INHERITANCE OF LEAF BLOTCHING IN AN INTERVARIETAL CROSS OF *TRITICUM AESTIVUM* L.

S. M. SIKKA AND K. B. L. JAIN

Division of Botany, Indian Agricultural Research Institute, New Delhi

AT the Botany Division, Indian Agricultural Research Institute, New Delhi, an extensive collection of wheat varieties, both Indian and exotic, is maintained. These are critically assessed for disease resistance and other desirable agronomic characters for utilizing them as direct introductions or in hybridization work for wheat improvement. Among the recently received wheats from the U.S.A., a hybrid variety Supremo × Montana (accession number, E. 1844), while showing high resistance to brown and yellow rusts, was found to develop symptoms of blotching in leaves during the two-year period for which it was under study.

Detailed observations on the development of blotching in leaves revealed that its symptoms first appeared in the older leaves about 50 days after the sowing of the crop and they subsequently spread also to younger leaves. The yellow-chlorotic spots occurred in patches at random in the leaves, their size being variable in the same leaf. At later stages, the tissues in these chlorotic zones dried up. When the incidence of such chlorotic patches was high, the whole leaf dried up. The leaves with typical blotching are shown in Fig. 1. The exact nature of this blotching, however, is not as yet known, though it has been established that the chlorotic patches are not caused by any fungus.

The variety, Supremo × Montana, was crossed with New Pusa 718, which has normal green leaves, with a view to finding out if this character was genetically controlled. The mode of inheritance of this character was studied for two years. During the year 1956-57, the F_1 and the F_2 generations of the cross were grown while in the subsequent year, F_3 progenies were also added. Casual observations made during 1956-57 showed the dominance of normal green leaves over blotched leaves in F_1 and the segregation of the two characters in accordance with the simple Mendelian ratio in F_2. During the year 1957-58, the F_1, F_2 and F_3 generations along with parents of the cross were grown in three replications. It is of interest to note that, during this year as well, the parent E. 1844 developed characteristic blotching of leaves in all the replications, while N.P. 718 had normal green leaves. The F_1 data confirmed previous year's observations that blotching in the leaves of E. 1844 was recessive to normal green leaves of N.P. 718. The segregations observed in the F_2 and F_3 generations are given in Tables I and II respectively.

TABLE I

The mode of inheritance of leaf blotching in the F_2 of the cross N.P. 718 × E. 1844

Material	Number of plants			χ^2	P. value
	Normal green	Blotched	Total		
N.P. 718 ..	155	..	155	..	..
F_1 ..	119	..	119	..	..
F_2 Observed ..	183	77	260	2·95	·10–·05
Expected (3 : 1)	195	65	..	..	..
E. 1844 ..	..	97	..	..	..

TABLE II

Segregation of leaf blotching in the F_3 of the cross N.P. 718 × E. 1844

Material	No. of families					
	Homozygous green	Heterozygous (3 : 1)	Homozygous blotched	Total	χ^2	P. value
F_3 Observed ..	4	9	7	20	..	..
Expected (1 : 2 : 1) ..	5	10	5	..	1·1	·95–·90

In the F_2, a large variation in the intensity of blotching was observed (Fig. 1). However, when all the plants showing even slight development of yellow spots were grouped together and compared with the normal green plants, the segregation showed a good fit to a monohybrid ratio of 3 normal : 1 blotched.

In the F_3, the segregation among the families showed a good fit to a ratio of 1 homozygous green : 2 heterozygous : 1 homozygous blotched. A further analysis of heterozygous families in this generation showed them to segregate in a ratio of 3 normal green : 1 blotched. The F_2 and F_3 data, therefore, prove conclusively that

blotching in leaves of wheat variety Supremo × Montana behaves as a recessive to normal green leaves of N.P. 718 and is inherited in accordance with a monohybrid ratio.

