

HYBRIDIZING WHEATS.

The process of hybridizing plants consists in bringing the pollen contained in the anthers of one flower in contact with the stigma, or top of the pistil of another flower to be impregnated. This process is used for the purpose of originating new varieties, whether of fruits or vegetables or grains, but is still in its infancy. By means of hybridization the qualities of each of the original or parent fruit or grain are imparted to the offspring, making a new and it may be a superior variety to either of the parent varieties.

But little has yet been accomplished in hybridizing wheat by this artificial process of fecundation, and the intricacy of the experiment and the nicety with which it must be executed to insure success is likely to deter most persons from undertaking it. Still as by this process it is possible to secure new varieties of wheat, which ripen earlier, and are more hardy and productive than the present ones, it is important that it should be more generally understood. In these remarks, hastily and a little crudely brought together we will endeavor, by means of a few engravings to illustrate as clearly as we can the method of accomplishing it. Perhaps as much difficulty lies in the way of securing the proper conditions of the parent varieties, necessary to secure success, as in skilful execution of the work. We think more. The two varieties with which it is proposed to make the experiment must have advanced to the same degree of growth at the same time. Impregnation cannot be effected unless the flower of each expand or bloom at the same time. When this is the case with the parent heads of wheat, they being male and female, the time for the experiment is just before the anthers project out of the glumes. Select if possible, a warm still day, and operate in the middle of the day, which seems to be the time most likely to meet with success. Lest a spell of bad weather should occur, just at this time, and interfere with the process, it is well to have several varieties of wheat growing near together, ripening at different times. These will give the operator a number of chances if some should fail through bad weather. The anther must be taken out at the very time that it rises above the pistil, for immediately after this it bursts, discharges the pollen and fecundates the pistil. The operator should be provided with a magnifying glass, and a very sharp and slender pair of scissors, with which to clip out the anthers without bursting them. It is a simple but delicate operation. The experimenter should carefully observe the moment when wheat first comes into bloom to make his experiments. If the first attempt be unsuccessful he has opportunities to try again.

Experiments made in hybridizing plants have by no means confirmed the hybrid origin of forms apparently intermediate between other species, and which were once regarded as probable hybrids produced in a state of nature. The interference of man is usually necessary to effect an intermixture, and even then, though experiment has proved it possible, it is by no means of easy accomplishment. The predilection of the plant for pollen of the same kind appears to be very strong. If pollen both of the same and of another kind be applied to the stigma of a flower, the fruit is the same as if only its own pollen had been there. The hybridizer must therefore be very careful to cut away the stamens at the proper moment, and be equally careful that no pollen escapes from them, and that he deposits some of the pollen with which he wishes to impregnate.

With all the precautions he can take his operations will often result in failure.

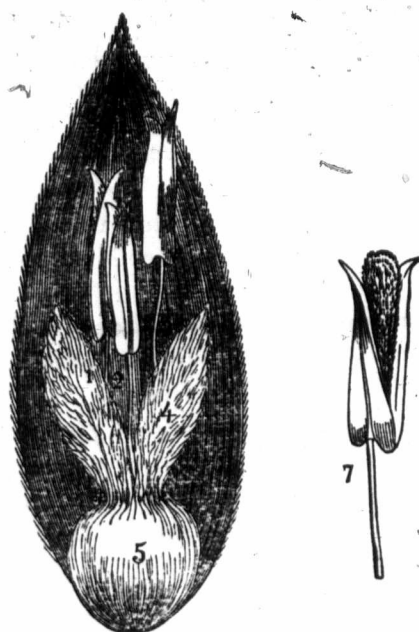


FIG. 1.

Engraving No. 1 correctly represents the interior view of a glume of wheat, the inner surface of the chaff or husk, and the interior condition of the glume at the proper moment for hybridizing, as it appears when magnified. 5 is the ovule, or the young wheat grain just forming. 4 represents the pistil, or female portion of the flower. 1, 2, 3, the anthers or male portions of the flower. These contain the pollen which impregnates the ovule. This also represents the exact time when the anthers marked 1, 2, 3, must be taken out of the flower in order to succeed in the experiments. If not immediately removed they burst, discharge their pollen, and resemble that marked 7. It is then too late. With the long sharp scissors the operator opens the glume as in Engraving Fig. 2, gently, and if the young plant appears as has been represented, it is ready to be



FIG. 2.

operated on. He cuts off the anthers at the places marked 1, 2, and 3, takes them out carefully so as not to burst them. When they are removed he produces the anthers from the wheat plants with which he wishes to impregnate the plant, partly bursted as in No. 7, in Engraving 1, and scrapes off the pollen with a finely pointed knife or a camel hair brush upon the pistils from which the anthers have been removed. After depositing the pollen from four or five of the anthers upon the pistils, he closes up the glumes or chaff care-

fully, to prevent other pollen from blowing into it, and to protect it from accident or injury. It is best to secure it by tying the ends of the chaff together at the top, by a silk thread, and letting it ripen. To increase the chances of success there should be a number of plants grown, so that several may bloom at the same time. They should be planted in rows, near together, so as to be convenient for the experiments.

When the plants, upon which hybridization has been attempted ripen, the seed should be gathered carefully, and sown where there is no other wheat near, and carefully observed. If it prove hardy and early, and partakes of the qualities of both parents it should be carefully sown again, and the results noted, until it be fully determined whether it be a hybrid or not. But if it presents no advantages over either of the parents, it is no true hybrid and should be discontinued.

It is thought that hybrids partake more largely of the qualities of the male plant than of the female. In hybridizing the pollen should be taken from the best and hardiest varieties, as it is more likely to produce a valuable hybrid. The question of continued fertility, or endurance of hybrids is one having important relations to this subject. Most probably, like the parent plants, some will deteriorate speedily, while others will grow better by use, and last a long time. It is to the advantage of wheat growers to have a variety of hybrids, and select from them those which experience proves to be the best in point of quality, productiveness, hardiness and earliness. The best white and amber wheats grown in the country are believed to be accidental hybrids, and have established their superiority over all others.

In conclusion I may add that the successful experimenter is one who is not discouraged by repeated failures, and is willing to try again year after year.

This is especially essential in hybridizing wheats. Some seasons unpropitious weather causes failures. Again after the experiment has been performed under favorable circumstances, a long time is required to prove the work, to determine if the results are real hybrids, whether they are profitable, and possess the qualities that are sought.

Mr. G. A. Deitz, editor of the "Experimental Farm Journal," is practically experimenting in Hybridizing. He has kindly lent us the accompanying illustrations. His paper is edited in Chambersburg, Pa., and is only \$1 per annum.

WHEAT BLOSSOMS AND THE WHEAT FLY.—Mr. T. Ross, of Bachelton, Perth, says in a recent letter, that the want of grain in the ears of wheat is not owing to the wind blowing away the blossoms. "Whenever the blossom appears inside the chaff or husk, the sooner it comes off the better, whether blown by high winds or otherwise. It is when

the blossom remains inside the chaff or husk too long that all the mischief is done; and moreover it is invariably in quiet dull weather that the wheat fly (one of the wheat farmers' greatest foes) is best able to deposit its eggs, to hatch its young, and bring forth for the destruction of future crops whereas in the critical blooming season, if we have a blow of wind, we escape such a result comparatively.