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Federal Research Institute for Cultivated Plants
Federal Republic of Germany**

Guideline for the testing of plant protection equipment

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Measurement of direct drift of liquid plant protection products in the field

Non-official translation - German text is legally binding

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Introduction

This guideline serves for the assessment of plant protection equipment as an examination according to § 52 Article 1 PflSchG with regard to direct drift or for determination of direct drift data for e.g. basic drift values or research-relevant data. It should enable extensive comparability of drift values determined in the field. Many test parameters are not freely selectable in field tests as they are on a test bench and cannot be constant during a test. It has been shown that if the limits specified in this guideline are adhered to for some test parameters, they are in accordance to numerous results of different test organizers. In order to clarify detailed questions, it is possible to deviate from the specifications in this guideline. However, it must be taken into account that these results could be not suitable for an absolute statement in every case, but only allow a relative comparison.

1. Definition

Direct drift is the proportion of the applied active ingredient that is carried over the area to be treated during the application process as a result of air movement. Active ingredient discharge through evaporation or leaching is not to be counted as direct drift.

2. Test area

The test area consists of a treatment area and a measurement area. The measurement area must be located downwind of the treatment area. The treatment area must be at least 50 m long and 20 m wide (see Appendices 1 - 5).

3. Test arrangement

The direct drift is recorded as ground sediment. For this purpose, petri dishes are put on the ground as drift collectors on a suitable horizontally aligned support.

The arrangement of the petri dishes for determining the ground sediment depends on the experimental question. To ensure comparability of the experiments, at least five distances from the test area are to be selected from the following grid:

1; 2; 3; 4; 5; 7.5; 10; 15; 20; 30; 40; 50; 75 and 100 m distance.

The petri dishes are set up at least ten times at a distance of 1 m. The zero point determining the distances from the trial area is:

- in arable farming: half a nozzle distance from the outermost nozzle,
- in fruit, wine and hop growing: half a row distance from the outermost row.
- in the forest: edge of the canopy of the treatment area

The arrangements are shown graphically in appendices 1 - 5.

Outside the measuring area at least 5 Petri dishes shall be laid out for the determination of the zero values. The arrangement must be such, that they cannot be hit by the drift.

4. Test execution

Before the drift measurement, the crop protection device used is to be calibrated or the spray rate applied on the test area is to be determined in l/ha by other suitable means. The device shall be operated with appropriate and customary settings. The spray pressure is to be set to values which are a multiple integer of 0.5 bar.

The test liquid is applied onto the entire treatment area. This liquid must contain a detection substance; e.g. pyranine 120 % (Simon & Werner) as a water-soluble, fluorescent detection substance. The concentration should be such that, depending on the application parameters and the analytical technique, the minimum values of drift required according to the test question are above the limit of determination.

Each test has to be repeated at least 3 times.

The following weather data have to be recorded during the test:

- wind direction (1 reading per second)
- wind speed (1 reading per second)
- air temperature (1 measured value per run)
- relative humidity (1 reading per run)

The measurements of the meteorological data are taken on the central axis behind the measurement area 1 m above the height of the crop but at least 2 m above the ground.

The air temperature should not exceed 25 °C during the entire trial. The wind data collected for each replicate shall meet the following conditions: The weighted mean values of the wind speeds must not fall below 2 m/s and must not exceed 5 m/s (for weighting factors see Appendix 6). No more than 30% of the individual values may fall below 2 m/s or exceed 5 m/s. The mean wind direction must not deviate by more than 30° and no more than 30% of the individual values must deviate by more than 45° from the perpendicular to the direction of travel.

After several tests on the same test area, blind tests should be carried out to determine the basic load.

At least at the beginning and at the end of a series of tests on one day, tank samples are to be taken as reference values from the tank with the test liquid. The sampling can be taken with a scooping aid both from the tank and directly at the nozzles. Sampling through the emptying device of the tank is unsuitable.

5. Analysis (Laboratory)

A stock solution with a defined mass concentration is prepared in the laboratory. This serves as a reference liquid for determining the concentration of the tank sample and thus the sediments in the petri dishes.

For the quantitative determination of the amount of detection substance of the test liquid collected in the petri dishes, a calibration series is generated with the stock solution. The calibration series should consist of at least five calibration points evenly distributed in the expected concentration range.

