Tentative Instructions for the Climax Blowing of Kentucky Bluegrass1/ Seed

A.O.S.A. Bluegrass Studies Committee

I. Blowers -- advantages and disadvantages when used for a uniform blowing technic.

A. General information.

1. Synchronous vs. induction motors.

Induction motors (sometimes called constant speed motors) have some reduction of speed when under load. This reduction in speed is usually referred to as "slip". The percentage of slip for induction motors, under full load, is about 5.0%. Blower motors probably do not operate near capacity; nevertheless, there is always some load and there will be some slippage. Cold motors will have more slip than warm motors. Therefore, a warm-up period for induction motors is desirable. A variable electrical supply may also cause "slip". When voltage falls, slippage is increased. If voltage varies more than 3 - 5%, a voltage regulator should probably be used. Voltage may be checked with a voltmeter.

Synchronous motors have no reduction in speed under ordinary operating conditions. Motor speed is based on the frequency of the current (cycles per second). As a consequence, temperature or a small variation in voltage should have no effect.

The Ames, Erickson, Ottawa and Chas. Hearson blowers all use induction motors. The General blower has a synchronous motor.

2. Large vs. small motors.

It is generally considered that a large motor will run more evenly than a small motor. However, this may only be true when the motors are loaded to near capacity. Under seed laboratory operating conditions, there is probably little difference in the performance of a large or small motor. A small motor which runs at a high speed will, however, be more noisy. This is true for the Chas. Hearson blower motor.

1/ Kentucky bluegrass only refers to "common" Kentucky bluegrass and does not include any of its varieties.

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3. Pressure Chambers.

Some blowers have pressure chambers. It is problematical whether a pressure chamber has value; therefore, this feature will not considered in the following evaluation of blowers.

4. Worm gears.

Four of the blowers (the Ames, Ottawa, Chas. Hearson and General) use a worm gear to open and close the air gate valve. Worm gears generally have some lag when the direction of turn is reversed. This has no influence on the manometer settings (for the Ottawa and Chas. Hearson) or on the dial setting in the case of the Ames blower. However, this must be taken into consideration in the case of the General blower. This is discussed in section II E 3.

B. Specific information.

1. Ames blower.

a. Advantages.

(1) Has a metal tube which eliminates static electricity.

(2) Performed well in 1956 trials in which the Ames, Ottawa and Erickson blowers were compared.

b. Disadvantages.

(1) Trap is too small to hold all the inert material in a light bushel weight sample. This necessitates the use of a two blowing system.

(2) Has a small dial and vernier which makes setting difficult.

(3) Blower can no longer be purchased. Many of the Ames blowers, now in use, are possibly in poor condition and need repairs.

2. Erickson blower.

a. Advantages.

(1) Analyst can see blowing action because of plastic tube.

(2) Settings are easy to make.

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b. Disadvantages.

(1) Static electricity is a nuisance with small-seeded crops.

(2) Dial settings are not sufficiently discriminating.

(3) This blower did not produce as uniform results as the Ames or Ottawa blowers in the 1956 study.

3. General blower.

a. Advantages.

(1) Effects of static electricity are insignificant.

(2) Utilizes a glass tube so analyst may see blowing action.

(3) Dial setting is easy to make.

(4) Has a synchronous motor which should produce more uniform air pressure and should eliminate the necessity of "warm-ups". Motor is very quiet.

(5) The cup is easy to load and empty because the glass tube need not be removed. The pan for inert material is also easily emptied.

(6) Preliminary trials have indicated that uniform results can be expected.

b. Disadvantages.

(1) Dial setting is with a worm gear which may cause an "air gate lag".

(2) Light seeds sometimes lodge on the bottom of the curve of the large tube. This makes blower calibration somewhat difficult.

4. Ottawa blower.

a. Advantages.

(1) Effects of static electricity are insignificant.

(2) Utilizes a glass tube so analyst may see blowing action.

(3) Uses a manometer to offset effects of barometric pressure. Barometric pressure may be of little or no importance.

(4) This blower performed well in the 1956 bluegrass studies.

b. Disadvantages.

(1) Manometer settings are not as easy to make as conventional settings.

(2) It is a nuisance to remove the tube to load the cup or to remove the glass settling chamber to obtain the inert material.

(3) Blower can no longer be purchased. Some of the blowers in use are not in good repair. The Ottawa blower has been replaced by the Chas. Hearson.

5. Chas. Hearson.

This blower has many of the same advantages and disadvantages of the Ottawa blower. It is suggested that those who have the Chas. Hearson blower, refer to the mimeographed booklet "Description and Use of the Improved Type Ottawa Seed Blower" by E. W. Debney.

a. Advantages over Ottawa.

(1) The cup can be filled and emptied without moving the glass tube. The tray for inert can be removed without lifting the settling chamber.

(2) The Chas. Hearson performed well (as did the Ottawa) in preliminary trials.

b. Disadvantages as compared to Ottawa.