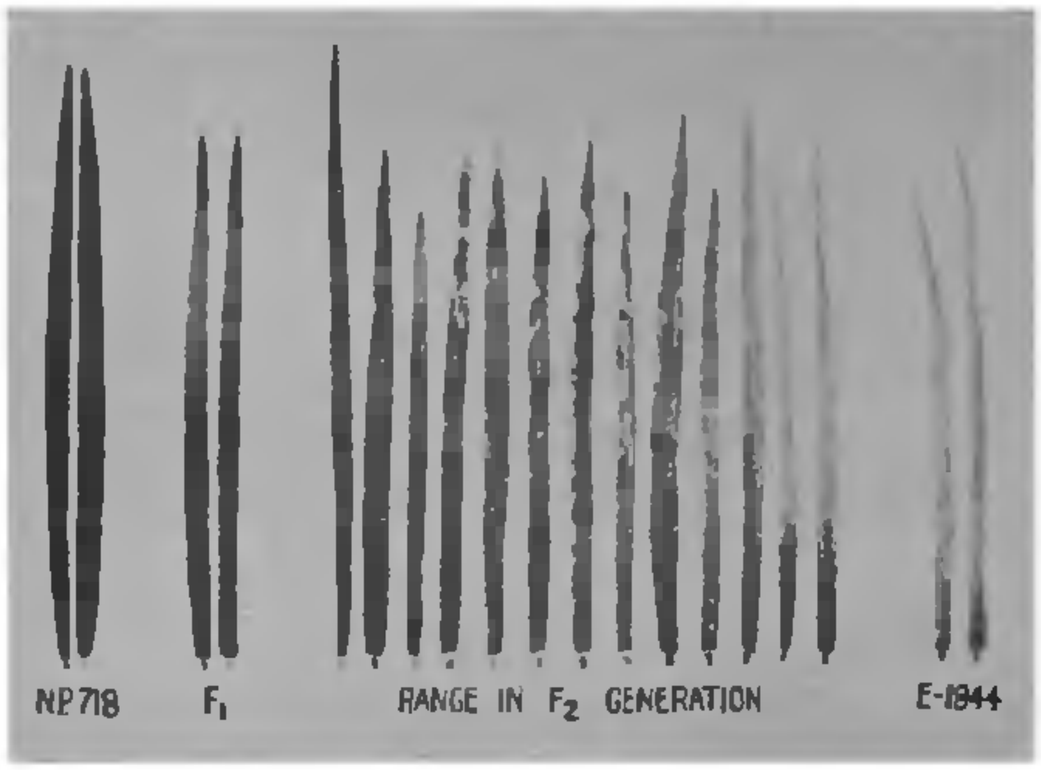

FIG. 1

With a view to finding out the association, if any, between blotching and grain yield, the F_2 data were subjected to '*t*' test. The results are summarized in Table III.

TABLE III

Grain yield comparison of normal green and blotched plants in the F_2 of the cross N.P. 718 × E. 1844

Material	Mean grain yield per plant (gm.)	Difference	't' value	P. value at 5% level
Normal green plants	17·84 ± 0·8217	..	..	..
Blotched plants..	17·12 ± 1·1345	0·72	0·489	1·959

It will be observed that the blotched-leaved phenotypes had slightly lower mean yield than the normal green-leaved phenotypes, though the difference between them was not significant statistically.

As far as the authors are aware, the occurrence of blotching in wheat varieties has not been reported before. Further work is in progress to find out the nature of blotching in the leaves of variety Supremo × Montana.

PHYSICAL PROPERTIES OF LIVING PROTEINS

ACCORDING to a report given by Soviet Scientist Prof. Lev Blumenfeld, living proteins have physical properties very similar to those of metals and a large group of substances, including ferrites, widely used in making mechanical memory devices and radio apparatus. The ferromagnetic properties of living proteins were discovered by means of an electronic paramagnetic resonator.

The essence of the phenomenon discovered is that living proteins can conduct electricity and are capable of magnetic polarisation similar to that which takes place on ferrites in mechanical memory devices. Experiments have shown that proteins and nucleic acids have no such properties when separated from each other. But as soon as these two polymers are combined they develop this property. A huge cloud of free (non-paired) electrons, up to 10,000 per molecule, is observed in the molecules of living proteins.

The experiments were conducted for a year with various preparations of the nucleic acids and natural proteins. It was established that the new phenomenon is much more pronounced in the experiments with younger, rapidly-growing tissues and with tissues of the marrow and the brain than in the experiments with artificial preparations.

Commenting on Prof. Blumenfeld's report, Acad. Kapitza pointed out that no one among the physicists who had worked on theory in this field had expected it to help to explain the basic phenomena of life.

The experiments carried out by Prof. Blumenfeld and his assistants open up a new way of studying the physical basis of life. The studies of the new phenomenon may even help to get a deeper insight into the laws of heredity and to understand the mechanism by which living matter "memorises" the so-called genetic code. This mechanism may, to a certain degree, be similar to a very complicated magnetic recording. Human memory probably has the same physical basis.—*Soviet News.*