# Differential Tolerance of Some Arid-Range Wheatgrasses to Snow Mold

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**Highlight:** *Snow mold is most severe under a prolonged spring snow cover, where temperatures are favorable for growth of certain fungi. In the spring of 1971 a replicated plot containing 30 accessions of wheatgrasses provided an opportunity to study differential tolerance to snow mold. On the basis of the percent of 1-year-old plants killed, fairway wheatgrass A-12477X (mean of 4 accessions) was most susceptible with 29.4% mortality, fairway wheatgrass A-1770 (3 accessions) averaged 13.7%, and fairway wheatgrass NM-251 (5 accessions) averaged 2.7%. Crested wheatgrass Nordan (4 accessions) averaged 4.9% mortality. Crested wheatgrass A-1874 (1 accession) averaged 11.3% and crested wheatgrass PI 277354 (2 accessions) averaged 2.3%. Five other sources of crested wheatgrass had significantly less mortality than Nordan. Siberian wheatgrass (5 accessions) averaged 4.2% mortality. Intermediate wheatgrass (1 accession) had no mortality, and only 2 plants out of 300 showed moderate injury.*

Many grasses, winter cereals, alfalfa, and other forbs are in some years damaged by snow mold. The causative organisms are fungi, favored by a winter season when snow falls on unfrozen ground (Sprague, 1961) or where the snow cover remains on the ground 4 or 5 months (Vargas and Beard, 1971). Species of *Typhula* are the primary cause of snow mold in the Intermountain Region of the Western United States (Sprague, 1961). *Typhula* occurs worldwide (Dickson, 1956).

Snow mold control is possible by fall chemical treatment (Vargas and Beard, 1971), but a spring treatment is much preferred after it is known that conditions favorable to the disease are present. This is particularly true on grain and forage crops. Broadcasting substances on the snow to hasten snowmelt in the spring reduces damage (Dewey and Nielson, 1969). Winter wheat selections have been found that show some tolerance to snow mold (Sunderman and McKay, 1968). Although snow mold has been studied extensively on winter wheat, it also has long been known to damage turf and other grasses (Remsberg, 1940).

The present paper was made possible by an infestation of snow mold in the spring of 1971 on an experimental plot near Logan, Utah. Thirty accessions of wheatgrasses had the year before been established in replicated blocks.

## Material and Methods

Seeds of a number of wheatgrasses were made available to us by Soil Conservation Service Plant Materials Centers in the Western United States. We chose 12 accessions of fairway wheatgrass (*Agropyron cristatum* (L.) Gaertn.), 12 of crested wheatgrass (*A. desertorum* (Fisch. ex Link) Schult.), 5 of Siberian wheatgrass (*A. sibiricum* (Willd.) Beauv), and 1 of intermediate wheatgrass (*A. intermedium* (Host) Beauv.). The taxonomy of these wheatgrasses is unsettled, and some sources may require reclassification.

The initial purpose of the study was to determine whether a preplanting seed treatment had any effect on the subsequent behavior of the plants. The pretreatment (Keller and Bleak, 1968) allowed the seeds to absorb water until they were near the point of germination, when they were dried. Treated and natural seeds were sprouted before placing in ¾ x ¾ inch plant bands 3 inches deep, containing a good field soil. These seedlings were later transplanted at a dryland site with 5 replications of 30 accessions. All plants were on a 1-ft spacing in rows 20 inches apart. Each plot consisted of 3 rows of plants derived from seed that had been given the preplanting seed treatment, plus 3 rows from natural seed.

These plots were established during the period April 9 to 16, 1970. The location of each accession within each replication, as well as the position of the three alternating rows from treated and untreated seed within each plot, was at random. In April, 1971, the seedlings had been in the field one year. Snow mold damage was apparent after snowmelt. A survey of the field was made, classifying every plant as follows: (1) dead, (2) severely damaged, (3) light to moderate damage, (4) plants dead from other causes, and (5) plants

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Table 1. The accessions of wheatgrasses observed and the percent dead plants resulting from snow mold. Each value is based on a population of 60 plants in each of 5 replications.

