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Blower Calibration

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SCOPE
This procedure explains how to calibrate seed blower using the uniform blowing method for *Poa pratensis* and *Dactylis glomerata.*

RELATED DOCUMENTS
ISTA rules 3.4.2.1

RESPONSIBILITIES
Purity Committee: for updating the procedure

ABBREVIATIONS
UBP - uniform blowing point

PROCESS DESCRIPTION

1. CALIBRATION SAMPLE

1.1 Composition

Each calibration sample consists of defined amounts of heavy and light single florets. These are as follows:

Poa pratensis: approx. 0.85 g (0.9 g) of heavy florets, stained green, and approx. 0.15 g (0.2 g) of light florets, stained yellow;

Dactylis glomerata*:* approx. 2.77 g (2.8 g) of heavy florets, stained red, and approx. 0.30 g (0.3 g) of light florets, stained yellow.

(In brackets: samples produced before 2000)

1.2 Half calibration sample

When the purity analysis is carried out on half working samples, the calibration sample shall be split into two half calibration samples, following the procedure below:

1. Determine the uniform blowing point (UBP) with the whole calibration sample, following the procedure described in section 4: Determining the uniform blowing point.

2. Blow the calibration sample with a slightly higher blower setting. Remove and set aside the green florets present in the lighter fraction after blowing. This is the light green/red fraction. Return the yellow florets to the calibration sample.

3. Re-blow the calibration sample (minus the heaviest green/red fraction) with a slightly lower blower setting. Remove and set aside the yellow florets present in the heavier fraction after blowing. This is the heavy yellow fraction.

4. Separate the florets of the remaining calibration sample (minus the light green/red and heavy yellow fractions) by colour into the fractions heaviest green/red and lightest yellow.

   At the end of these four steps, four fractions are obtained: heaviest green/red, lightest yellow, light green/red and heavy yellow.

5. Divide each of these four fractions into two equal halves, with the same number of florets and the same weight.

6. Combine one of these half-fractions from each of the four fractions to form two new half calibration samples, each containing the same amount of lightest green/red, heaviest yellow, heavy yellow and light green/red florets.

7. Check the reliability of the half calibration samples:

• The UBPs of both half calibration samples should be identical. If not, repeat the procedure.

• Over 5 days, both half calibration samples are blown 15 (10) times.

• If the blower settings obtained from both the half calibration samples are identical, they can be used:

1.3 Storage

Moisture and insects may cause deterioration or damage to the calibration sample. It is therefore recommended to keep the sample closed in the jar in which it is received. Samples may be kept in a desiccator or in a cool location out of direct light, but may need preconditioning before use (see sections 5.2 and 5.3).

To prevent damage caused by insects, an insect deterrent may be placed in the desiccators.

1.4 Check of the calibration sample

The calibration sample must be handled with care to prevent loss of florets. Only a small portion of the green/red and yellow florets have a terminal velocity that makes them active in defining the UBP. The loss of a few of these can impact the UBP.

It is recommended that the calibration sample is weighed regularly by comparable humidity and temperature conditions (e.g before every use, check the total weight and compare it to the original acceptance weight), to have the calibration sample checked by the producer, to purchase a new calibration sample if the weight is below 0.95 g for *Poa pratensis,* or 2.85 g for *Dactylis glomerata*, or if many broken florets are observed in the sample.

It is also recommended that regularly, the heavy and light fractions are checked separately with regard to condition and weight composition. The following minimum weights of each fraction can be accepted:

Poa pratensis

light fraction 0.14 g (0.17 g)

heavy fraction 0.81 g (0.78 g)

Dactylis glomerata:

light fraction 0.28 g

heavy fraction 2.57 g

(In brackets: samples produced before 2000)

When a half calibration sample is used, these tolerances must be divided by 2.

1.5 Work area

The work area must be cleaned before any work begins. A purity analysis work board and a good light should be readily available near the blower for counting the misplaced florets during the calibration process.

