

b.2) The squared coefficient of variability (C.V.)² for height, within selfed progenies, ranged from 67.2 to 1444.0 while for the outcrossed the range was from 62.4 to 285.6.

b.3) As was shown by A. Robertson (1952), dominant genes act by increasing genotypic variability within inbred lines in the first generations of inbreeding (when compared to random mating conditions). Additive genes act decreasing the genotypic variance within inbred lines. In the present case it was observed that:

b.3.1) 26 progenies, obtained by selfing, showed a greater (CV)² than the respective "controls", which may be the result of the action of recessive genes in homozygous condition and also perhaps the result of homeostasis of the "controls".

b.3.2) 12 of these showed a significantly lower (CV)² than the "controls". This can be explained, if we assume that additive genes diminished the genotypic variability within inbred lines, in accordance with Robertson's argument.

b.3.3) 14 of the progenies obtained from selfing remained with the same variability as the "control" progenies. An equilibrium between dominant and additive genes can perhaps explain these observations.

The experiment will be repeated in order to obtain further supporting results.

Bibliography

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R. Vencovsky

UNIVERSITY OF TEXAS
Austin, Texas

1. Crossing over and disjunction in trivalent configurations containing corn-Tripsacum interchange chromosomes.

In a 21 chromosome stock in which a portion of the short arm of the distal region of chromosome 2 has been exchanged for a corresponding region of a *Tripsacum* chromosome, trivalent configurations are found in 95-98 percent of sporocytes at pachytene. These trivalent configurations

always or nearly always involve preferential pairing of the two homologous corn segments for the distal region of chromosome 2S. These trivalent configurations are frequently unpaired in the region of the interchange. Since crossover frequency in corn has been found to be markedly increased adjacent to regions of synaptic failure in certain heterozygous aberration configurations, the crossover frequency between the two homologous corn distal 2S segments in the trivalents described above was considered to be a matter of interest. Stocks were constructed to test this frequency in which recessive ws_3 lg_1 gl_2 were carried only on the corn 2S segment attached to the *Tripsacum* centromere. Disjunction of the two corn centromeres from the *Tripsacum* centromere occurs with a frequency of only about 4 percent. From this type of disjunction gametes carrying the chromosome with the *Tripsacum* centromere are deficient for all of the long arm of chromosome 2 and about half of the short arm, and are inviable. From test crosses of 21 chromosome plants of the constructed stock, 20 chromosome recessive progeny arise only from crossing over between the two chromosome 2S distal homologues followed by disjunction at anaphase I of the two chromosomes involved in this chiasma, and 21 chromosome recessive progeny arise only from crossing over in this region followed by non-disjunction at anaphase I of the two chromosomes involved in this chiasma. Twenty-one chromosome progeny are easily identified because they are unfailingly pollen sterile while 20 chromosome progeny have completely normal pollen. These testcrosses are therefore a simple test not only of crossover frequency in distal 2S in these trivalent configurations but also of adjacent distribution from chiasmata.

Results were as follows: for the ws_3 - lg_2 region 22/306 20 chromosome recombinants, 2/222 21 chromosome recombinants; for the lg_1 - gl_2 region 42/306 20 chromosome recombinants, 3/222 21 chromosome recombinants; for the region proximal to gl_2 51/306 20 chromosome recombinants, 1/222 21 chromosome recombinants. This is interpreted as 18 percent crossing over in the ws_3 - lg_1 region (14 percent followed by disjunctive distribution, 4 percent non-disjunctive); 32 percent crossing over in the lg_1 - gl_2 region (27 percent disjunctive, 5 percent non-disjunctive); 35 percent crossing over proximal to gl_2 (33 percent disjunctive, 2 percent non-disjunctive). Total non-disjunction from a chiasma in this portion of the trivalent was about 14 percent (as compared to the 4 percent of non-disjunction which has been found for the corn centromeres).

Crossover frequency in the ws_3 - lg_1 and lg_1 - gl_2 regions did not differ significantly from standard expectation. A maximal estimate of the extent of the genetic map of chromosome 2S included in the interchanged segment is 54 units (based on unpublished data of Dr. E. B. Patterson and Dr. E. G. Anderson from genetic studies of translocations, and the cytological findings of Longley (1958)). A maximal estimate of the probable extent of genetic map proximal to

gl_2 actually synapsed at pachytene and therefore available for crossing over (if this occurs at pachytene) based on 115 measurements of pachytene trivalent configurations is 14 units. The amount of recombination found proximal to gl_2 in this experiment did not differ significantly at the 5 percent level from standard expectation based on these maximal estimates (chi square - 3.47 for 20 chromosome progeny, d.f. 1). Since all the estimates were intentionally maximized, the results are inconclusive, and it may be that crossover frequency was in fact increased somewhat in the region synapsed proximal to gl_2 . In any event there does not seem to have been enough increase in crossover frequency in this region to compensate for the crossover suppression in the region at synaptic failure. Further tests are planned in which markers on both sides of the point of interchange may be utilized with progenies sufficiently large for studies of interference.

M. P. Maguire

2. Recombination inhibition and enhancement in disomic plants heterozygous for a substitution from Tripsacum.

In disomic plants which are heterozygous for a segment derived from a Tripsacum chromosome substituted for approximately the distal 60 percent of the short arm of chromosome 2, pachytene synapsis is usually normal throughout the complement. The Tripsacum segment has been shown to carry normal dominants for the chromosome 2S markers ws_3 , lg_1 , gl_2 , but in test crosses crossing over rarely occurs between the Tripsacum and corn segments, a region estimated to contain 54 map units. Preliminary tests have indicated, however, that crossing over may be greatly increased elsewhere in chromosome 2 in plants of this constitution. Forty-four percent recombination (215/484) was found in the gl_2-v_1 region although it is probable that only about 29 crossover units were available for crossing over in this region, 5 of these on the long arm side of the centromere. Tests are planned using additional marker loci to determine the degree and distribution of possible crossover frequency increases outside the region of crossover suppression. The extent of this region of crossover suppression may be varied by the use of rare recombinants between the Tripsacum and corn segments.

M. P. Maguire

3. Behavior of Tripsacum chromosomes added to the normal corn complement.

Studies are continuing on the genetic and synaptic homologies of Tripsacum chromosomes in the corn complement. A number of new stocks are currently available for tests. In one of these an extra chromosome from Tripsacum, having physical properties similar to chromosome 9 or 10