
**Equipment for crop protection —
Methods for field measurement of spray
drift**

*Matériel de protection des cultures — Mesurage de la dérive du jet au
champ*



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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

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Equipment for crop protection — Methods for field measurement of spray drift

1 Scope

This International Standard establishes principles for the measurement of droplet drift from all types of equipment designed for applying plant protection products. Detailed specifications relate to tractor-mounted, trailed and self-propelled agricultural sprayers operating in arable field crops (boom sprayers) and in bush and tree (including vines, hops, fruit) crops (including broadcast air-assisted sprayers).

The principles are also applicable for any hand-held equipment or aircraft, but detailed protocols for such systems are not included in the specifications defined.

All measurements are made with the sprayer operating outdoors in typical field conditions or over a defined surface including grass turf. Crop conditions include all arable (field) and horticultural crops that would be treated with a boom sprayer. Measurements of the crop and basic meteorological conditions at the time of spraying are made as part of the test procedure.

This International Standard specifies the making of field measurements so as to determine the quantities of spray drift during application at defined distances from a treated area for risk assessment purposes. Standard measurement distances are defined that are used to enable the results from different experiments to be compared.

Measures of drift can relate to either the deposition of spray onto horizontal surfaces outside of the treatment area or to airborne spray profiles that can be characterised at given downwind distances downwind of the treatment area. Deposition onto horizontal surfaces is relevant to the assessment of the risk of contamination of, for example, surface water; whereas the measurement of airborne profiles are relevant to risk assessments relating to inhalation effects and to the contamination of, for example, vegetative structures at field boundaries. This International Standard is applicable to both situations, although the emphasis in any series of trials may be varied by selection of the sampling matrix to be used.

Where comparative assessments of the relative drift risk from different application systems are needed, then this International Standard is applicable, but some requirements relating to the use of reference spraying systems, collectors, selection and definition of the trial site may need to be modified. A description of such modifications is included, where appropriate.

Drift measurements relate to application conditions aimed at achieving realistic levels of deposit on a target within the sprayed area. Since drift is commonly expressed as a proportion of the application rate, it is important that some direct assessments of target deposits be made as part of the drift measurement procedure.

2 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

2.1

spray drift

quantity of plant protection product that is carried out of the sprayed (treated) area by the action of air currents during the application process

NOTE Material applied which escapes from deposits on treated plants or the ground after application is not regarded as spray drift. Drifting material may take the form of droplets, as dry particles or as vapour. However, this International Standard is only concerned with the sampling and estimation of droplet drift.

2.2

swath width

working width of boom sprayers operating over arable crops and broadcast-air-assisted sprayers operating in tree and bush crops

2.3

directly sprayed area

area to which the spray treatment is intended

3 Essential elements of a trial

3.1 General

A spray drift measurement shall comprise the application of a tracer dye, or other traceable material for representing a plant-protection product formulation, to a defined, directly sprayed area of crop by means of travel in a single pass at a measured forward speed along defined tracks arranged to be at right angles to the mean wind direction. Spray drift shall be determined by sampling in a defined downwind area.

Where measurements are to be made to compare the relative drift from different application systems, then a single track may be used, arranged at right angles to the mean wind direction, with multiple passes being made on that track if necessary to obtain adequate resolution in the measurement of drift deposits. Sampling may then be within the cropped area or in a specified downwind area as above.

Where possible, all measurements shall use a tracer of low toxicity that can be safely applied to the sprayed area with no associated risks of environmental contamination. The spray liquid shall have physical properties representative of liquids typically used in the application of plant protection products. This can normally be achieved by the addition of a water-soluble surfactant at typical usage rates (for example, 0,1 %).

NOTE The formulation of some tracers can include a surfactant component.

3.2 Selection of the trial site

The trial site shall be in an exposed area with the minimum of obstructions, other than a target crop, that could influence the airflow in the region of the measurement. Details of the site and local topography shall be recorded and detailed in the report of the results of the study (see Clause 7).

The directly sprayed area shall be such that, on the downwind side, there is an area in which to position sampling stations (see 3.5). The downwind area shall be bare soil or have short vegetation (maximum height 7,5 cm) over which assessments of airborne spray drift and/or sedimenting spray drift shall be made.