2. BLOWERS

It is essential that the blower used for the uniform blowing method is kept clean and in good condition?. It is recommended to set up a scheme for maintenance and cleaning of the blower and tube, especially before calibration and re-calibration. Follow the instruction manual for maintenance, cleaning and repair.

Blowers of the General, Ottawa and Hearson types are suitable. If other blowers are used, they should have a synchronous or constant-speed motor, a good valve that is capable of fine adjustment, and a dial that is easy to set and read. A glass tube is desirable, because it permits ready observation of the blowing action. The tube should be treated with an anti-static solution. A plastic or Plexiglas tube should not be used for the uniform blowing method, because of electrostatic effects.

Glass tubes may be washed with warm water and detergent, rinsed with water, and dried with warm air. A light brush may be used to remove small particles.

Check the blower thoroughly before calibration to ensure that no particles are left which might contaminate the calibration sample. This includes checking the top of the blower and any screens and receiving pans. The grid or screen where the airstream passes through to take the seeds must be kept clean.

Samples of 3.0 g of *Dactylis glomerata* can only be blown if the diameter of the glass tube is at least 55 mm.

3. BLOWER WARM-UP

The manufacturer's instructions should be checked for the length of warm-up time required. Warm-up is recommended for all blowers.

4. DETERMINING THE UBP

4.1 Procedure for blower calibration

Prior to use, the setting of the blower must be such that the blower allows separation of the light and the heavy fraction. Therefore, a calibration sample is used to determine the optimum setting of the blower. The optimum setting is determined by adjusting the dial so that, after blowing, the number of light florets (stained yellow) which remain with the heavy fraction (stained green/red) is about the same as the number of heavy florets which are taken over with the light fraction. Then the UBP has been found.

When the blower is being set for the first time, the following procedure is suggested:

1. The time is set to exactly 3 minutes.

2. The calibration sample is blown.

3. The initial blower setting is adjusted according to the result obtained after the first blowing. If, for instance, too many light (yellow) florets are left in the cup with the heavy (green/red) fraction, the air pressure is too low. It must be adjusted so that only few light florets remain in the heavy fraction.

The blower must be adjusted so that finally the number of yellow florets in the green/red floret fraction is equal to the number of green/red florets in the yellow floret fraction.

The setting of the blower is at the UBP when:

a) three subsequent blowing have given adequate results (see points b) and c) below);

b) the maximum number of misplaced yellow florets in the heavy (green/red) fraction, or green/red florets in the light (yellow) fraction, is 20 for *Dactylis glomerata* and 40 for *Poa pratensis* in each of the blowing (10 and 20, respectively, for half calibration samples); and

c) the total of the differences between the misplaced florets of the individual blowing does not exceed 10.

Example 1

Misplaced greens/reds in yellow	Misplaced yellows in green/red	Difference
17	21	4
14	20	6
15	17	2
	Total of the difference =	12

If the number of misplaced florets or the difference of totals is above 10, repeat the procedure at a slightly diferent setting to obtain figures similar to Example 2 below.

Example 2

Misplaced greens/reds in yellow	Misplaced yellows in green/red	Difference
18	15	3
16	18	2
19	17	2
	Total of the difference =	7

4.2 Recalibration

The blower's UBP must be checked at regular intervals. The frequency depends upon the stability of the climate conditions of the room in which the blower is set up, the number of samples blown, the distribution of the work load over the year, etc. In the following cases, re-calibration would be required:

- after cleaning;
- after the blower has been moved;
- after lubrication;
- at any sign of instability of the blower;
- after repair.

5. EXCEPTIONS, SPECIAL CASES, PROBLEMS

5.1 Air gate lag

Some blowers have what may be referred to as 'air gate lag'. The air gate of the blower is moved by a worm gear which rotates as the operator turns the dial. Air gate lag is the distance the worm gear thread must rotate, when its direction of turn is reversed, before it begins to moves the air gate.

