1. THE RELATION OF TRIPLOID FACTORS AND CHROMOSOME GROUPS IN WHEAT AND OATS

E. P. Gaines

The literature of the past 20 years on wheat and oat hybrids shows many cases where multiple factors are involved in producing a given character. Without attempting to make a complete list, a few common references may be cited. Nilsson-Ehle (8) of Sweden, in 1909, found red grain color in wheat to be caused by three independent factors. Third generation families were obtained which gave three different types of ratios of red and white grain as follows: 3:1, 15:1, and 63:1. This showed beyond doubt that three different chromosomes each carried a gene for red color. Gaines (3), in 1917, found a parallel case in which only 13 white-seeded F<sub>2</sub> plants appeared in a total population of 539. The 280 F<sub>3</sub> families which were analyzed the next year gave the following results:

- 168 families gave pure red
- 30 families gave 63 (red): 1 (white)
- 48 families gave 15 (red): 1 (white)
- 28 families gave 3 (red): 1 (white)
- 6 families gave pure white.

Waldron (17), in 1924, reported the occurrence of dwarf plants in the progeny of crosses between normal wheats in ratios that necessitated some kind of a three-factor hypothesis, but was unable to devise one to account for all the conditions observed. The dwarf factors reacted as recessives in one case, as dominants in another, and as two dominants and one recessive in a third.

According to Gaines (4, 5), resistance to bunt in wheat resulted from the cumulative effect of three factors in the crosses made at the Washington Agricultural Experiment Station between the resistant varieties Turkey, Florence, and Alaska, and the susceptible varieties Jenkin, Hybrid 128, and Jones Fife.

Powers (12) found the winter habit of growth of Hybrid 128 differing from Velvet Node by three factors which were cumulative in effect. Any one factor acting alone would produce a type somewhat later than Velvet Node and two would make the segregate head and

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"Cerealist, Washington Agricultural Experiment Station, Pullman, Wash."

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