

Cross Pollination of Wheat

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ABSTRACT All species of *Triticum* are crossed in essentially the same manner. Minor differences in technique are related to flower structure. The species used in the slides is common wheat (*Triticum aestivum* L.). The emasculation and pollination techniques shown are the most widely used today. However, other techniques have been described. Wheat commonly is crossed by hand pollination or by approach crossing, so both methods are illustrated. Approach crossing can be used effectively to obtain crossed seed with a minimum of labor in both the field and greenhouse. Seed set from approach crossing is generally high. Hand pollination requires more labor, is slower, but a larger number of crosses can be made from one pollen parent using this technique.

A slide set showing a rapid method of scissor emasculation and mass pollination of wheat and barley has been developed by D.G. Wells for personal use. The objective of our slide set is to show the step-by-step procedure of the approach and hand pollination crossing techniques, which are the most commonly used of all procedures for wheat. It would be a valuable visual aid for a variety of audiences and would appropriately supplement a lecture on the subject for students, research associates, trainees, and workshops. The slide set with a narrative could be used for independent study in audio-tutorial sessions or minicourses. It could be adapted to many situations and the techniques described used on a wide variety of wheat cultivars.

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The set consists of 26 close-up pictures, which are divided into three basic parts.

Part 1. Emasculation: The first 11 slides show the mechanical, hand preparations of the spike, spikelets, and anthers. Also included is a demonstration of several bagging methods. The first slide displays the equipment needed to complete the process of crossing. The rest show the sequential steps involved in the emasculation and preparation of the female plant.

Part 2. Hand Pollination: The next two slides demonstrate the procedure for hand pollination utilizing forceps. The

critical factors needed to guarantee success of this most important step are noted.

Part 3. Approach Crossing: The next 13 slides elaborate on the approach crossing technique as first described by Curtis and Croy (1958). They illustrate the selection and preparation of male spikes for pollination. The technique of holding pollination spikes in plastic soda straws as developed by R.E. Allan and C.J. Peterson at Washington State University is also described.

Narratives for five selected slides are listed below. A photo of each corresponding slide for each narrative is given in Fig. 1 to 6.

Slide 4 (Fig. 1). The central florets of each spikelet are generally removed with forceps, leaving two lateral florets in each spikelet. Often a spikelet on a well-developed spike will have more than one central floret. Care should be taken to ensure that the entire floret is removed because the anthers and ovary of the central floret frequently will slip out of the lemma and palea and remain in the spikelet. If central florets are well developed and are needed for additional seed set, they may be left and emasculated in the same manner as lateral florets.

Slide 10 (Fig. 2). The anthers should be counted to ensure complete emasculation. Infrequently one or more anthers will have aborted, leaving only a colorless "shell" at the base of the ovary. It is recommended that the florets within a spike be emasculated in an orderly sequence; otherwise one floret may be missed, which will contaminate the entire head.

Slide 13 (Fig. 3). A spike from the male plant that contains mature anthers ready to dehisce is selected before any anthers have been extruded from the spikelets as shown. If the emasculated spike is rather immature the male spike also should be somewhat less mature. If present, the awns are clipped, but no spikelets of florets are removed from the male spike.

Slide 17 (Fig. 4). The soda straw is filled with water every 1 or 2 days to keep spike and pollen viable. The

wrapped spikes are shaken when they are watered to aid in pollen disposal. Note the male spike is positioned above the female spike.

Slide 20 (Fig. 5). Insert the spikes firmly into the pocket with the bottom of the wrap approximately 1.27 cm (0.5 inches) above the soda straw.

Slide 23 (Fig. 6). Beginning near the spikes, wrap the entire paper tightly around them. Finish by folding the point snugly around the stems at the base of the wrap and fastening with a staple or metal fastener. Be careful not to crush or break the stems during wrapping. The cross should be properly identified.

A narrative, six pages in length, is available, which completely describes each step and slide in detail relative to how, when, and why. Sufficient information is provided to give the user complete detail about each step using

technical and biological terms. Descriptions of the proper growth stage or condition provide the learner with a complete picture of the skill required and how to recognize the requirements of each step being performed.

The slide set, coupled with demonstrations and actual hands-on practice, should provide the means of effectively teaching the learner. Almost everyone can become basically trained in the skill of crossing wheat in a matter of a few hours. Following that, practice will make perfection.

The slide set is available from Dwane G. Miller, Plant and Soil Science Department, Texas Tech University, Lubbock, TX 79409.

Reference

Curtis, B.C., and L.I. Croy. 1958. The approach method of making crosses in small grains. *Agron. J.* 50:49-51.

