**2023 American Malting Barley Association**

# Pilot-Scale Selection

**Selection:** DH170472  **Parentage:** DH130939/Calypso

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**Description:**

 Growth Habit: Winter

 Spike Type: 2-row, Lax

 Awn Type: Rough

 Rachilla Hair: Long

 Aleurone Color: Blue

 Glycosidic nitrile: Non-producer

**History**

DH170472 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 2017. DH170472 was advanced through mini-plot, preliminary, and advanced yield trials in the Willamette Valley of Oregon based on agronomic and malting quality performance. It has progressed to regional and national trials. It was in the 2021-2022 Idaho Extension trial and it will be in the 2022-23 Winter Malting Barley Trial (WMBT) and Idaho Extension trials.

Available data from Oregon environments are shown in Table 1. DH170472 has a 34 bu/acre yield advantage over the highest yielding check (Thunder). The test weight is excellent and 2.1 lbs/bu higher than the best check. DH170472 is two days earlier than Wintmalt but later than the other checks. It is six inches taller than the shortest check (Thunder) but had 15% less lodging. Stripe rust epidemics were mild during the test years. The scald resistance is excellent compared to the checks.

In the Idaho Extension trial (Table 2), DH170472 had a yield 22 bu/acre lower than Thunder. Test weight was lower than the checks, but on-board test weight estimates tend to be lower than actual test weights. DH170472 was similar in height and heading date to the checks. Lodging percentage was low and comparable to Wintmalt. Winter survival was excellent for all varieties.

More recent winter survival data are limited. As shown in Table 3a, based on 5 station years in the WMBT (22/23 season), DH170472 has the lowest winter survival of the set. In Table 3b, data are provided for locations where there was differential winter survival and at least one check was included in the same trial. DH170472 suffered at St. Paul, MN and Logan, UT. Additional data will be needed to ensure that it is a safe bet for current fall-sown barley areas.

DH170472 may be of greatest interest to grain distillers (Table 4) as compared to the checks it meets the most metrics for barley factors, malt factors, measures of malt modification, and congress wort. It could be of some interest to all malt distillers given the somewhat lower enzymes and FAN. It is an EPH null and therefore a non-producer of GN. The PSY meets the all-malt distilling threshold (Tables 5 and 6). As shown in Table 7, managing levels of nitrogen fertility may be a tool for using DH170472 for both all malt and grain distilling end-uses.

In addition to the data provided by the USDA-ARS-CCRU, we have data from different samples varying in malt protein for 2021 crop. DH170472 and Thunder were micro-malted and pilot-malted at OSU and analyzed at Hartwick for the usual suite of malt parameters, as well as predicted spirit yield (PSY) (Tables 5 and 6). Compared to Thunder, DH170472 had similar or slightly lower malt extract, similar DP and similar alpha amylase. Beta glucan, FAN and PSY values were similar.

Over two years at Lebanon and Corvallis, OR DH170472 had a germination index similar to Thunder. DH170472 showed lower water sensitivity than the checks for both 2021 and 2022 (Table 8).

**Agronomic Strengths**

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

**Adaptation and Probable Production Area**

DH170472 was bred for fall-planting in the Pacific Northwest (South Idaho, Palouse, Columbia Basin, and western valleys of Oregon and Washington). Performance in South Idaho will be assessed in the Idaho Extension trials and the WMBT data will show if it has broader adaptation.

**Agronomic Characteristics**

**Table 1.** Agronomic performance of fall planted DH170472 compared to check cultivars and DH162310 (AMBA pilot scale entry). 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 |
| DH170472 | 151 | 53.5 | 121 | 45 | 1 | 3 | 5 |
| DH162310 | 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 fall planted DH170472 compared to check cultivars and DH162310 (AMBA pilot scale entry). 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* |
| DH170472 | 168 | 48.3 | 153 | 43 | 10 | 100 |
| DH162310 | 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 3a.** Winter survival of DH170472 compared to check cultivars and Top Shelf (AMBA pilot scale entry). Average of the 2023 Winter Malting Barley Trial when differential survival was observed.

|  |  |
| --- | --- |
| Entry | Winter survival(%) |
| *Station yrs.* | *5* |
| DH170472 | 34 |
| Top Shelf | 48 |
| Wintmalt | 55 |
| Charles | 45 |

**Table 3b.** Winter survival of DH170472 compared to check cultivars and Top Shelf (AMBA pilot scale entry) where there was differential survival and at least one check variety was included in the same experiment. Blank cells mean no data are available.



