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GUIDELINES FOR HERBICIDE REGISTRATION TRIALS:

UNWANTED TREE AND SHRUB GROWTH

Issued by the Registrar: Act 36 of 1947 - Department of Agricultural Economics and Marketing. Compiled by the Department in consultation with the Agricultural and Veterinary Chemicals Association of South Africa.

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I N D E X

GUIDELINES FOR HERBICIDE REGISTRATION TRIALS: UNWANTED TREE AND SHRUB GROWTH

1. INTRODUCTION

1.1. The purpose of these guidelines is to obtain greater uniformity in registration trials for herbicides to control or eradicate trees and shrubs on open lands, such as grazing, or woody areas where some degree of clearance is required. This exposition serves only as a guide to such trials.

1.2. The guidelines refer to different methods of application. These are cut-stump, tree injection, frill ringing, basal bark spraying, spot spraying application, granular application (overall and spot application) and overall foliage spraying (mainly small shrubs).

1.3. These guidelines do not replace the requirements set out in Act 36/1947 and the regulations promulgated thereunder but are only complementary to the above.

1.4. Experimentation with a view of obtaining registration of an agricultural remedy must be discussed in advance with the Technical Advisor (Herbicides), Act 36/1947 of the Department of Agricultural Economics and Marketing. The Department should be provided with a plan of each trial and a proposed list of treatments prior to commencement of the trials.

1.5. It is recommended that the Department of Agricultural Economics and Marketing be kept informed of the progress of the experiments at all times prior to submission for registration.

1.6. Herbicide formulations, herbicide tank mixtures and the addition of adjuvants require registration.

1.7. If required by the Department of Agricultural Economics and Marketing, a sample of the candidate herbicide must be submitted to them for evaluation in their own efficacy studies.

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The sample must be submitted well in advance of the commencement of the growing season. These trials will serve merely to back up and not to replace the data produced by the applicant.

2. TRIAL REQUIREMENTS

2.1. Requisites

2.1.1. The Herbicides should be tested at enough locations to represent adequately the range of environmental conditions in which they are likely to be used in practice. As the effectiveness of control of woody species by chemicals can be influenced by time of application, seasonal variations, and soil type, a trial programme should try to test subject herbicides over a range of these variables; in particular, treatments should be tested on each target species growing on a wide range of soil types.

2.1.2. Trial observations should (where applicable) extend at least to the end of the second year after application of treatments. In the case of herbicides with a long residual action trial observations should extend to the end of the third year.

2.1.3. In the full assessment of any test product the small plot replicated trials should preferably be followed by two or three large-plot field trials in which the product is tested at the rate(s) of application to be recommended for commercial use.

2.2. Application Equipment

2.2.1. Applicators similar to those likely to be used in commercial practice should be used in trial work. If small scale applicators are used they should have similar important characteristics (e.g. spray distribution pattern) as those of the larger commercial applicators.

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2.2.2. Wherever possible only precision applicators should be used. They should be carefully calibrated before use. Details must be furnished concerning the applicators, e.g. type of equipment, spray nozzle, pressure and the amount of diluted spray mixture applied per hectare or per plant.

2.3. Trial Design

2.3.1. Trial objectives and the criteria by which they are to be judged should be clearly defined when the design is formulated. Choice of design will be limited by available resources. Wherever possible consult a biometrician before setting-up trials.

2.3.2. Plot Size

2.3.2.1. Although actual plot size may depend upon available resources and disposition of the trees and shrubs, the following generally apply:

(i) Ten plants in each of the tree age classes for every species (total 30/species) in the following height classes.
   (a) Seedlings (0-0,5m high)
   (b) Active growing plants (0,5-2,0m high)
   (c) Older or adult plants (2m high)

(ii) With overall spraying, a plot 20 x 20 m usually has enough for at least 2 random samples totalling thirty datum shrubs (or trees), in arid areas the plots must be enlarged, depending upon the plant density, to include the required number of plants.

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2.3.2.2. These are the areas from which data are taken. With overall spraying, these defined plots should be separated by border or buffer strips to avoid edge effects of various kinds.

The strips should be suitably wide to prevent root uptake e.g. two to five meters or more in the case of large trees. If root-grafting is suspected then buffer strips should be used around individually-treated trees and shrubs. The strips should not be sampled or harvested for test data.

2.3.3. **Controls**

2.3.3.1. Check plots are an integral part of a trial and should be laid out in the same number and manner as the test-treatment plots.

