

The advantages of this method may be readily apparent. It is possible to examine a hundred thousand pollen grains or more if necessary and thus it is possible to detect very small differences in the level of preferential pairing. Also it is feasible to look for rare spontaneous changes in chromosome structure affecting chromosome pairing without having to plant an acre of tester plants. One possibility, which now can be tested easily, results from non-homologous pairing of a univalent (the pairing with itself) in a trisome. Crossing over in this non-homologously paired region would lead to the formation of an inversion.

G. G. Doyle

NATIONAL INSTITUTE OF AGRICULTURAL SCIENCES  
Hiratsuka, Kanagawa, Japan  
Division of Genetics

1. Japanese local races of maize resistant to the virus disease, corn stunt.

Four virus diseases are known to occur in maize under natural conditions. Stunt disease transmitted by the smaller brown planthopper, Delphaiodes striatella Fallén, is the most harmful one in Japanese maize production. A great deal of damage by virus disease is done to maize cultivation in the southern district of Japan, especially in Kyūshū.

Over a period of 2 years many varieties were tested for resistance to stunt disease at the Miyakonozyō Sub-station of the Miyazaki Agricultural Experiment Station, Miyazaki Prefecture. Seventy materials (48 Japanese local races, 17 varieties introduced from foreign countries, and 5 recom-mended hybrids) were tested in 1963. The results showed that all but 2 Japanese races, Kamigane-1 and Suyama-inno-1, had high susceptibility to this disease. Frequency (%) of diseased plants and index of susceptibility\* was over 50% and 1.70 respectively. However, Kamigane-1 showed only 13.5% and 0.42, and Suyama-inno-1 showed 24.4% and 0.65 respec-tively.

In 1964, two hundred eighteen races (151 Japanese local races and 67 races collected from foreign countries, of which 17 were from Thailand), were tested. It is said that most of the Thailand races originated from the progenies of Guatemala Golden Yellow Flint Hybrid. All but some Thailand and the 2 Japanese races mentioned above had low resistance to the disease, showing similar values regarding susceptibility as the test in 1963. The values in some Thailand races varied from 9.4% to 45.2% and 0.3 to 1.4. The values of Kamigane-1 were 12.5% and 0.3, and those of Suyama-inno-1 were 6.3% and 0.1 respectively.

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

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

K. Murakami  
S. Soejima

NORTH CAROLINA STATE UNIVERSITY  
Raleigh, North Carolina

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  $\alpha = cqp d$ , 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,  $c = \frac{\alpha}{qp d}$ . This formula implies a direct relationship between  $qp d$  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.