The directly sprayed area shall be at least 20 m wide immediately upwind of the edge of the cropped area. Where crops are grown in rows (for example, fruit trees), then the minimum width of the sprayed area shall be as close to 20 m as possible consistent with the crop row spacing.

The length of the directly sprayed area or spray track shall be at least 50 m. When making spray drift measurements at large downwind distances from the directly sprayed area or spray track, the length of the area or track should be increased to account for the variations in wind direction. The length of the spray track shall be at least twice that of the largest downwind sampling distance and shall be symmetrical about the axis of the sampling array.

All downwind distances shall be measured from the downwind edge of the directly sprayed area (see Annex A).

A coordinate reference system shall be used to describe the layout of a spray drift trial, including location and size of spray drift collectors in sampling arrays, as described in Annex B. The details of the spray drift trial layout shall be fully reported within the results.

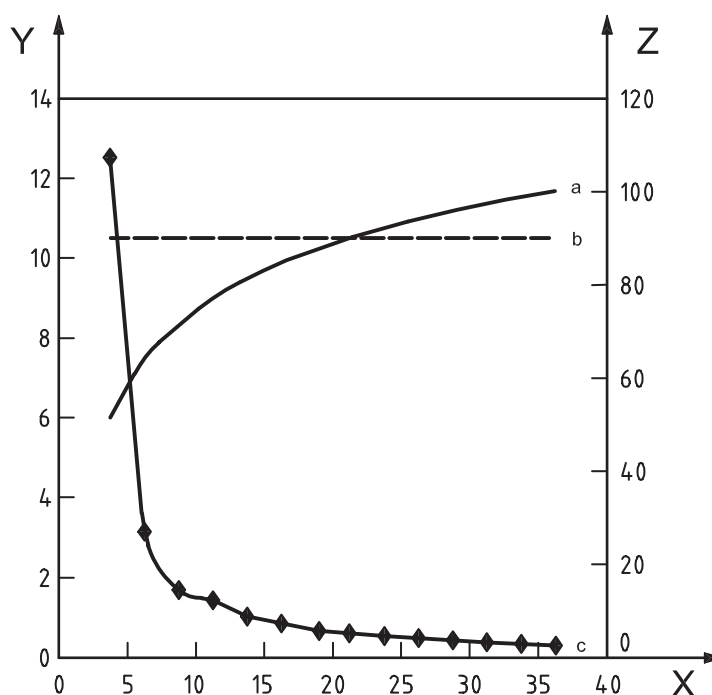
3.3 Conduct of trial

In all experiments, single-track tests should first be conducted to provide data necessary to gauge the downwind extent and decay profile of that component of spray drift originating from a single pass on the downwind side of any directly sprayed area. Comparative assessments of relative spray drift from different application systems require only single-track experiments.

In experiments to measure the spray drift loss from a directly sprayed area, subsequent multiple-track tests shall be made as needed. Adjacent swaths within a directly sprayed area should always be sprayed by moving successively in an upwind direction. The total number of adjacent swaths needed is dependent on the necessary upwind distance from which spray drift may add a significant contribution (> 10 % of total measured drift) toward the total spray drift loss from the area, and should be at least 20 m. In many situations, a default width of treated area of 20 m will be adequate. When this is not so, the distance should be calculated using the results from the single-track tests already conducted for the sprayers concerned. This calculation should use measurements from either ground and/or airborne spray drift measurements and should involve

- the plotting of a decay curve of measured spray drift with distance from a single swath, having a scale of mean deposition from a single swath treatment in the directly sprayed area representing 100 %, and
- a cumulative projection along the decay curve to determine the distance corresponding to a drift value of 90 % of the total amount of spray drift measured.

This distance shall then be the minimum width of the directly sprayed area (see Figure 1, which in this example gives a minimum width of around 20 m).



Key

- X downwind distance (m)
- Y spray drift (% of applied volume)
- Z cumulative % of measured spray drift
- a Cumulative % of total measured spray drift.
- b 90 % of total measured spray drift.
- c Measured spray drift (% of applied volume).

Figure 1 — Calculation of minimum width of directly sprayed area