1. Pollen restoration.

All sources of inbred I153 (from Iowa, Indiana, Minnesota, Wisconsin, Connecticut) restore pollen production to all T sterile inbreds and single crosses tested; 10 different single cross progenies and 12 different 3-way combinations were grown. In time of shedding in relation to silking, in sequence of anther dehiscence on the tassel, and in amount of pollen produced, restoration seemed to be completely normal on all plants grown. WF9T sterile restored by various sources of I153 were used as pollinators on several different sterile single crosses. Five progenies were grown and produced 39 completely fertile and 28 completely sterile plants indicating that I153 has one dominant gene capable of complete pollen restoration for the T type of cytoplasmic sterility.

When these same I153 lines were crossed on the S type of sterility, in single cross and 3-way combinations, all of the progenies were sterile. Either no anthers were produced or a few plants produced some anthers that were almost entirely devoid of well filled pollen grains. Therefore I153 is a good inbred to differentiate between S and T sources of cytoplasmic pollen abortion.

The three single cross combinations of Ky21, Tx127C and NC77 were used as pollinators on standard WF9T sterile single cross seed parents. In a total of 143 plants in 10 progenies all were normal in pollen production except four plants in one progeny which were completely sterile. These could be outcrosses. All three inbreds apparently have the same pollen restoring gene in common. Two of these same inbreds in combination with Oh41 produced 32 fertile and 25 sterile plants, and with A71 32 fertile and 35 sterile plants. Both Oh41 and A71 in combination with Ky21 and Tx127C add little or nothing to the pollen restoring ability of these good restorers.

Oh29, Oh41, A71, and M14 alone or in combination show partial restoration of the T type of sterility. The results are highly variable in combinations with different inbreds but the same combinations perform about the same when grown in widely different places throughout the northern corn growing regions from the Atlantic seaboard to the Missouri Valley.

Oh41 is a better restorer for the S than the T type of pollen sterility. Oh29 and A71 have not been tested on 8 adequately. M14 has no ability to restore the S type.

Good restorers when crossed on to T sterile inbreds show a wide range of segregation in F_2 selfed generation progenies varying from 3.75 to .50 fertile to 1 sterile plant. Oh41 on T sterile likewise segregates in F_2 selfed progenies varying from 1.50 to .25 fertile to 1 sterile. This indicates either variable number of complementary genes or variable potency.

An S sterile inbred (A158S) converted to fertility by outcrossing by Ky21 and backcrossing on the original S sterile inbred (A158SF4) has good restoring ability on other S sterile inbreds. Seven different progenies were grown. When tested on T sterile inbreds in seven combinations, six were completely sterile. One showed 11 fertile and 8 sterile plants. Therefore

backcrossing four times on S sterile plants eliminated all of the T restoring genes in six out of seven backcrossed progenies and S and T restoration must be due to different genes.

D. F. Jones