(1) The manometer is mounted in the blower itself. When mounted on the blower rather than on a solid wall, the manometer setting may be in error if the blower has been unknowingly moved.

(2) Readings of the manometer vary as much as $\pm$.2 while the blower is in operation. Blower setting takes this into consideration; nevertheless, most conscientious analysts may worry about it.

(3) In general, the blower is not as well made as the original Ottawa blower.

(4) Since this is made in England it is not as convenient to purchase and it will be more difficult to obtain replacement parts.

Climax Blowing -- Continued

II. Calibrating blowers with stained samples.

A. Blower repair.

It is essential the blower be in good mechanical condition. Necessary repairs should be taken care of before the blower is calibrated. Also, if the blower motor needs oiling, this should be done before the climax blowing point is determined because oiling may somewhat affect the speed of induction motors. Anytime alterations are made which may affect blower performance, the blower should be recalibrated.

B. Cleaning blowers.

The cup screens, and in the case of the Ames and Erickson, the cap screen should be kept clean. It is suggested that a cloth, slightly moistened with benzene or with a 50% xylene - 50% alcohol mixture, be used to gently clean these screens before setting the blower and at least once a week thereafter. Five minutes should be allowed after cleaning to permit the cleaning solution to dry. A light brush may be used to remove extraneous materials between blowings.

C. Care to prevent loss of seeds.

Care should be exercised to prevent loss of seeds in assembling and disassembling the blowers. If the Erickson or Ames blower are used, particular care needs to be taken. The joint between the cup and plastic column of the Erickson blower has a tendency to catch and retain light seeds unless the column goes all the way down to the lip of the cup. The trap and the top of the cup are the two critical places on the Ames blower. Seeds near the edge of the trap may fall back into the cup as the column is removed. Careful handling will prevent this from occurring. Unless the top of the cup is gradually tapered to meet the column, light seeds will rest on the top edge and fall either to the outside or into the cup when the column is removed. If the cup of your Ames blower is not gradually tapered at the top, it is suggested that a small file be used to taper it to approximately a 45° angle.

D. Setting the climax blowing point.

The object in setting the blower with a stained sample is to determine the dial or manometer setting at which the number of red seeds remaining with the unstained portion (heavy seed) and the number of unstained seeds blown into the stained portion (light seed) is approximately the same. This is the climax blowing point.

Climax Blowing -- Continued

If you have never set a blower for a "uniform blowing" the following procedure is suggested. Warm up the motor (except the General blower) by turning it on for 10 minutes. For each blowing of the stained sample, set the time for exactly 3 minutes. If you do not know approximately where you should begin your first blowing, it will be evident after your first trial. If you are not near the climax blowing point, many seeds will be misplaced. For example, if there are 100 or more stained seeds left in the cup with the unstained seeds, the pressure is not high enough; conversely, if numerous unstained seeds have been blown over, your setting is too high. At first, use large changes in dial or manometer settings (for example try a setting of 15, then 20, then 25 on the Erickson blower; 20, 25, and 30 on the Ames blower; 6, 9 and 12 on the General; 3.0, 4.0 and 5.0 on the Ottawa) so you may quickly learn the approximate climax setting. After you know the approximate setting, make smaller changes. When you have no more than 40 misplaced seeds left in the unstained portion, or in the stained portion, you are near the correct blower setting. Make small subsequent changes (for example 10.9, 11.0, etc. on the General blower). At the climax blowing point, approximately the same number of stained seeds should be left in the unstained portion as unstained seeds in the stained portion. For guidance purposes, when the difference between the number of stained and unstained seeds misplaced is less than 8, we may consider that we have located the climax blowing point.

Before proceeding with your first "working sample", it is best to recheck the climax blowing point. Suppose you have determined the climax blowing point to be 11.0 on the General blower. Turn the dial back to 10.5 (refer to section on air gate lag in section II E 3) then to 10.8 for the first blowing, 10.9, 11.0, 11.1 and 11.2 for additional check blowings. Record the number of misplaced seeds at each blowing.

E. Setting the Ames, Erickson, General or Ottawa blower at the climax blowing point.

1. Ames blower.

The motor should be turned on for 10 minutes and allowed to warm up. It should then be turned off and the climax stained sample placed in the cup. Refer to section II D "Setting the climax blowing point".

The Ames blower trap at the upper end of the column is quite small, necessitating the use of a "two blowing system". With the "two blowing system", the first setting should be 2.0 below the second setting. Suppose you decide to make the first blowing at 26.0, then the second should be made at 28.0. Put the blower column and upper cap in place and set the dial at 26.0. Turn on the motor and allow it to run for 2 minutes.

