

From the results of the 2-year test it was concluded that both Kamigane-1 and Suyama-inno-1 were resistant to the corn stunt disease and useful materials for maize breeding in Japan. These two races were collected from the environs of Mt. Fuji by our institute in 1954 (cf. Maize Genetics Cooperation News Letter 32, 1958).

\*Index of susceptibility: Four numerical values (v), 0, 2, 4, and 6, are given to diseased plants corresponding to degrees from light to heavy damage, and the number of plants (n) belonging to each grade are counted. Index of susceptibility is obtained from

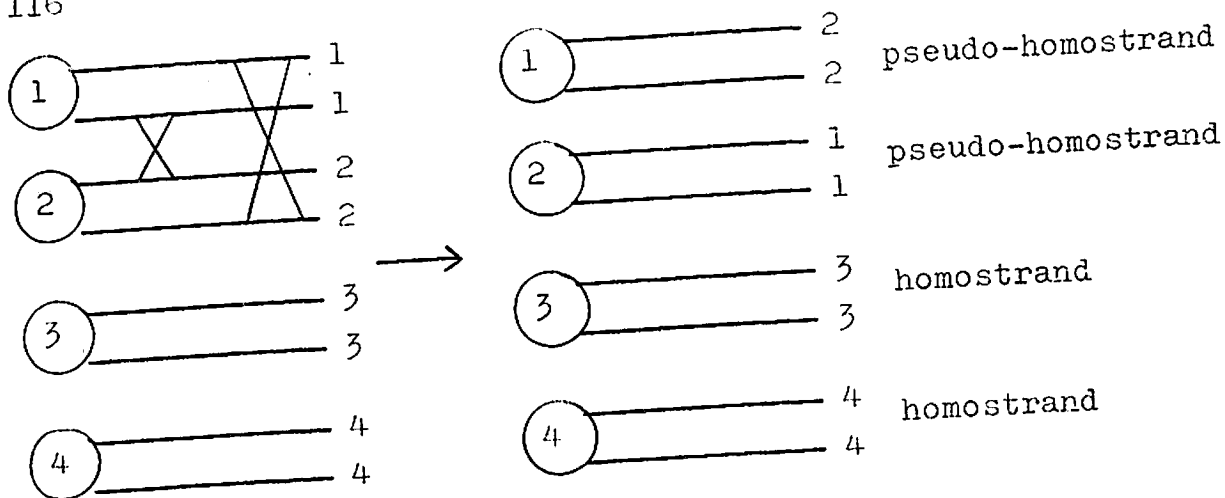
$$\frac{\sum n v}{\text{Total number of plants}}$$

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1. Considerations in the use of double reduction in autotetraploids for mapping.

The coefficient of double reduction,  $\alpha$ , has been used in estimating crossing-over between a gene and centromere in autotetraploid maize (Catchside, Heredity 10:205-218, 1956). In this case,  $\alpha$  was stated to be dependent upon the coefficients: (1) the amount of crossing-over (c) between centromere and the locus; (2) the frequency (q) of quadrivalent formation; (3) the frequency (p) of adjacent (or parallel) disjunction of quadrivalents; and (4) the frequency (d) with which adjacent disjunction of the quadrivalent results in nondisjunction of the genes in paired chromosome arms. These parameters are related by the formula  $\alpha = cqpd$ , since the half chance of having the necessary disjunctional arrangement at division II of meiosis is offset by the double chance of the necessary crossover in each cell. Crossing-over between gene and centromere can then be determined by solving the above formula for c,  $c = \frac{\alpha}{qpd}$ . This formula implies a direct relationship between  $qpd$  recombination and double reduction. Unfortunately, this is not entirely true. For example, the occurrence of a four-strand double crossover involving two of four chromosomes yields strands which are designated here as pseudo-homostands.



If the centromeres were marked, the pseudo-homostrands would be scored as recombinant strands. However, the crossovers have placed the telomere portion of sister chromatids (i.e. 2-2 and 1-1) on the same centromere. This, of course, precludes double reduction, since at second division they must separate to different gametes. Multiple crossovers, other than four-strand doubles, can also give rise to pseudo-strands. Since recombinants can occur which actually prevent double reduction, crossing-over between a gene and centromere determined from double-reduction values will be underestimated.

A second point should be made. When recombination is estimated from autotetraploid data, it is not directly comparable with diploid estimates (Sved, *Heredity* 19:585-596, 1964). For instance, the upper limit of recombination in autotetraploids is 75% while it is only 50% in diploids. Therefore, if methods were available with autotetraploids for determining recombination distances between centromeres and genes, these values would need appropriate corrections to be comparable with diploid values.

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1. Neocentromeres as metaphase I chromosome markers.

Analysis of the meiotic behavior of specific chromosomes has been mostly confined to pachynema, though attempts have been occasionally made to extend the analysis to early diakinesis (for example, Miller 1960: MNL 34).