

2. Induction of heritable change at the R locus by abnormal chromosome K10.

Abnormal chromosome K10 has a novel effect on the R paramutation system. Following introduction into a K10 chromosome a paramutable R factor becomes relatively insensitive to stippled action in R K10/Rst heterozygotes. It has now been observed that the insensitivity regularly persists, in one or another degree, after return of R by crossing over to a structurally normal chromosome 10. Recent data also show that the change in sensitivity does not occur in plants in which paramutable R and the K10 knob are carried by homologous chromosomes, that is, in repulsion. The large, terminal knob characterizing abnormal chromosome 10 is distal in 10L to striate-2 which, in turn, is distal to R. Since striate-2 and R show about 35 per cent recombination, the R locus and the K10 knob are far apart. The evidence suggests that the observed change in R sensitivity is the result of a stimulus originating in the distinctive, terminal K10 segment that is propagated along the same chromosome to the R locus, at which the heritable alteration in sensitivity to Rst action is then effected.

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Addendum:

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1. Investigations on WF9 mutants.

In 1960-61 mutants were induced in the WF9 line by X-rays of 7000 R and 15000 R. On the basis of morphological and biochemical investigations, 60 mutants were identified.

In 1965, the protein and oil content was determined in seeds of 37 mutants. The results of these investigations are shown on Table 1.

In 1967 a study of the resistance of 60 mutants was made at our request by the Agricultural Research Institute of the Hungarian Academy of Sciences, where Dr. I. Manninger had the goodness to include our mutants in an experiment together with his own breeding material.

During one series utilizing comparative experiments of standard methodology, in two experiment places (per 10 plants) he studied resistance to the head and the common smut with the provocation method, and resistance to Fusarium in a natural infection.

In the starting material the frequency of infection was 5.26 per cent for head smut, 2.17 per cent for common smut, and 7.3 per cent for Fusarium. Among the 7 kinds of WF9 breeding material (including 3 kinds of male sterile) selected by the Institute or received from abroad, two kinds appeared to be fully resistant to all 3 pathogens.