| Accession | % dead plants |
|---|---|
| Fairway wheatgrass A-12477X, 1965 | 34.7 a[1] |
| Fairway wheatgrass A-12477X, 1964 | 31.3 a |
| Fairway wheatgrass A-12477X, 1962 | 27.7 ab |
| Fairway wheatgrass A-12477X, 1963 | 24.0 abc |
| Fairway wheatgrass A-1770, 1966 | 16.3 bcd |
| Fairway wheatgrass A-1770, 1967 | 14.3 cd |
| Crested wheatgrass A-1874, 1967 | 11.3 cde |
| Fairway wheatgrass A-1770, 1968 | 11.0 de |
| Crested wheatgrass commercial Nordan, 1965 | 8.3 de |
| Crested wheatgrass FC 39759 Nordan, 1967 | 6.7 de |
| Crested wheatgrass NPMC, Nordan, 1963 | 5.7 de |
| Fairway wheatgrass NM-251, 1963 | 5.3 de |
| Siberian wheatgrass P-27, 1963 | 4.7 de |
| Siberian wheatgrass P-27, 1964 | 4.0 de |
| Fairway wheatgrass NM-251, 1967 | 4.0 de |
| Crested wheatgrass Moc. Mont., 1966 | 3.3 de |
| Siberian wheatgrass P-27, 1961 | 3.3 de |
| Crested wheatgrass NPMC, Nordan, 1964 | 3.0 de |
| Crested wheatgrass PI 314604, 1968 | 3.0 de |
| Siberian wheatgrass P-27, 1967 | 3.0 de |
| Fairway wheatgrass NM-251, 1963 | 2.7 de |
| Crested wheatgrass PI 314187, 1968 | 2.7 de |
| Crested wheatgrass PI 277354, 1964 | 2.0 e |
| Crested wheatgrass FC 395572, Summit, 1966 | 2.0 e |
| Siberian wheatgrass P-27, 1964 | 2.0 e |
| Crested wheatgrass PI 277354, 1965 | 1.7 e |
| Crested wheatgrass FC 39753, 1967 | 1.7 e |
| Fairway wheatgrass NM-251, 1965 | 1.0 e |
| Fairway wheatgrass NM-251, 1966 | 0.7 e |
| Intermediate wheatgrass, 1961 | 0.0 e |

[1] Values with no common letter are significantly different at the 1% level (Duncan's multiple range test).

severely damaged from other causes. In this study we report only plants killed by snow mold, as determined by the April 1971 survey.

## Results

Mortality due to snow mold was the same for plants from treated as for those from nontreated seeds. Plants from treated and nontreated seed have been combined. Where percent mortality was high, degree of damage to living plants was also high. Less than 1% of all plants were classified as dead or damaged from causes other than snow mold. Accessions included in the study and the percent mortality from snow mold are presented in Table 1.

The 4 accessions of fairway wheatgrass A-12477X were consistently susceptible to snow mold. Similarly, the three accessions of fairway wheatgrass A-1770, the four accessions of Nordan crested wheatgrass, the five accessions of Siberian wheatgrass P-27, and the five accessions of fairway wheatgrass NM-251 each had values close to the mean of their group. Five miscellaneous crested wheatgrass accessions, each of a separate identity, ranged from 1.7 to 3.3% mortality.

Table 2. Summarization of wheatgrass mortality (%) from snow mold by sources.

| Source | No. of accessions | Mean mortality |
|---|---|---|
| Fairway wheatgrass A-12477X | 4 | 29.4 a[1] |
| Fairway wheatgrass A-1770 | 3 | 13.7 b |
| Crested wheatgrass A-1874 | 1 | 11.7 b |
| Crested wheatgrass Nordan | 4 | 5.9 c |
| Siberian wheatgrass P-27 | 5 | 4.2 cd |
| Fairway wheatgrass NM-251 | 5 | 2.7 d |
| Crested wheatgrass misc. | 5 | 2.3 d |
| Crested wheatgrass PI 277354 | 2 | 1.8 d |
| Intermediate wheatgrass (unknown) | 1 | 0.0 d |

[1] Values with no common letter are significantly different at the 1% level (Duncan's multiple range test).

The mean mortality for each source is presented in Table 2. The mean percent dead for fairway wheatgrass A-12477X was 29.4, and for fairway wheatgrass A-1770, 13.7. These differences exceeded the 1% level of significance. Fairway wheatgrass A-1770, in turn, had significantly higher mortality than Nordan crested wheatgrass, or Siberian wheatgrass P-27, or fairway wheatgrass NM-251, which did not differ from one another.

The remaining accession was intermediate wheatgrass. It suffered no mortality, and moderate injury was observed on only 2 plants out of 300 in the study. That there were significant differences among the accessions of fairway wheatgrass and among the accessions of crested wheatgrass suggests that neither species is either resistant or susceptible. P-27 was the only source of Siberian wheatgrass included in the study.

Additional observations are needed, but our data suggest that in areas where snow mold occurs, intermediate wheatgrass will have a high tolerance, while some sources of fairway wheatgrass and crested wheatgrass will show significantly higher mortality than Nordan crested wheatgrass or Siberian wheatgrass P-27.

## Literature Cited


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