It must be ensured that the entire detection substance is extracted from the Petri dishes in a defined manner.

The blank values of all collectors (e.g. filter paper) and solvents must be taken into account. Values from blank tests as well as zero values shall be taken into account in the calculated determination of the amount of detection substance sedimented into the petri dishes .

The detection limit and the determination limit must be determined for the detection substance and the analytical instrument used. Measured values below the detection limit are set to zero. Measured values between the detection limit and the limit of determination shall be set to the arithmetic mean of these two limits.

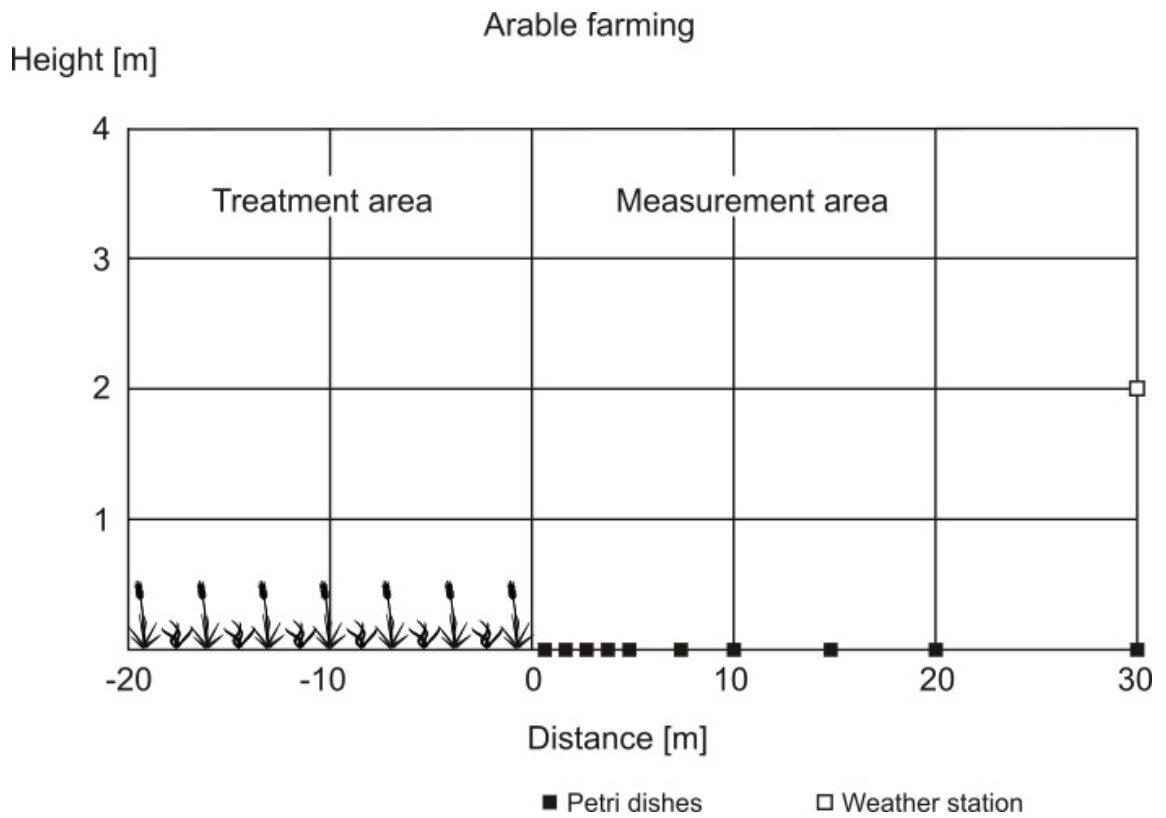
6. Documentation

The analysis results of the petri dishes and the weather data shall be documented as raw data. In addition, data on the arrangement of the trial and treatment area (e.g. number of rows, working width), on the crop (e.g. type of crop, boundaries/height of the crop, BBCH stage), on the trial liquid, on the crop protection device (e.g. nozzle type, pressure, application rate, travel speed, number of nozzles opened, arrangement of nozzles, target area distance), on the special settings and on the analytics must be recorded extra (e.g. using APPLCALC, www.julius-kuehn.de).

