

# High Elevation Orchardgrass and Meadow brome grass Study

**Objective:** Lack of winter hardiness in orchardgrass (*Dactylis glomerata* L.) and meadow brome grass (*Bromus riparius* Rehm.) frequently limits grass persistence and forage production of irrigated pastures on high mountain deserts in the Great Basin. The objectives of this project are to identify genetic variation within orchardgrass, tall fescue, and meadow brome grass that will allow us to develop better adapted and productive pasture grass to the high mountain deserts (i.e., like Panguitch, UT).



**Hypothesis:** It is hypothesized that plant materials collected from higher elevations are more adapted and would have less winter injury (death) than those collected from lower elevations.

**Plant Materials:** In 2003, orchardgrass was collected in southern Utah at elevations ranging from 1408 m to over 3319 m. These materials were established at Panguitch, UT (2154 m elevation) and Logan, UT (1358 m elevation).

**Winter Injury:** Winter injury was scored on a 1 to 9 basis with 1 being dead and 9 having no apparent injury. Combined over 2005 and 2006, plot winter injury in orchardgrass ranged from 3.9 to 6.6 and averaged 5.7. Check cultivars Potomac and Ambassador averaged 5.2 and 5.1, respectively. Based on two years data, there is no correlation between collection elevation and winter injury ( $r=-0.19$ ; i.e., plants collected at higher elevations are more winter hardy). As expected, there was a significant correlation between winter injury and forage yield ( $r=0.86$ ). Plot winter injury in meadow brome grass ranged from 8.7 to 9.0 and averaged 8.9. See Table for winter injury scores.



**Total forage yield (dry matter basis) SEE TABLE:** - is based on the first two harvests in 2005. These yields are relative and could change over the life of the study.



**Future Plans:** This study will be continued over the next two years to monitor for winter hardiness and forage yield under high mountain desert conditions. After the two years, plants superior in winter hardiness while maintaining high levels of forage production will be intercrossed. This population will be the base line for developing orchardgrass and meadow brome grass cultivars with increased winter hardiness.

**High Elevation Orchardgrass Study - Panguitch, UT**

| Collection                  | Location          | Elevation (ft) | Winter Injury (1-9) | Vigor Score (1-9) | Total DMY (lb/acre) |
|-----------------------------|-------------------|----------------|---------------------|-------------------|---------------------|
| 1                           | Nebo Loop         | 4576           | 5.5                 | 5.1               | 3215                |
| 2                           | Nebo Loop         | 5261           | 5.3                 | 4.9               | 2322                |
| 3                           | Nebo Loop         | 5815           | 5.4                 | 5.7               | 3036                |
| 4                           | Nebo Loop         | 6467           | 6.1                 | 6.3               | 3036                |
| 5                           | Nebo Loop         | 7235           | 5.4                 | 4.8               | 2322                |
| 6                           | Nebo Loop         | 7998           | 6.4                 | 7.3               | 3929                |
| 7                           | Nebo Loop         | 8273           | 6.4                 | 7.7               | 4108                |
| 8                           | Nebo Loop         | 8398           | 5.8                 | 6.0               | 3036                |
| 9                           | Nebo Loop         | 8478           | 5.9                 | 5.8               | 3036                |
| 10                          | Nebo Loop         | 8673           | 5.3                 | 5.9               | 3036                |
| 12                          | Nebo Loop         | 9375           | 5.1                 | 5.7               | 2500                |
| 13                          | Nebo Loop         | 8368           | 5.0                 | 4.8               | 2322                |
| 14                          | Nebo Loop         | 6079           | 6.6                 | 7.3               | 3929                |
| 15                          | Sky Line Trail    | 8127           | 6.3                 | 5.7               | 3036                |
| 16                          | Sky Line Trail    | 8853           | 6.5                 | 7.2               | 3929                |
| 17                          | Sky Line Trail    | 9771           | 6.3                 | 6.4               | 3572                |
| 18                          | Sky Line Trail    | 10226          | 6.5                 | 6.7               | 3572                |
| 19                          | Sky Line Trail    | 10218          | 4.9                 | 5.0               | 2322                |
| 20                          | Sky Line Trail    | 10480          | 4.6                 | 3.7               | 1429                |
| 21                          | Sky Line Trail    | 9937           | 5.9                 | 5.8               | 2500                |
| 22                          | Marysville Canyon | 9336           | 6.0                 | 6.6               | 3393                |
| 23                          | Marysville Canyon | 10052          | 6.4                 | 7.0               | 3572                |
| 24                          | Marysville Canyon | 10085          | 3.8                 | 3.2               | 1072                |
| 26                          | Marysville Canyon | 10787          | 6.3                 | 7.1               | 3929                |
| 27                          | Marysville Canyon | 10395          | 5.7                 | 5.4               | 2858                |
| 28                          | Marysville Canyon | 7028           | 5.5                 | 5.1               | 2143                |
| 29                          | Marysville Canyon | 6341           | 6.4                 | 6.7               | 3393                |
| 23T                         | Marysville Canyon | 10052          | 5.3                 | 4.0               | 1786                |
| 24T                         | Marysville Canyon | 10085          | 3.9                 | 4.0               | 1786                |
| Ambassador                  | Cultivar          |                | 5.1                 | 5.9               | 2858                |
| Potomac                     | Cultivar          |                | 5.2                 | 5.5               | 2858                |
| <b>LSD<sub>(0.05)</sub></b> |                   |                | <b>0.88</b>         | <b>0.14</b>       | <b>893</b>          |



**Orchardgrass winter injury scores**

**High Elevation Meadow bromegrass Study - Panguitch, UT**

| <b>Entry</b>                    | <b>Winter<br/>Injury (1-9)</b> | <b>Total DMY<br/>(lb/acre)</b> |
|---------------------------------|--------------------------------|--------------------------------|
| <b>Top Three Breeding lines</b> |                                |                                |
| <b>09_57</b>                    | <b>9.0</b>                     | <b>6787</b>                    |
| <b>03_28</b>                    | <b>8.9</b>                     | <b>6474</b>                    |
| <b>03_64</b>                    | <b>9.0</b>                     | <b>6385</b>                    |
| <b>Cache</b>                    | <b>9.0</b>                     | <b>6072</b>                    |
| <b>Regar</b>                    | <b>9.0</b>                     | <b>6251</b>                    |
| <b>Paddock</b>                  | <b>9.0</b>                     | <b>5537</b>                    |
| <b>Fleet</b>                    | <b>9.0</b>                     | <b>5537</b>                    |
| <b>Study Mean</b>               | <b>9.0</b>                     | <b>5894</b>                    |
| <b>LSD <sub>(0.05)</sub></b>    | <b>0.13</b>                    | <b>536</b>                     |