FROST INJURY TO CEREALS IN THE HEADING STAGE

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The recent distribution and widespread culture of the very early wheat variety Ramona has given California a new major production hazard—frost injury during the heading stage. Such damage has previously been infrequent and generally has been restricted to very early plantings. A similar situation in Argentina was reported by Rudorf and Job (5), who stated that the culture of the early-maturing variety, 38 M.A., greatly increased the hazard from frost during heading. Frost damage at the heading stage has also been reported from Kansas (8) in Early Blackhull wheat.

Previous American workers, including Breithaupt (2) at Burns, Oregon, and Harlan and Shaw (4) at Obsidion, Idaho, reported damage from frost to cereals in heading as well as in the dough stage. Frost in the dough stage damages the appearance and often the quality of the grain. The writer has observed injury from frost in both the heading and dough stages in certain sections of Oregon and the northern mountain region of California. In these areas the hazard from damage at heading appears to be greatest with early varieties, but occasional summer frosts may injure either early or late varieties at any stage. Frost-damaged grain is virtually unknown in the grain-producing sections of California mentioned hereafter.

Evidence that frost injury at heading is not always recognized by agronomists and that it is of occasional importance in many parts of the country has prompted presentation of the observational and experimental data accumulated at the California Agricultural Experiment Station.

EXPERIMENTAL RESULTS

In California in 1940, severe frost injury at the heading stage occurred in commercial fields of Ramona wheat in Riverside County in February; in the Antelope Valley in March; and in the Shasta Valley in May. In 1939 similar damage resulted from a March frost in the San Joaquin Valley and a May frost in Shasta Valley. In field plot tests at Davis sown in November or December, frosts at the heading stage damaged Ramona in 3 of the 12 seasons from 1929 to 1940. In these seasons the estimated reductions in yield ranged from 30 to 60% despite a compensating growth of late tillers. Despite this damage, average acre yields of Ramona during the 12-year period have been satisfactory. The average yield of Ramona wheat was 46.8 bushels per acre, which was 3 bushels higher than that of the later-maturing Baart variety. These yields suggest that earliness is advantageous in the absence of frost, but they also show that “the plant breeders’ ideal”—a consistently high-yielding variety—has

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3Reference by number is to “Literature Cited”, p. 834.