~~2.3.3.1.~~ Two kinds of checks may be required.

(i) Check I (untreated plot) - trees/shrubs on these are not subjected to treatments by herbicide-carrier or mechanical action during the trial.

(ii) Check II - in this the trees/shrubs are subjected to the same operations as the test treatments except test-herbicides are excluded.

NOTE: When test-treatments involve frill ringing, tree injection or cut-stump applications, then Check II trees/shrubs must be mechanically-damaged in similar ways. When non-aqueous formulation components are used in test-applications then similar components (devoid of herbicides) should be used in Check II trees/shrubs.

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2.3.4. **Replications**

The number of replicates depends on the chosen design, generally not less than two replications of each test-treatment and of each check should be used.

3. APPLICATION

3.1. RATES OF APPLICATION

Normally at least three application rates should be tested for each herbicide formulation. These should be 0,75x, 1x and 1,5x once the apparent x rate has been established. If possible, five or more rates should be tested to determine a reliable dose-response curve.

3.2. SPRAY VOLUME

With spraying applications the test volumes applied will depend upon the equipment used and formulation characteristics of the product being tested. Preliminary studies (e.g. screening tests) or the manufacturer's recommendations should give guidance.

If it is known or suspected that variation in spray volume (as may be expected in commercial practice) could influence the herbicide's efficacy and safety then this aspect should be investigated by comparing a range of volumes taking the optimum (or recommended) volume as mid-range.

3.3. TIMING

This depends upon the characteristics of the herbicide. Preliminary studies or the manufacturer's recommendations should give guidance.

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4. EVALUATION

4.1.1. RECORDING TIMES

4.1.1.1. Recording should be made before and after applications.

4.1.1.2. Actual post-application recording times will depend upon the objective(s) of the trial and the properties of the formulation as well as evident effectiveness of control. In general, the following minima apply:

Recordings	Time after applications
(i) First	Three months
(ii) Second	Twelve months
(iii) Third	At end of the second growing season
(iv) Fourth	At end of the third growing season (where applicable)

4.1.2. DATA RECORDINGS BEFORE OR AT APPLICATION OF TREATMENTS

4.1.2.1. The names (species, variety) of the target trees and (or) bushes; a simple description of their development stage(s) at time of application (age, stem diameter or girth, flowering, fruiting, etc.); and estimation of target species population density.

NOTE With tree description note if seedling, sapling, or mature tree; and with coppice growth note the period elapsed since the mature tree was mechanically disturbed. Measure stem diameter or girth at tree base or at waist height or level of chemical injection.

4.1.2.2. Estimation of number (if present) and density of suppressed target seedlings or suckers associated with trees/shrubs receiving individual treatments.

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Estimation of the percentage canopy cover due to non-target vegetation (including grasses and ferns; estimation of extent of bare ground).

NOTE Record the incidence of major non-target species.

4.1.2.3. Applicator and application details, such as dosage rate, spray volume, number of applications, nozzle or injector type, working pressures, etc.

4.1.2.4. Description of the site soil type(s) - specific as possible, noting soil moisture content and any special features likely to effect assessment of results.

4.1.2.5. Description of the weather conditions before and at time of application - covering the period in which effectiveness of the treatments is likely to be affected - noting temperature, rainfall (time, amount), relative humidity, wind (speed, direction) and any other conditions likely to affect herbicide performance.

4.1.3. **DATA RECORDINGS AFTER APPLICATION OF TREATMENTS**

4.1.3.1. Record observations and measurements showing treatment effects on the target species, such as: the number killed; the density of resulting seedlings and suckers; the vigour and injury rating of survivors (use and appropriate system to estimate these effects); resurgence of affected species; the species not controlled; impression of overall effects.

4.1.3.2. Estimation of the percentage canopy over due to surviving target plants and other vegetation including grasses and ferns; estimation of extent of bare ground.

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Estimation of effects, if any, on neighbouring non-target vegetation.

4.1.3.3. Description of weather conditions where relevant (See 4.1.2.5.).

5. DATA ANALYSIS

Where sufficient quantitative data has been recorded and differences are not dramatic, these data should be analysed by a suitable procedure and differences tested for statistical significance. Interpretation of results will be much easier where the design provides at least twelve degrees of freedom for error.

6. RECOMMENDED TREATMENTS

Recommended treatments must have been included in the range of treatments covered by trials.