THE INHERITANCE OF BRITTLE RACHIS IN BARLEY

I. J. JOHNSON AND EWERT ÅBERG

THE occurrence of brittle rachis in barley, characteristic of Hordeum spontaneum C. Koch and H. agriocriton E. Åberg (1) has been observed and studied by several investigators. In 1889, Liebscher (4) obtained brittle rachis plants from a cross of H. distichum L. and H. vulgare L. and in 1907 Biffen (3) reported a 3:1 ratio for brittle and normal rachis in crosses between H. spontaneum and two varieties of H. vulgare.

Brittle rachis plants were obtained in the F1 generation by Ubisch (7) in crosses between nonbrittle cultivated varieties. A ratio of 9 brittle to 7 normal in the F2 was in agreement with a complimentary factor interaction with two dominant factor pairs necessary for the expression of the brittle rachis character. Ubisch assumed that both of the dominant genes for brittle rachis were present in H. spontaneum.

Schiemann (6) found that the degree of brittleness of the rachis was influenced by an inhibitor, and that plants heterozygous for the two dominant brittle genes were nonbrittle in the presence of the dominant inhibitor gene. The inhibitor was assumed to be absent in H. spontaneum but present in cultivated varieties. A third factor for brittle rachis was found in a six-rowed hulless barley, but its effect was less pronounced than from the two dominant genes in H. spontaneum.

Previous studies have not been reported on the occurrence of brittle rachis from crosses between varieties of barley now grown in the United States or on the inheritance of brittle rachis in crosses with H. agriocrithon.

MATERIALS AND METHODS

In 1941, among several crosses used in the barley breeding program at the Iowa Agricultural Experiment Station, the combination Peatland × C.I. 4821 produced all brittle rachis plants in the F2 generation. Peatland, a six-rowed, white, rough-awned, short-haired rachilla variety, was developed by selection at the Minnesota Experiment Station and is rather extensively used in breeding studies. The variety C.I. 4821, a six-rowed, black, rough-awned, long-haired rachilla barley, is an introduction from Manchuria and was obtained from the Office of Cereal Crops and Diseases, U. S. Dept. of Agriculture, as parental material in breeding for resistance to leaf rust. H. agriocrithon variety eu-agriocriton described by Åberg (1) was originally obtained from Tibet. This variety is a six-rowed, white, rough-awned, long-haired rachilla type with brittle rachis.

As previously noted, the F1 cross between Peatland and C.I. 4821 was grown in 1941 and additional F1 plants were backcrossed to both parents in the green-

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2 Research Professor of Farm Crops and Research Associate on leave of absence from the Agricultural College, Upsala, Sweden, respectively.
3 Numbers in parenthesis refer to “Literature Cited”, p. 106.