

# ASA, CSSA, and SSSA Virtual Issue Call for Papers: Advancing Resilient Agricultural Systems: Adapting to and Mitigating Climate Change

Content will focus on resilience to climate change in agricultural systems, exploring the latest research investigating strategies to adapt to and mitigate climate change. Innovation and imagination backed by good science, as well as diverse voices and perspectives are encouraged. Where are we now and how can we address those challenges? Abstracts must reflect original research, reviews and analyses, datasets, or issues and perspectives related to objectives in the topics below. Authors are expected to review papers in their subject area that are submitted to this virtual issue.

## Topic Areas

- Emissions and Sequestration
  - » Strategies for reducing greenhouse gas emissions, sequestering carbon
- Water Management
  - » Evaporation, transpiration, and surface energy balance
- Cropping Systems Modeling
  - » Prediction of climate change impacts
  - » Physiological changes
- Soil Sustainability
  - » Threats to soil sustainability (salinization, contamination, degradation, etc.)
  - » Strategies for preventing erosion
- Strategies for Water and Nutrient Management
  - » Improved cropping systems
- Plant and Animal Stress
  - » Protecting germplasm and crop wild relatives
  - » Breeding for climate adaptations
  - » Increasing resilience
- Waste Management
  - » Reducing or repurposing waste
- Other
  - » Agroforestry
  - » Perennial crops
  - » Specialty crops
  - » Wetlands and forest soils



## Deadlines

Abstract/Proposal Deadline: Ongoing  
Submission deadline: 31 Dec. 2022

## How to submit

Submit your proposal to  
[manuscripts@sciencesocieties.org](mailto:manuscripts@sciencesocieties.org)

Please contact Jerry Hatfield at  
[jerryhatfield67@gmail.com](mailto:jerryhatfield67@gmail.com) with any questions.



### Registration of 'Sublette' Barley

'Sublette' (Reg. no. CV-323, PI 639908), a two-rowed spring malting barley (*Hordeum vulgare* L.) was developed and released in 2005 by the USDA-ARS, Aberdeen, ID, in cooperation with the University of Idaho Agricultural Experiment Station. Sublette was named after William L. 'Bill' Sublette, an early explorer of the western United States, and the Sublette Reservoir, an outstanding natural area in southern Idaho.

Sublette was tested as experimental line 90Ab241 and is a selection from the cross A517/2\*Harrington' (Harvey and Rossnagel, 1984). The parent A517 is a proanthocyanidin-free selection from the line WA 9037-75 developed at Washington State University. WA 9037-75 has the pedigree 'Klages'/4/'Betzes' (PI 129430)/Heines Hanna' (PI 321794)/Pirolina' (PI 262218)/3/Foma (GSHO 467). Klages (Wesenberg et al., 1974) contributes significantly to both A517 and Harrington. Harrington is a two-rowed malting barley released by the Crop Development Centre, University of Saskatchewan, and is the current western two-rowed malting industry standard. Sublette has semismooth awns with a medium-lax spike. The kernel has long rachilla hairs and white aleurone. Sublette is adapted to both irrigated and dryland conditions of the U.S. Intermountain West.

In 1989, following pedigree selection for resistance to lodging, shattering, and favorable plant and spike type in the F<sub>2</sub> through F<sub>4</sub> generations grown under irrigated conditions at Aberdeen, ID, 100 spikes were selected from the cross A517/2\*Harrington and grown as rows in 1990. The row designated no. 241 was selected due to favorable spike type and resistance to lodging and shattering. It was given the designation 90Ab241 and entered into replicated yield trials in 1994.

Sublette was tested in various trials throughout Idaho from 1994 to 2002, and 2004. It was tested in both the Western Regional Spring Barley Nursery (WRSBN) and the Western Regional Dryland Spring Barley Nursery (WRDSBN) from 1996 to 1998. It was evaluated in the American Malting Barley Association (AMBA) sponsored pilot scale malt tests from 1999 to 2001 and received favorable ratings in 1999. In 2000 it received an unfavorable rating due to low diastatic power and  $\alpha$ -amylase activity. It again received a favorable rating in 2001 and was recommended for advancement to plant scale evaluation.

