

tinguishing among cytoplasm. If it is true that variegation is more frequent in the WF9 S steriles, this would mean that the normal and sterile cytoplasm differ not only in their effects on pollen viability, but also in the cytoplasmic factors whose response to a WF9 nucleus produces the chlorophyll abnormality. Also, there is some indication of differences in the response of cytoplasm A - H. In short, it is suggested that the relative frequency with which cytoplasmically inherited plastid alterations occur in the presence of a WF9 genotype may be used as a criterion for characterizing different cytoplasm. This is only a speculation, and further investigation is needed to establish the validity of this approach.

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4. The origin of cytoplasmic sterility in maize.

So far all of the many different sources of cytoplasmic male sterility or pollen abortion fall into two distinct groups which we have designated S and T. These two plasmatypes together with the usual cytoplasm, which may be called the M type, found in most of the cultivated maize varieties commonly grown throughout the world, form three distinct classes of cytoplasmic differences. Their classification is based on their interaction with fertility restoring genes. It is possible that these cytoplasm originated in the different species that are considered to have had a part in the development of cultivated maize. These are the primitive pod corn or pro-maize described by Mangelsdorf, *Tripsacum* (gama grass) and *Euchlaena* (teosinte). Mazoti has shown that chlorophyll genes that are aberrant in maize cytoplasm are normal in teosinte cytoplasm. This is evidence that teosinte cytoplasm is different from that of *Zea mays*.

If this conjecture should be borne out by more complete evidence it would show that cytoplasmic differences are permanent over very long periods of time and that they are more important in the origin and separation of species than is generally realized.

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5. The performance of restored-sterile hybrids.

Many double crossed hybrids made on sterile seed parents with various non-restoring and restoring pollinators have been compared in yield, time of maturity, and stalk quality. The results are given in our annual corn report (Conn. A. E. S. Progress Report G1, 1960). Where natural restoring inbreds are used with either normal fertile or sterile inbreds as pollinator single crosses, the final double crosses are equal in performance in all characters measured. The actual ratio of fertile and sterile plants in percent is 56:44 where the pollinator is fertile \times restorer and 58:42 where the pollinator is sterile \times restorer. The excess of fertile plants in both cases is probably due to minor modifying factors.

Twelve different double crosses were made with restoring pollinators nearly alike in genotype but differing in plasmatype. One series is a normal fertile inbred \times a restored sterile inbred. The other series is the sterile version of the same inbred by the same restored sterile inbred. In both series the segregation of fertile and sterile plants is practically the same; 47:53 in the normal \times restored sterile, and 46:54 in the sterile \times restored sterile. In both series there is a slight excess of sterile plants. The excess of steriles in this series and an excess of fertiles in the other is probably due to residual gene differences in the different inbreds used for the sterile seed parents and restoring pollinators. For practical purposes the differences are not important since adequate pollen production is supplied in both series.