

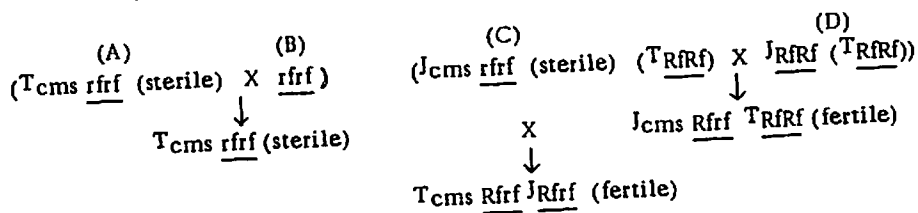
for partial fertility in 1958 than expected on the basis of two factors. Genes operating for partial fertility in F_2 would likewise be expected to operate in the backcrosses. Such is not the case. If the modifying gene is necessary for complete fertility half of the fertile plants in the backcrosses should be only partially fertile. In some populations a higher percentage of fully fertile plants was obtained, while in others more partially fertile plants were obtained.

Progeny tests should reveal whether genes for partial fertility can operate independently from the major gene. Differences in the two types of backcrosses indicate that Ky27 possibly possesses a modifying gene necessary for fertility that functions only when carried in sterile cytoplasm. The different results obtained in the two types of backcrosses suggests a gametic influence. If backcrosses are considered a more accurate determination of the genetic mechanism, then it must be assumed that an excess of fertile or partially fertile plants is expressed in the F_2 populations. This could be caused by differential competitive effects between Rf and rf pollen grains such that genotypes carrying rf genes are eliminated. This would also account for the excess number of fertile plants in the backcrosses made by pollinating the sterile inbred with fertile F_1 pollen.

-- L. M. Josephson

3. Hybrids without detasseling.

It is interesting to note that by utilizing both Texas and 33-16 type sterile cytoplasm it will be possible, without detasseling at any stage, to produce double crosses giving only fertile plants in the farmer's fields by the following method:



Texas sterile cytoplasm will be used to produce the seed parent single cross and 33-16 sterile cytoplasm to produce the male parent single cross. Inbred K55 can be utilized in the (C) position since it has been converted to 33-16 sterile cytoplasm and is a natural restorer of Texas sterile cytoplasm. Inbred K64 can be used in the (D) position since a selection which is a full restorer of Texas sterile cytoplasm has been obtained and it in turn is being converted to a restorer of 33-16 sterile cytoplasm. Other lines could similarly be converted.

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1. A presumed stippled-Navajo compound R allele.

A new R allele has been isolated giving an aleurone phenotype resembling the effects of both stippled (R^{st}) and Navajo (R^{nj}). Pigmentation is restricted mostly to the crown region of the kernel, as in Navajo, but occurs in spots rather than a solid patch, as in stippled. The limited evidence at present available suggests that (i) the new allele reflects the action of R^{st} and R^{nj} when present in the

same chromosome, (ii) in this relation, R^{nj} determines the area competent to form pigment and (iii) formation of pigment within this area is dependent upon the action of R^{st} . (In ordinary R^{st}/R^{nj} heterozygotes, and also in $R^{st}/R^{nj}/r\bar{g}$ trisomics, however, the full action of both alleles is expressed. That is, the crown region is solidly colored, and the remainder of the aleurone is spotted).

The new phenotype appeared on the ear of one plant among 138 offspring from an $R^{st}/R^{nj}/r\bar{g}$ ♀ x $R^f R^f$ ♂ mating. The remaining progeny were distributed among the six classes expected from such a trisomic ♀ x disomic ♂ cross. The plant in question was pollinated by $r\bar{g}r\bar{g}$. About 1/2 the resulting kernels were self-colored, as expected, and the rest (except 8) showed the new aleurone phenotype ($R^{st:nj}$). Composition of the exceptional individual, therefore, was $R^f/R^{st:nj}$. Of 20 plants reared from $R^{st:nj}/r\bar{g}$ seeds, and then pollinated by $r\bar{g}r\bar{g}$, 19 yielded $R^{st:nj}$ and $r\bar{g}$ kernels with about equal frequency, and 1 individual gave a 1:1 ratio for typical Navajo and colorless. Five of the 8 exceptional kernels on the original ear showed the Navajo phenotype, but the four plants obtained from these seeds bred as $R^{st:nj}/r\bar{g}$ individuals. The other 3 exceptional kernels possessed comparatively few spots in the crown region. Progeny data suggest that they are probably the counterparts of "light stippled" which, as Ashman has shown, differs from stippled in a modifying factor normally situated about 6 crossover units distal to R , and widely distributed in non-stippled strains.

-- R. A. Brink

2. Enhancement of R^f action associated with reciprocal translocation T2-10a, involving a break in chromosome 10 proximal to the R locus.

The following report is supplementary to that presented by Dr. Margaret Blackwood and the writer last year (MGC News Letter 33, pages 120-121, 1959).

1. As earlier observed, T2-10a R^f (TR^f) gametes from TR^f/R^f plants have a lower pigment producing potential, on the average, than TR^f gametes from TR^f/r^f sibs. Testcross kernels from $r\bar{g}r\bar{g}$ ♀ x TR^f/R^f matings nevertheless tend to give bimodal distributions for aleurone pigmentation. It has now been shown that the darker kernels from the latter mating, when subsequently grown out, yield a preponderance of semisterile, whereas the light kernels give a pronounced excess of fully fertile plants.

2. The effects of T2-10a on R^f action have been retested using the offspring from the mating R_4^B/r^f x TR^f/r^f . The R_4^B allele is a mutant from standard R^f , indistinguishable from the latter in aleurone pigment-producing action and in paramutability in heterozygotes with stippled. Employment of the R_4^B allele, carrying the green seedling marker, made it possible to identify definitively all eight classes of offspring from the R_4^B/r^f x TR^f/r^f cross, including the crossovers between T and the R locus. The results of testcrosses on $r\bar{g}r\bar{g}$ ♀♀ of these 8 genotypes confirm the conclusions summarized in last year's News Letter. The points of particular interest are:

- (a) R^f pigment-producing action is enhanced when R^f is carried in coupling with T2-10a.
- (b) Enhancement of pigment-producing action is retained for one generation at least after R^f is returned by crossing over from a T to a structurally normal chromosome.
- (c) The pigment-producing action of R_4^B is not enhanced when in repulsion with T (TR^f/R_4^B).
- (d) The pigment-producing potential of TR^f gametes from TR^f/r^f plants is significantly higher than that of TR^f gametes from TR^f/R^f sibs. Likewise R^f , following return from a T chromosome to a structurally normal chromosome, has a higher pigment-producing potential in