**Malting Quality Characteristics**

**Table 4**. Malt quality1 of DH170472 and check cultivars using data from analyses of barley samples grown in Oregon (2019-2022). Data meeting AMBA guidelines are shown, respectively, in **bold (adjunct brewing)**, *italics (all malt brewing/distilling)*, and/or underline (grain distilling), or a combination if the specification meets malting production types. Due to the nature of the process, there is no β-glucan or PSY specification for grain distilling.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Entry | Plump Kernels (%) | Malt Extract (%) | Barley protein (%) | Wort protein (%) | S/T(%) | DP(0ASBC) | Alpha amylase(20°DU) | Beta glucan(ppm) | FAN(ppm) |
| *Station yrs.* | *7* | *7* | *7* | *7* | *7* | *7* | *7* | *7* | *7* |
| DH170472 | ***98.7*** | ***82.5*** | ***10.7*** | ***4.9*** | 48.5 | **165** | **96** | 107 | **243** |
| Wintmalt | ***93.3*** | 80.3 | ***11.1*** | *4.6* | ***44.7*** | **153** | ***69*** | 104 | *181* |
| Thunder | ***95.6*** | ***82.0*** | ***11.1*** | 5.7 | 55.1 | **169** | **129** | ***97*** | **287** |
| **Adjunct**  | >90 | >81 | <12.8 | 4.8- 5.6 | 40-47 | >140 | >50 | <100 | >210 |
| *All malt*  | >90 | >81 | <11.8 | <5.3 | 38-45 | 110-150 | 40-70 | <100 | 140-190 |
| Grain distillers  | >70 | >79 | 11.5 - 14 | >6.0 | >48 | >200 | >75 |  | >250 |

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

**Table 5**. Malt quality of DH170472 and Thunder grown in Oregon 2021. Micro-malted at OSU and analyzed at Hartwick College). Data meeting AMBA guidelines are shown, respectively, in **bold (adjunct brewing)**, *italics (all malt brewing/distilling)*, and/or underline (grain distilling), or a combination if the specification meets malting production types. Due to the nature of the process, there is no β-glucan or PSY specification for grain distilling.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Entry | Malt Extract (%) | Malt protein (%) | Wort protein (%) | S/T(%) | DP(0ASBC) | Alpha amylase(20°DU) | Beta glucan(ppm) | FAN(ppm) | PSY (LAA/Tonne) |
| DH170472 | ***83.1*** | ***10.2*** | **5.18** | 50.8 | *119* | ***70.4*** | ***41*** | **252** | *402* |
| Thunder | ***82.8*** | ***9.7*** | **5.38** | 55.5 | *120* | **77** | ***52*** | **266** | 398 |

**Table 6.** Malt quality of DH170472 and Thunder grown in Oregon 2021. Pilot malted at OSU and analyzed at Hartwick College). Data meeting AMBA guidelines are shown, respectively, in **bold (adjunct brewing)**, *italics (all malt brewing/distilling)*, and/or underline (grain distilling), or a combination if the specification meets malting production types. Due to the nature of the process, there is no β-glucan or PSY specification for grain distilling.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Entry | Malt Extract (%) | Malt protein (%) | Wort protein (%) | S/T(%) | DP(0ASBC) | Alpha amylase(20°DU) | Beta glucan(ppm) | FAN(ppm) | PSY (LAA/Tonne) |
| DH170472 | ***82.3*** | **12.2** | **5.46** | **44.8** | ***174*** | ***69.7*** | ***76*** | **240** | *401* |
| Thunder | ***83.4*** | ***10.7*** | **5.63** | 52.6 | **162** | **85.3** | ***83*** | **267** | *405* |

**Table 7.** Malt quality of DH170472 at increasing protein levels, grown in Corvallis, OR 2021. Micro-malted and analyzed at USDA-ARS CCRU). Data meeting AMBA guidelines are shown, respectively, in **bold (adjunct brewing)**, *italics (all malt brewing/distilling)*, and/or underline (grain distilling), or a combination if the specification meets malting production types. Due to the nature of the process, there is no β-glucan or PSY specification for grain distilling.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Entry | Barley protein (%) | Plump Kernels (%) | Malt Extract (%) | Wort protein (%) | S/T | DP | Alpha amylase | Beta glucan | FAN |
| (%) | (0ASBC) | (20°DU) | (ppm) | (ppm) |
| DH170472 | ***9.5*** | ***99.5*** | ***83.2*** | **5.4** | 59.2 | ***149*** | **100** | ***29*** | 271 |
| DH170472 | ***11.6*** | ***99.6*** | ***82.7*** | 5.8 | 54.2 | **191** | **96** | ***57*** | 295 |
| DH170472 | ***12.4*** | ***99.6*** | ***81.7*** | 6.2 | 53.2 | **222** | **95** | 133 | 314 |
| DH170472 | 13.9 | ***99.6*** | 80.6 | 6.3 | 48.3 | **221** | **93** | 150 | 334 |

**Table 8.** Germination index (IK) and Water Sensitivity (WS) of DH170472checks, and Top Shelf (DH162310; AMBA Pilot Scale entry) at Lebanon (LEB) and Corvallis (COR), 2021 & 2022 crop. Data recorded in December 2021 & September 2022 of their respective harvest year.