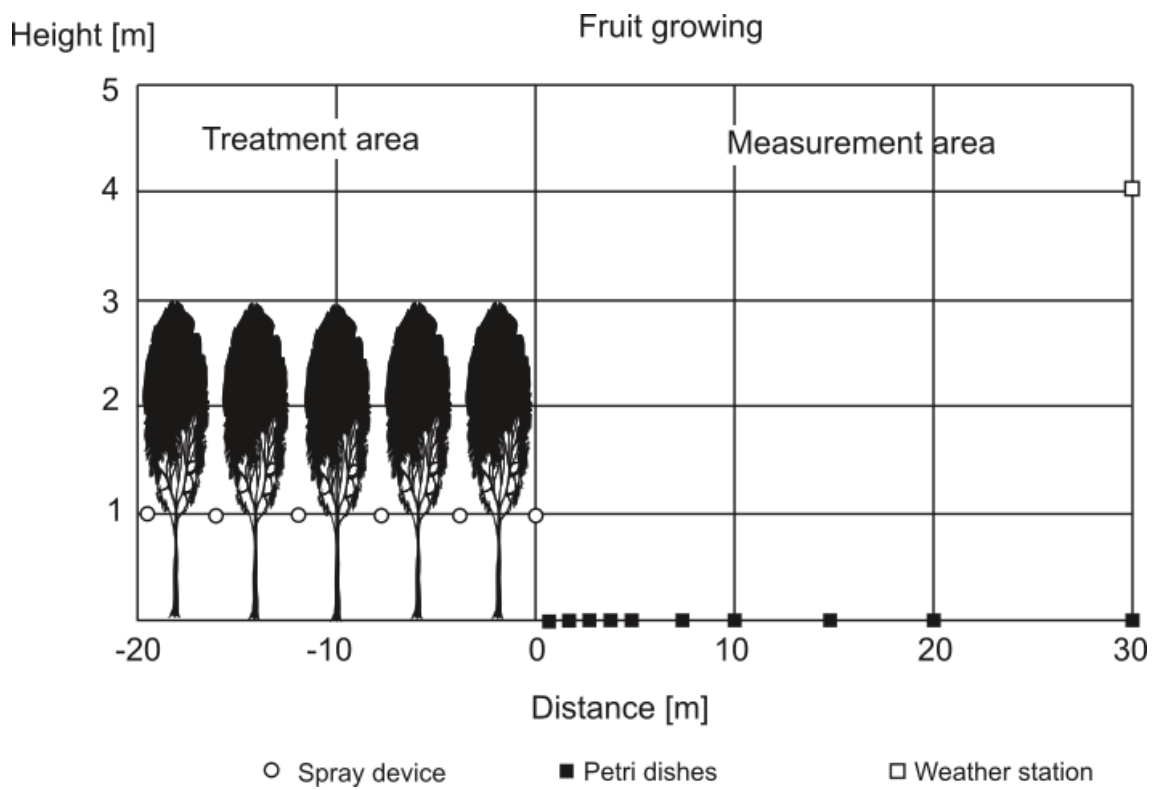
7. Come into effect of the guideline

This Guideline applies from 1st January 2021.

