ii) - no blockages;
 - (iii) - no streaking and wear;
 - (iv) - correct alignment.
- (d) replaces rogue nozzles;
- (e) checks anti-drip system functioning correctly;
- (f) compares all nozzle outputs using a flow meter or recording jar;
- (g) replaces nozzles varying + or - 5% from average;
- (h) uses a calibrated vessel to measure output from four nozzles (at least one from each boom section) and compares with target nozzle output;
- (i) varies pressure to make small adjustments.

LO3 OPERATE A GROUND CROP SPRAYER.

PC The student:

- (a) measures and mixes pesticide correctly;
- (b) follows safe and accurate spraying procedures;
- (c) minimises drift of spray;
- (d) adheres to all appropriate safety regulations and safe working practices;

IA Practical Exercise

The student will be set an exercise to test the skills required to demonstrate the correct procedures to apply pesticides efficiently using a ground crop sprayer. The student will spray a given area making one or two headland runs as appropriate at one end and two double field runs normally of at least 100 metres in each direction.

Satisfactory achievement of the learning outcome will be demonstrated by students completing all items on the following checklist:

- (a) measures and mixes pesticide correctly;
- (b) sets boom level and at correct height;

- (c) ensures correct agitation;
- (d) clears water/air from boom/nozzle;
- (e) operates controls to start and finish spraying at beginning and end of each swath.
- (f) sets forward speed and pressure correctly for field conditions.
- (g) matches swaths correctly;
- (h) wears appropriate clothing;
- (l) copes with obstacles - eg. electricity poles.

LO4 UNDERSTAND HOW TO CLEAN CLOTHING, EQUIPMENT AND APPLICATION EQUIPMENT WHICH MAY HAVE BEEN CONTAMINATED WITH PESTICIDE.

PC The student:

- (a) explains the procedures to be followed when cleaning and decontaminating the sprayer;
- (b) describes how to prepare a sprayer for medium to long term storage;
- (c) explains the procedures to be followed for cleaning and storing protective clothing.

IA Restricted Response test.

The student will be set ten questions which test the understanding of procedures to be followed when cleaning equipment and clothing which may have been contaminated with pesticide.

Satisfactory achievement of the Learning Outcome will be demonstrated by the student producing 4 correct responses to (a), 2 correct responses to (c)

The questions will be allocated as follows:

- (a) cleaning and decontamination of the sprayer. 5
- (b) preparation of a sprayer for medium to long term storage 3.
- (c) knowledge of procedures for cleaning and storing protective clothing 2.