If the dial could always be turned forward to a higher reading, air gate lag would not be a problem. When a higher air gate setting is desired, the dial can be turned directly to a higher reading. However, to calibrate the blower or blow a sample, the dial must sometimes be reversed to obtain a lower setting. To avoid air gate lag, it is recommended that the dial be first reversed one full revolution below the desired setting, then turned forward to a new setting. This procedure for setting the blower at a lower reading is illustrated with the following example:

The blowing point was set at 11.10 and the next blowing should be made at 11.00.

The dial should first be reversed until the air gate reading is approximately 10.

The dial may now be turned forward until the reading is 11.00.

5.2 Drifting

When the blower is being calibrated, it may happen that the calibration point drifts during the calibration process. This will happen when the moisture content of the stained florets is not in equilibrium with the relative humidity of the air. This is likely to happen when the calibration sample is stored in a desiccator. To reduce this effect, the calibration sample must be removed from the desiccators and left without a lid for up to one day prior to the calibration, depending on the relative humidity of the ambient air in the blower area. If there is an unexpected need for calibration, the calibration sample may be repeatedly blown until the number of stained florets misplaced remains relatively constant at a given setting. Five three-minute blowing is usually sufficient.

5.3 Other recommendations

Before the blower is calibrated for the first time or after a long period without being used, it should be carefully checked that it is in good repair. The cup and glass tube should have a snug fit so that no air may leak and no florets are lost during blowing. If the blower has been used in the laboratory for a long time without servicing, the manufacturer's instructions should be checked. Usually the blower motor will need to be cleaned, lubricated or greased, small florets and inert material must be removed from the bottom of the air chamber.

If the calibration sample is kept in a desiccator or under conditions of temperature and humidity which are different from those of the samples to be blown, it may be desirable to use the blower warm-up time to precondition the calibration sample. The purpose of preconditioning is to bring the moisture content of the calibration sample into equilibrium with the atmosphere. The calibration sample should be poured into the cup and the dial set at a low pressure. The pressure should be sufficient to agitate the florets, but low enough to retain most of the yellow florets in the tube.

At any sign of instability of the blowing procedure, the blower must be carefully checked. One single missing screw may affect the pressure of the air stream. Appropriate action must be taken.

The blower works best under controlled temperature and humidity conditions. The relative humidity should be between 35–50% and the temperature between 20–25 °C. If the relative humidity is too low, electro-static effects may become more pronounced.

6. BLOWING

The blower is set at the calibration point obtained with the calibration sample. The working sample is poured into the cup and blown for exactly three minutes. This precision of the time of three minutes is important for both calibration of the blower and blowing of samples. After blowing, continue the purity test according to the current ISTA Rules.

For *Poa trivialis* and small-seeded varieties of *Poa pratensis*, use the factors given in the current ISTA Rules.

Precautions to prevent loss of florets also apply to the working sample. Therefore, the cup should be placed on a piece of paper when the working sample is being poured into it. Fine particles of sand, for example, may be sifted out by agitating the cup on the sheet of paper so that the sand can be added to the inert material. This precaution is important for samples containing sand. If such samples are not sieved, the fine sand may fall into the blower during the blowing procedure, and the pure seed percentage will be higher.

After blowing and before removing the cup with the heavy portion, check that there is no seed around the bottom of the glass tube where the tube fits over the cup. If there are seeds there, it is advisable to ensure that the seeds fall back into the cup by lightly tapping on the tube or using a brush. If the cup is removed without checking, any seeds which are there will fall into the bottom of the blower.

If there are many seeds stuck on the inside of the tube, because of electrostatic effects then the sample will have to be removed, the tube may need to be washed, dried and re-treated with an anti-static solution, and the blower may need to be recalibrated.

ANNEX
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DISTRIBUTION LIST
ISTA Website

REVISION HISTORY

Version #	Changes
2.0	Layout change