**AMBA Plant Scale Evaluation Program**

**Top Shelf (DH162310)**

**GN0 Two-Row Winter Malting Barley**

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**Overview**

Top Shelf is the first American-made GN0 winter malting barley. This variety is perfect for distillers because it provides exceptional malt quality for both all-malt and grain/adjunct whiskey production. Top Shelf shows an excellent nitrogen response and when managed for high protein boasts a super enzyme and FAN package. When managed for low protein it has very high extract and PSY required for all-malt distilling. Why look to Europe for GN0 barley when the Top Shelf is right here?

**Evaluation**

Top Shelf (DH162310) is a doubled haploid derived from the cross of DH130939/Calypso. DH130939 is an experimental winter 2-row malting type from the OSU program. Calypso is marketed in the US by Limagrain Cereal Seeds. The cross was made in 2015 and the doubled haploid was produced in 2016. Top Shelf was advanced through increasingly rigorous and larger-scale trials based on agronomic and malting quality performance.

**Performance**

Top Shelf has shown excellent yield, grain physical quality and disease resistance (Tables 1 and 2). In most trials there has been 100% winter survival; in the limited number of tests where there was differential winter survival, it is comparable to the checks (Table 3). Top Shelf has excellent malting quality, with plenty of enzymes (Table 4). The PSY is above the minimum specification (Table 5) and nitrogen management can lead to a range of malting quality values, depending on the intended market (e.g. all-grain or adjunct) (Table 6).

**Seed Production**

Approximately 8,000 lbs. of Foundation seed will be available in July, 2024.

**Variety Release, Adaptation and Probable Production Area**

Top Shelf was released by Oregon State University in 2023 under non-exclusive license. The variety was developed for fall-planting in the Pacific Northwest (South Idaho, Palouse, Columbia Basin, and western valleys of Oregon and Washington). Additional testing throughout the US is ongoing to determine its range of adaptation.

**Agronomic Strengths**

High yield; excellent kernel plumpness; good lodging resistance; resistance to stripe rust and scald.

**Agronomic Characteristics**

**Table 1.** Agronomic performance of Top Shelf compared to check cultivars. Average of 2019-2023 trials in Oregon.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Entry | Yield (bu/acre) | Test Weight (lbs/bu) | Heading Date (DOY) | Plant height (in) | Lodging (%) | Stripe rust (%) | Scald (%) |
| *Station yrs.* | 9 | 9 | 5 | 9 | 5 | 3 | 8 |
| Top Shelf | 156 | 53.9 | 113 | 46 | 1 | 3 | 3 |
| Wintmalt | 115 | 50.6 | 123 | 38 | 16 | 18 | 37 |
| Thunder | 117 | 51.4 | 117 | 39 | 22 | 16 | 34 |

**Table 2.** Agronomic performance of Top Shelf compared to check cultivars. Average of the 2022 University of Idaho Extension Trials (Aberdeen and Rupert).

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Entry | Yield(bu/acre) | Test weight\*(lbs/bu) | Heading (DOY) | Plant height(in) | Lodging (%) | Spring Stand(%) |
| *Station yrs.* | *2* | *2* | *2* | *2* | *2* | *2* |
| Top Shelf | 164 | 50.6 | 148 | 41 | 18 | 100 |
| Wintmalt | 169 | 48.3 | 154 | 40 | 7 | 100 |
| Thunder | 190 | 50.7 | 152 | 40 | 24 | 100 |
| Charles | 156 | 45.8 | 153 | 41 | 67 | 100 |

\*Test weight as measured by the on-board combine weighing system.

**Table 3.** Winter survival of Top Shelf and checks where (1) there was differential survival in the trial and (2) all entries were present in the same trial.

|  |  |
| --- | --- |
| Entry | Winter Survival (%) |
| *Station yrs.* | *5* |
| Top Shelf | 48 |
| Charles | 45 |
| Wintmalt | 55 |

**Malting Quality Characteristics**

**Table 4**. Malt quality1 of Top Shelf and check cultivars using data from analyses of barley samples grown in Oregon (2019-2023).

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Entry | Plump kernels (%) | Malt extract (%) | Barley protein (%) | Wort protein (%) | S/T (%) | DP (0ASBC) | Alpha amylase(20°DU) | Beta glucan(ppm) | FAN (ppm) |
| *Station yrs.* | *9* | *9* | *9* | *9* | *9* | *9* | *9* | *9* | *9* |
| Top Shelf | 98.8 | 84.0 | 11.4 | 5.3 | 48.6 | 197 | 110 | 85 | 279 |
| Wintmalt | 94.6 | 81.0 | 10.8 | 4.6 | 45.9 | 145 | 68 | 97 | 174 |
| Thunder | 96.4 | 82.6 | 10.8 | 5.7 | 57.3 | 160 | 123 | 82 | 281 |

1Data courtesy of the USDA-ARS Cereal Crops Research Unit, Madison, WI.

**Table 5.** Malt quality of Top Shelf and Thunder grown in Oregon 2021. Pilot malted at OSU and analyzed at Hartwick College.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Entry | Malt Extract (%) | Malt protein (%) | Wort protein (%) | S/T(%) | DP(0ASBC) | Alpha amylase(20°DU) | Beta glucan(ppm) | FAN(ppm) | PSY (LAA/Tonne) |
| Top Shelf | 84.4 | 12.1 | 6.11 | 50.5 | 200 | 80.9 | 70 | 284 | 409 |
| Thunder | 83.4 | 10.7 | 5.63 | 52.6 | 162 | 85.3 | 83 | 267 | 405 |

**Table 6**. Malt quality of Top Shelf at increasing protein levels, grown in Corvallis, OR 2021. Micro-malted and analyzed at USDA-ARS CCRU.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Entry | Barley protein (%) | Plump Kernels (%) | Malt Extract (%) | Wort protein (%) | S/T | DP | Alpha amylase | Beta glucan | FAN |
| (%) | (0ASBC) | (20°DU) | (ppm) | (ppm) |
| Top Shelf | 9.4 | 99.7 | 85.1 | 5.7 | 62.6 | 193 | 115 | 69 | 309 |
| Top Shelf | 12.5 | 99.6 | 83.4 | 6.6 | 55.6 | 259 | 120 | 82 | 349 |
| Top Shelf | 12.9 | 99.6 | 82.9 | 6.6 | 54.2 | 256 | 119 | 117 | 346 |
| Top Shelf | 13.2 | 99.6 | 82.4 | 6.7 | 53.6 | 279 | 109 | 87 | 355 |

**Publications featuring Top Shelf:**

1. Registration of “Top Shelf” barley: the first glycosidic nitrile-null, winter malting cultivar to be released in North America. Morrissy et al. 2024. Journal of Plant Registrations.
2. Code Name: Top Shelf. Morrissy et al. 2023. Artisan Spirit.

<https://issuu.com/artisanspiritmag/docs/artisanspirit_issue044_web>

1. Malting barley for North American distillers: Novel barley varieties meet and exceed contemporary expectations. Morrissy et al. 2024. Journal of Distilling Science.

<https://doi.org/10.61855/JDS0301.02>