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Empty the contents of the trap into a container, reassemble the blower, set dial at 28.0 and blow for an additional 2 minutes. Empty the contents of the upper trap into the same container. Count the unstained seeds which blew into the trap and the stained seeds which remained in the cup. If the number of misplaced seeds in the heavy and light portion are not approximately the same, rerun the entire sample again at appropriately altered dial setting.

2. Erickson blower.

It is suggested that you use the small portable blower for your work. If you do not have a small blower, the large Erickson blower may be used. However, you should use the small column designed for use with small-seeded grasses. In preparation for the setting of the climax blowing point, and prior to blowing subsequent samples to be tested by the climax blowing procedure, the motor should be turned on for 10 minutes to permit it to warm up. It should then be turned off and the stained sample placed in the cup. Refer to section II D "Setting the climax blowing point". Suppose you decide to make your first blowing at 21. Put the blowing column and cap in place with the cap set at 21. The motor should be turned on and allowed to run for exactly 3 minutes. If the number of seeds misplaced in the heavy and light portions is not approximately the same, rerun the entire sample again at an appropriately altered dial setting. Reset the blower and rerun the climax stained sample as many times as is necessary to establish the climax point. Once the climax blowing point is obtained, the cap should be carefully taped at the desired setting so it cannot be unknowingly moved.

3. General blower.

If you have both the small and large tube for the General blower, you have four combinations available for your use: small tube with bleeder valve open or closed and large tube with bleeder valve open or closed. Preliminary studies have indicated that somewhat more uniform test results are obtained with the large tube than the small tube.

The General blower may have what we refer to as "air gate lag". The air gate 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 move, when its direction of turn is reversed, before it moves the air gate. It is important not to overlook this air gate lag, particularly in setting the blower with a stained sample. Possible errors due to air gate lag may be prevented by always turning the dial in the same direction when making a setting. The common practice with a mechanical device using a worm gear is to always make the setting by turning from a low to high reading. Obviously the direction of turn must sometimes be reversed.

Climax Blowing -- Continued

We may illustrate air gate lag in the General blower with the following example:

Suppose you have just had a blowing at 11.00 and decide that the next blowing should be made at 10.90. If the blower air gate has a lag of .15, the dial must be reversed until the dial reading is less than 10.75 (say 10.50) and returned to 10.90. If it is turned directly from 11.00 to 10.90 without "overshooting" 10.75, the 10.90 blowing will actually be made at the 11.00 blowing pressure.

When you are ready to calibrate your blower, assemble the blower tube, receiving pan etc. No warm-up time is necessary. Refer to section II D "Setting the climax blowing point". Using the large tube with the bleeder valve closed, the climax blowing point will be somewhere near 11.0. Whole numbers are read above the air gate, tenths are read on the dial. Put the climax stained sample in the cup and turn the time to exactly 3 minutes. If the climax blowing point is not obtained, rerun the entire sample again at an appropriately altered dial setting.

4. Ottawa blower.

The motor should be turned on for 10 minutes before calibrating the climax blowing point. After warm up, and with the motor at rest, the manometer scale should be adjusted to 0. Turn on the motor, but before placing seed in the cup, open the air gate gradually until the manometer fluid is exactly up to 3.7 on the manometer scale. Note that the manometer reading is obtained without a sample in the cup. Stop the motor and place the stained sample in the cup. Reassemble by putting the cup and blower tube in place, switch on the motor and run for exactly 3 minutes. If you find that 3.7 is not the climax blowing point, reset and reblow the sample, as described in section II D, until it is obtained.

III. Procedure for purity separation.

A. Blowing

Set the blower at the setting or settings you obtained with the climax stained sample. Blow for exactly 3 minutes with the Erickson, General or Ottawa and for two 2 minute periods with the Ames blower.

Climax Blowing -- Continued

B. Separating the "heavy portion".

After the blowing has been completed, the heavy portion in the seed cup should be placed on the work board. All Kentucky bluegrass florets (including multiple florets) are considered pure seed. The other crop seeds (including other Poa spp.), weed seeds, stems, sand etc. should be separated from the Kentucky bluegrass florets and classified as specified in sections 2.8, 2.9, and 2.10 of the Rules.

C. Separating the "light portion".

Contents of the lighter portion should be separated into other crop seeds (including bluegrass florets other than Kentucky), weed seeds and inert material. All Kentucky bluegrass florets should be left in the inert material. Bluegrass florets, other than Kentucky, should be removed and classified as to other crop seeds, weed seeds or inert in accordance with sections 2.8, 2.9 and 2.10 of the Rules.

D. Purity analyses of Kentucky bluegrass in the "rough" (non-milled). Purity analyses of non-milled samples should be made by the hand method. The analyst should "draw the line" between pure seed and inert so that purity results on these samples correlate with test results obtained by the climax method on other samples

The codfish lays ten thousand eggs,
The homely hen lays one.
The codfish never cackles
To tell you what she's done.
And so we scorn the codfish,
While the humble hen we prize,
Which only goes to show you
That it pays to advertise.