

## 9. Description of two proposed breeding methods for introduction of restorers into "Problem" inbred lines.

Using the "Eckhardt" method of recovery, and alternating one or two winter generations with a summer crop, a few lines show normal 1:1 segregation in the winter backcross population. The succeeding summer generation may show no normal fertiles at all, and only a few partials, this latter generation typically being one of the middle or later backcross generations.

It is widely suggested that such exceptional phenomena must relate to the possibility of having by-passed needed complementary genes during a generation (presumably in Florida) grown under a non-critical environment. It is also widely suggested that individuals for backcrossing should be selected from large populations only under a critical environment (presumably summer). Because, however, of the great expanse of time involved in recovering lines by such a one generation per year procedure, plus the fact that even any one summer environment may well fail to be "critical," two other procedures are being attempted.

The first merely involves straight backcrossing until the first non-fertile (partial) generation is reached. Sibbing between partials, across as much family relationship as possible, should then reconstitute the "threshold" complementary gene level with a very reasonable frequency, assuming dominant and independent (excluding complementary) action of the threshold genes. Backcrossing might then be resumed on the resulting normal fertiles of the next generation, followed again by a sib generation as necessary.

The second method merely involves backcross recovery in the absence of sterile cytoplasm, where "F" heterozygotes are identified by means of a sterile tester. Such a procedure would make it possible to easily introduce the "F" locus into a problem line, but it would be almost categorically impossible to also bring in any or few of the threshold genes. Since, however, only a small portion of lines lack such a threshold (presumably composed of only a small random portion of an essentially dominant series of alleles), it would seem likely that the odds against any resultant four-way hybrid lacking such a minimum threshold would be very heavy indeed.

It is hoped that the reader does not interpret any claim to originality for the actual techniques described above, except perhaps as they may be applied.