In 40 irrigated trials across Idaho from 1994 to 2002, Sublette headed 1 d earlier and was 3 cm shorter than both Harrington and Merit. Merit, a two-rowed malt barley from Busch Agricultural Resources Incorporated, has performed well in both Idaho and Montana, and was included as a check cultivar. Sublette yielded 6554 kg ha<sup>-1</sup> compared with 6304 and 6702 kg ha<sup>-1</sup> for Harrington and Merit, respectively. Sublette and Harrington each had test weights of 68.2 kg hL<sup>-1</sup> compared with 67.5 kg hL<sup>-1</sup> for Merit. Sublette was superior to both Harrington and Merit for kernel plumpness. Kernels retained on a sieve with 0.24 by 1.9 cm slotted openings (American Society of Brewing Chemists, 1992) were considered plump. Sublette had 93% plump kernels compared with 86% for Harrington and 85% for Merit. Sublette is slightly inferior to Merit and superior to Harrington for resistance to lodging. On a 1-to-9 lodging scale, Merit had the best rating of 1.7, compared to 2.0 for Sublette and 3.1 for Harrington in 30 irrigated trials across Idaho from 1994 to 2002.

Across 33 Idaho rain-fed location-years from 1995 to 2003, Sublette headed 1 and 2 d earlier and was 4 cm shorter than Harrington and Merit, respectively. Sublette yielded 4100 kg ha<sup>-1</sup> compared with 3885 kg ha<sup>-1</sup> for Harrington and 4406 kg ha<sup>-1</sup> for Merit. Sublette had a test weight of 59.4 kg hL<sup>-1</sup> compared with 59.2 kg hL<sup>-1</sup> for Harrington and

58.6 kg hL<sup>-1</sup> for Merit. Sublette averaged 83% plump kernels compared to 69% for Harrington and 74% for Merit.

Across 26 location-years from 1996 to 1997 in the WRSBN, Sublette yielded 5215 kg ha<sup>-1</sup> compared with 5115 kg ha<sup>-1</sup> for Harrington and 5322 kg ha<sup>-1</sup> for Merit. Test weight values were very similar with values of 66.8, 66.6, and 65.8 kg hL<sup>-1</sup> for Sublette, Harrington, and Merit, respectively. Sublette and Harrington each headed 1 d earlier than Merit. Sublette was on average 2 cm shorter than Harrington and 5 cm shorter than Merit. As was shown in other tests, Sublette had higher percentage plump kernels than both Harrington and Merit, averaging 91% compared with 83% for Harrington and 84% for Merit.

Across 11 location-years in the 1998 WRSBN, Sublette yielded 5100 kg ha<sup>-1</sup> compared with 4998 kg ha<sup>-1</sup> for Harrington and had 80% plump kernels compared with 76% for Harrington. Sublette and Harrington each had test weight values of 64 kg hL<sup>-1</sup> and had heading dates of 179 Julian days. Sublette was 1 cm shorter than Harrington. Merit was not tested in the 1998 WRSBN.

In the 1996-1997 WRDSBN across 17 location-years, Sublette had 91% plump kernels compared with 80% for Harrington, yielded 4835 kg ha<sup>-1</sup> compared with 4721 kg ha<sup>-1</sup> for Harrington, and had a test weight value of 64.8 kg hL<sup>-1</sup> compared with 64.5 kg hL<sup>-1</sup> for Harrington. Sublette headed 1 d earlier than Harrington and was 2 cm shorter.

In regional trials under natural infection of stripe rust (caused by *Puccinia striiformis* Westend.) at Tammany, ID, in 1996, Sublette showed no symptoms of stripe rust while Harrington showed a trace. At Fairfield, MT, disease symptoms were again low with values of 5 and 18% diseased leaf area for Sublette and Harrington, respectively. Because little data are available, it is uncertain if Sublette is more resistant to stripe rust than Harrington and Sublette is not considered to be highly resistant.

