SMOOTH-AWNED barley varieties are favored by most farmers of the Intermountain West because the straw of such varieties has a higher value as feed or bedding for farm animals. Most smooth-awned varieties show a tendency toward partial sterility and the resulting empty florets suggest a possible loss in yield. The empty florets are a matter of considerable concern to some growers. The smooth-awn character of most hybrid barleys can be usually traced back to the Lion variety (C. I. 923), and generally it is associated with a stigma having few hairs. Stigma hairs serve to catch and hold pollen; consequently, the degree of sterility appears to be closely related to the extent of hairiness of the stigma. If these hairs are lacking, a mechanical failure of pollination may result. In extreme cases nearly 50% of the florets may be empty.

Velvon, which came from the cross (Coast×Lion)×Trebi, derived its smooth awns from the Lion parent. This variety offered a stock of variable material suitable for the study of sterility, yield, and related characters. Some 300 head selections taken from commercial fields of the F7 generation were available for this study.

The effect of varying degrees of sterility on yield and the comparison of the more homozygous F7 lines with the heterogeneous mother variety are problems of economic as well as scientific interest. The principal purpose of this study was to discover the effects of sterility on yield and to find a remedy if the loss was found to be important.

Material and Methods

Specific studies herein reported were confined chiefly to Velvon (C. I. 6109) and head selections made from commercial fields of that variety in the F7 and F8 generations. Velvon came from an F2 plant selection which appeared to be homozygous in F3 for aleurone color, smoothness of awn, stiff straw, and other visible characters, and also uniform in height and maturity. In 1936, Velvon was released for commercial testing. It is now by far the leading variety in Utah and is recommended in a number of other states. As might be expected, the F7 generation head selections differed considerably in height, straw strength, sterility, yield, and resistance to smut.

At first undesirable head row strains were discarded, but later some of the highly sterile ones were kept for comparative studies of sterility, yield, and kernel weight. Fourteen of the better 1940 to 1945, in which sterility, yield, rate and related factors were studied.

In 1943, two tests were set up. One, a date of March 29, consisted of 20 Velvon strains seeded March 29, randomized four-row blocks 9 feet long with six replications; a second experiment, factorial in design, consisted of four-row blocks from which 8 feet of the center rows were harvested for yield determinations.

Sterility percentages were derived by taking 30 spikes from each replication and counting the empty florets per spike, exclusive of the two lower nodes of the rachis. Special factorial and Latin squares used to measure the relationships between sterility, rate of seeding, average kernels per spike, kernel weight, and yield. Regular yield nursery tests served for a study of sterility in a large number of strains. Where possible, analyses of the data were made. Both yields and sterility were taken from the same plots. Covariance was used to determine the relationships between sterility, rate and date of seeding.

Since this study began the stigma hairs of those smooth-awned F2 and F3 plants from smooth by rough were examined in an attempt to find a stock of material possessing a hairy stigma and smooth awn.

Results

No hairy stigmas were found among the F2 and F3 of Velvon and sister smooth-awned plants. Some slight variations in degree of hairiness, although never amounting to more than 10%, have been observed by the author. Wisconsin Pedigree 38 has smooth awns and stigma hairs. Some parents and segregations of that variety having equal smoothness of the awn and considerable variation in the hairiness of the stigma. Medium hairy to hairy stigmas are found in smooth-awned barley plants have been associated with complete fertility in all cases observed.

STERILITY IN VELVON STRAINS