rest of the sample, then the minimum frequency of cells with at least one chiasma per trivalent was about 43/50 or 86 percent. The extent of homologous pairing available for crossing over in the pertinent region of these trivalent configurations is estimated to have included a maximum of 29 genetic map units. This estimate of genetic length is probably an overestimation since it is based upon a uniform cytological distribution of the genetic map although it is known to be somewhat more concentrated distally. Therefore, on the basis of these calculations, a chiasma frequency of less than 58 percent was expected where an actual minimum of 78 percent was found.

Thus it appears that either crossing over precedes and is required for pachytene pairing, or crossing over always, or almost always, follows synapsis of the regions studied in this experiment, even when their genetic length is considerably less than 50 units.

When estimated frequency of trivalents at metaphase is plotted against estimated cytological extent of homology in the T^2 chromosome for regions present in either or both of the other chromosomes, points for the various chromosomal constitutions follow an interesting pattern of tight clusters. If the results are taken at face value, it appears that: (1) The frequency of trivalent formation is depressed by the presence of homologous regions in triplicate in a way which is relatively insensitive to the length of these triplicated regions. (2) The frequency of trivalent formation nevertheless increases with increase in the extent of homology in the T^2 chromosome to either or both of the other two chromosomes. It also appears that the location of the terminal knob is unimportant, that terminal or intercalary position of a triplicated region makes no important difference, and that common homology to the T^2 chromosome can be divided between the 2^T chromosome and a normal chromosome 2 without significant change in trivalent frequency.

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1. Genetics of tillering.

A Pawnee stock and a grassy-tillered stock from E. G. Anderson, as well as Argentine Pop, were added to the forms being studied. The first crosses are expected to be ready for analysis this coming season.

2. Effects of maleic hydrazide and indole butyric acid on nana-1.

Eight plants, suspected of being homozygous for na_1 but all 5 feet tall, were backcrossed to na_1 in 1962. Seed from each produced some tall plants, so the conclusion was that the treatment had not caused the increase in height. Repeated in 1963 on homozygous na_1 plants, internodal elongation did occur in three out of five plants treated with MH (100

micrograms daily) plus IBA (500 micrograms daily), 2 out of 5 plants treated with MH alone and 1 out of 5 plants treated with IBA alone. Heights below the peduncle thus were increased from an average value of 13 cm in control plants to anywhere between 20 and 43 cm. The greater heights occurred with the combination treatment.

3. Kn suppression.

Development of knots in 4 strains of Coop stock was completely inhibited by daily treatment with 500 micrograms of NAA. Flowering was also suppressed. Plants were only 1/2 to 2/3 the height of controls. Internal anatomical differences include reduction of leaf thickness to that of normal plants (Kn leaves may be up to 3 times thicker than normal sibs). The same effect, less pronounced, is also obtained by GA treatment. Brace roots are induced to form as flanges, joined to one another, internally, they have a single stele for the entire group.

4. Modification of expression of Vg.

Results of applying IBA daily in 500 microgram doses were variable. In the 5 stocks employed, some were unchanged, some were rendered fertile and others showed variable responses between these extremes. The suppressed ligule development (Laughnan, MNL 1956) by which Vg plants may be early identified was unaltered. Galinat has suggested that some of the many modifiers of Vg he has found may be responsible for the variable results.

5. Dry-weight studies on two genetic strains of milo.

As reported last year at Allerton, threefold increases were obtained using daily treatments of IBA at 500 micrograms. In 1963, 25-plant samples in a randomized field pattern were collected from a population of over 1,500 plants. Rates of application were varied from daily, 3-day, 6-day and 10-day spans. IBA-soaked seed showed no differences from unsoaked, or those soaked in water, regardless of subsequent treatment. Incomplete data show that the increase in dry weight is real, but that it is not a threefold one. The greatest increases come under 6-day applications. Using the known auxin antagonist tri-iodo benzoic acid in a comparable set of plants, root development was completely inhibited under daily treatment; further, up to 50 basal corms were produced in lieu of tillers. These were later shown to be viable and to grow into normal-looking sorghum plants in the greenhouse. Under 10-day treatments, root growth was actually increased over that of controls. Anatomical changes accompany these changes, but their extent and significance is not known.

6. Masking of expression of v_4 by growth substances.

This mutant is expressed more strongly under cool temperatures. A stock of silkless carrying v_4 showed, when treated with MH and one of the growth substances IAA, IBA, or NAA, no virescents except in controls. Later plantings failed to show any virescence, presumably because of the increase in growing temperature.

7. Use of atrazine.

A commonly-employed weed killer and suppressor, atrazine has been shown to remain detectable in the soil for periods measured in years. A comparison of 15 races, stocks and hybrids grown on treated versus untreated halves of the same rows was made. To test responses of the plants under these conditions, a part of every section of each row was treated with GA. Response to GA was not influenced by atrazine. Other features with atrazine: dwarf-1, reduced in height and tillering; corn-grass, intensified in expression; zapalote chico, average height increase of 6 inches; spancross, size and vigor increased; pioneer 349 and its immediate parents, greater seedling vigor; others made no noticeable responses.

8. Tests involving other growth-regulating substances.

A number of other compounds not previously tested in 500-microgram doses were applied to races, hybrids and inbreds as well as to genetic stocks including ra_1, ra_3, tsb, na_1 and na_2. These were based on comparisons of 10-plant samples and a 10-plant control. The most significant outcome of the study is that these chemicals, applied at the rather high dosage, did not seriously alter plant growth, anthesis, and ear formation. The numbers below refer to numbers of stocks tested.

Alpha-phenyl butyric acid--more growth in 7, 6 equal to controls.
Gamma-phenyl butyric acid--6 equal to, 3 larger, 4 less than controls.
Indole propionic acid--5 shorter, 2 equal to controls.
Maleic Hydrazide (100 ppm)—reduces color in 5, shorter in 4, taller with more color in 4.
2,4-D (100 ppm)--3 reduced in growth, 3 enhanced, 2 equal to controls.
Indole--heavier vegetative growth in 2, slower growth and shorter in 2.
Iso-butyric acid--1 shorter, 5 with more vegetative growth, 1 slowed in reproduction.
Normal butyric acid--5 retarded, 1 equal to controls.

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1. A second case of hybrid enzyme formation in heterozygotes.

The pH 7.5 esterases specified by the E_1 gene exist in the form of a dimer. In homozygotes the dimers are composed of two identical monomers (autodimers), while in heterozygotes three enzyme types are found: the two autodimers produced when the alleles are in homozygous condition and in addition a hybrid enzyme (allodimer), composed of two homologous but non-identical monomers. As expected, the migration rate of the allodimer is always intermediate between the two autodimers. In starch gel electrophoresis the SS autodimer, formed by the E^S allele, bands out at a characteristic slow moving position. However, even plants which lack the E^S allele show a weak esterase band at the SS position (constant S).