Malt quality was assessed under irrigated conditions at Aberdeen and Tetonia, ID from 1996 to 2001. Across 11 location-years, Sublette averaged 95% plump kernels compared with 85% for Harrington and 88% for Merit. Sublette and Merit had similar values for percentage of malt extract with values of 80.1 and 80.2% while Harrington averaged 78.4%. Percentage grain protein for all three entries was very similar with values of 13, 13.2, and 13.1% for Sublette, Harrington, and Merit, respectively. Sublette and Merit had percentage wort protein values of 4.87 and 5.02%, while Harrington averaged 4.35%. Soluble/total protein values were 38, 34, and 40% for Sublette, Harrington, and Merit, respectively. Diastatic power was 144, 108, and 159 °ASBC for Sublette, Harrington, and Merit, respectively. Alpha-amylase values [20°C dextrinizing unit (DU)] for Sublette, Merit, and Harrington were 62, 68, and 52, respectively. Sublette, Harrington, and Merit had  $\beta$ -glucan levels of 255, 407, and 201  $\mu$ g g<sup>-1</sup>, respectively across the 11 location-years.

In WRDSBN trials across 11 location years from 1996 to 1998, Sublette and Harrington were evaluated for malt quality characteristics. Sublette was superior to Harrington for percentage plump kernels (89.4% vs. 81.5%), malt extract (80.2% vs. 79.0%), diastatic power (142 vs. 116 °ASBC),  $\alpha$ -amylase [57.7 vs. 50.2 20°C DU], and  $\beta$ -glucan (495 vs. 538  $\mu$ g g<sup>-1</sup>). Grain protein values were similar, with values of 13.1% for Sublette and 13.0% for Harrington.

In the WRSBN trials from 1996 to 1997, Sublette, Harrington, and Merit were evaluated for malt quality across nine location-years. Sublette averaged 91% plump kernels compared with 84% for both Harrington and Merit. Sublette had a slightly lower malt extract value compared to Merit (80.0% vs. 80.1%) but was superior to Harrington with a value of 79.1%. Enzymatic activity values were consistent among the



three lines as Merit had the highest and Harrington the lowest. Alpha-amylase values were 55, 50, and 59 20°C DU for Sublette, Harrington, and Merit, respectively. Diastatic power values followed the same trend, with values of 135, 116, and 156 °ASBC for Sublette, Harrington, and Merit, respectively. Barley protein values for Sublette were 13.2%, while both Harrington and Merit averaged 13.3%. For wort protein, Sublette averaged 4.78%, compared with 4.59% for Harrington and 5.07% for Merit. Soluble to total protein values were 39.2, 37.4, and 42.1% for Sublette, Harrington, and Merit, respectively. Beta-glucan levels were 446, 483, and 306  $\mu\text{g g}^{-1}$  for Sublette, Harrington, and Merit, respectively.

Over 3 yr of testing in AMBA pilot-scale evaluations, Sublette was superior to Harrington for percentage of plump kernels (95 vs. 85). Sublette was also superior to Harrington for percentage malt extract (80.6 vs. 78.4), diastatic power (157 vs. 124 °ASBC),  $\alpha$ -amylase (69 vs. 49 20°C DU), and  $\beta$ -glucan (324 vs. 428  $\mu\text{g g}^{-1}$ ). The soluble to total protein value for Sublette (41.8) was within the desired range, while that of Harrington (33.6) was lower than desired. Both Sublette and Harrington were below the desired range for wort color with values of 1.5 and 1.4 °ASBC, respectively.

Sublette is expected to perform well under both irrigated and rain-fed growing areas of the Intermountain West.

Breeder and Foundation seed of Sublette will be maintained by the Idaho Agricultural Experiment Station, Foundation Seed Program, Kimberly Research and Extension Center, 3793

N 3600 E, Kimberly, ID 83341. Small quantities of seed may be obtained from the corresponding author for at least 5 yr. It is requested that appropriate recognition of source be given when this cultivar contributes to development of new germplasm or cultivars.

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