

## 1. Cytoplasmic pollen sterility.

Additional evidence has shown clearly that the different sources of cytoplasmic pollen abortion behave differently in crosses with the same inbreds. Many lines that cannot be sterilized satisfactorily by one source can be sterilized completely by another and maintained in a sterile condition for successive generations in backcrossed lines and in first generation crosses. On the other hand, inbreds that cannot restore fertility to a cytoplasmic sterile line of one source may be able to restore fertility to the same inbred line when sterilized by a different source. This shows that the various sources of cytoplasmic sterility differ in their interaction with the same genomes. Five different sources are being studied.

All sterile lines that have been converted to a uniform type and maintained by backcrossing in successive generations (some for eight generations) have shown a few plants returning to partial fertility. These plants that are apparently not outcrosses occur with low frequency, usually not more than 1 in 800 to 1000. No completely fertile plant has been found so far but they produce sufficient pollen to be maintained by self-fertilization. The offspring are variable in the number of anthers exposed and in the amount of normal pollen produced. Some individuals return to complete sterility but, so far, none have been restored to complete fertility. These partially fertile plants cannot be attributed to outcrossing and must be due either to variation in the cytoplasmic state or mutation to pollen restoring genes. These possibilities are being tested by crossing by normally fertile lines free from restoring genes and on to completely sterile lines of the same genic constitution.