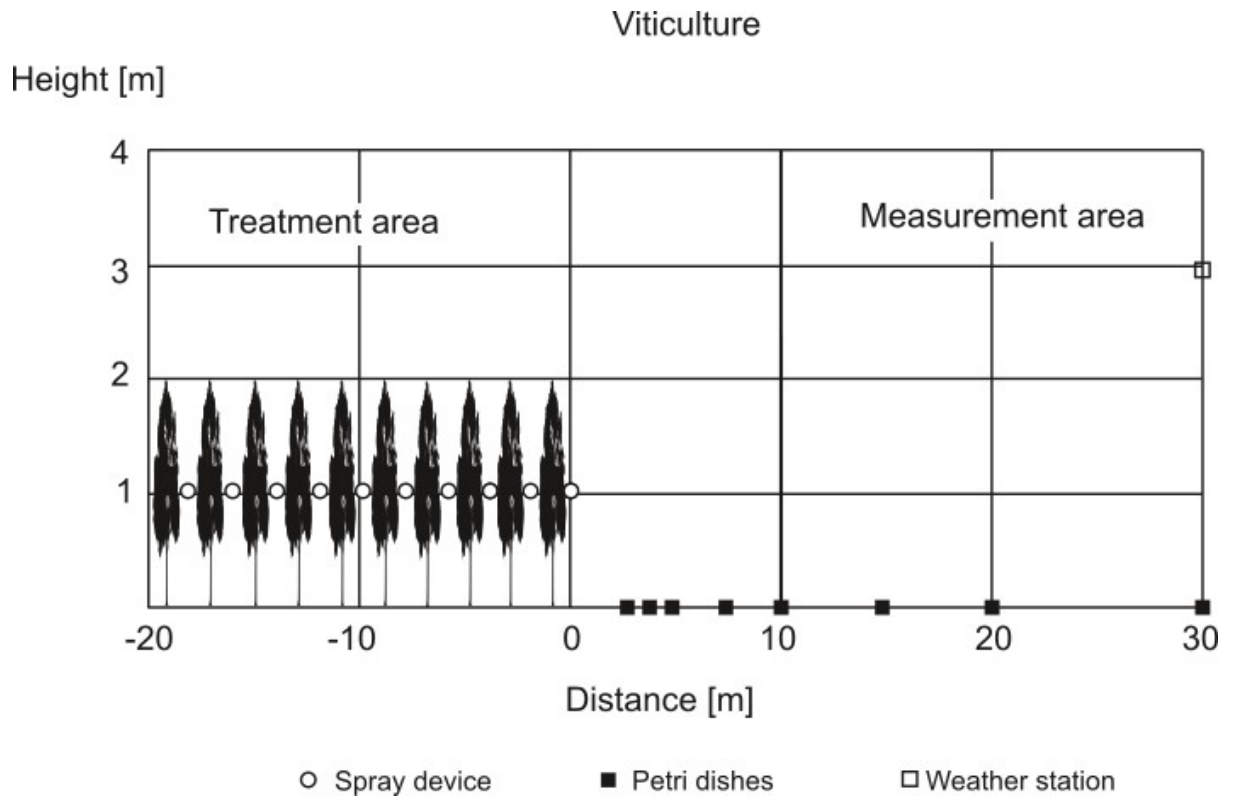
Appendix 1



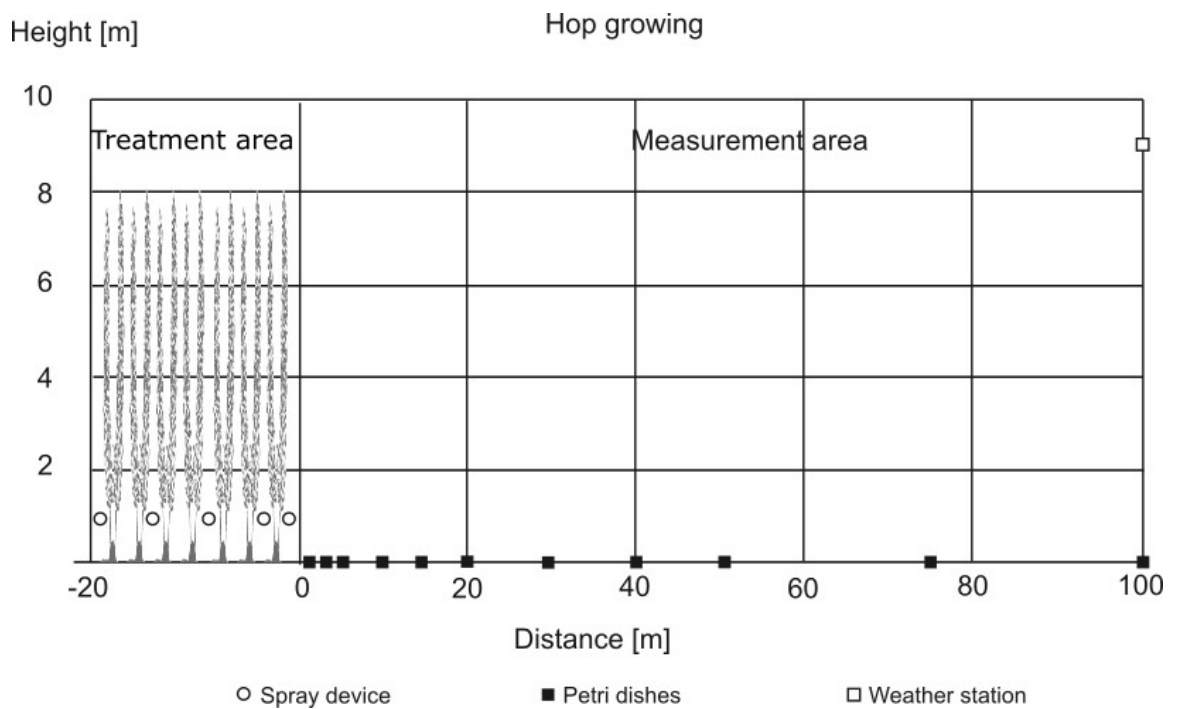
Appendix 2



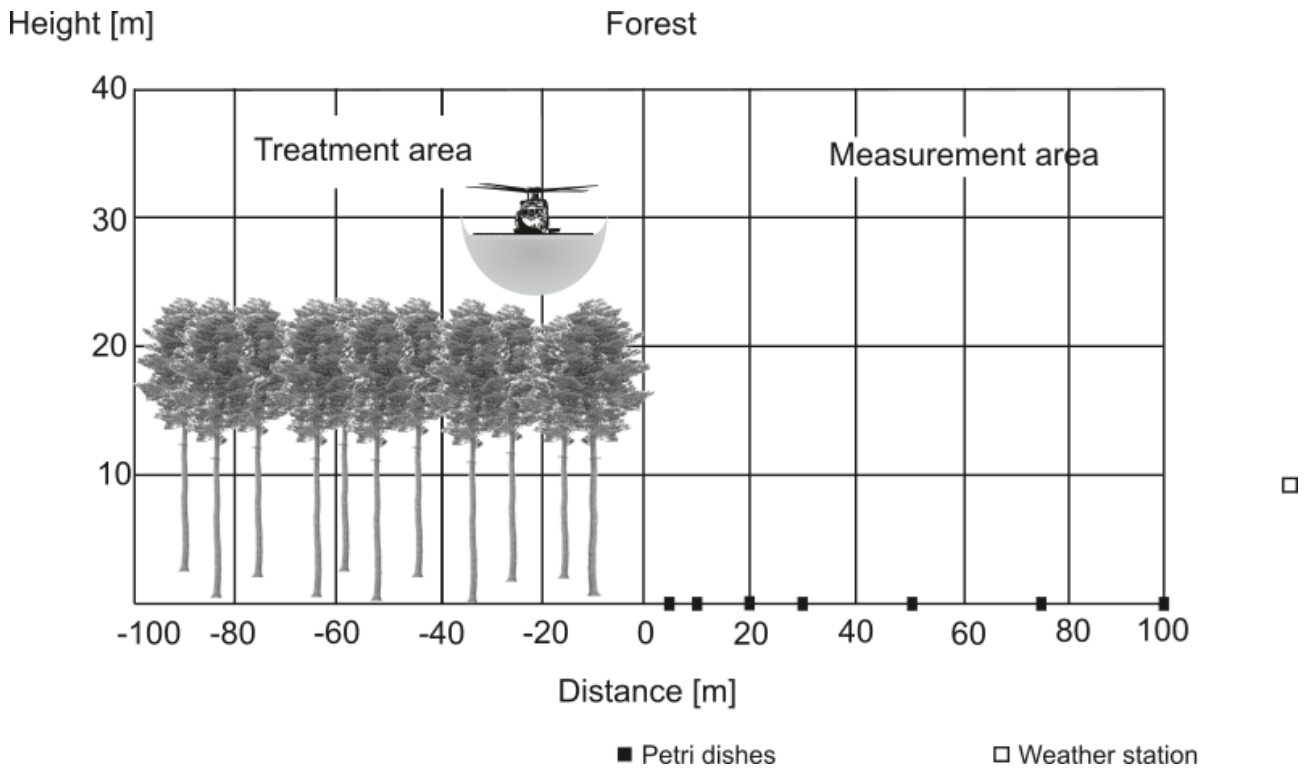
Appendix 3



Appendix 4



Appendix 5



Appendix 6

Weighting factors (%) for validation of weather data

Viticulture		Fruit growing	
Drive		Drive	
1	20	1	10
2	26	2	50
3	14	3	20
4	12	4	10
5	10	5	6
6	8	6	4
7	4		
8	2		
9	2		
10	2		