

NEBRASKA AGRICULTURAL EXPERIMENT STATION
UNIVERSITY OF NEBRASKA-LINCOLN
DEPARTMENT OF AGRONOMY AND HORTICULTURE

RELEASE OF NBE15420 WINTER BARLEY

NB15420 is a winter barley (*Hordeum vulgare* L.) cultivar developed by the Nebraska Agricultural Experiment Station and released in 2021. It was released primarily for its superior grain yield in rainfed barley production systems throughout the Central Great Plains. It is not a malting barley and its main uses will be as feed grain barley or as a forage barley.

NB15420 was selected from the cross P-845/NB08410. The pedigree of P-845 is Dictoo/NE91709, and the pedigree of NB08410 is NE95711/Legacy//NE95711 where Legacy Barley is a 6-row malting barley developed by Busch Agricultural Resources. The cross was made in 2009. The F₁ generation was grown in the greenhouse at Lincoln in 2010, and the F₂ to F₃ generations were advanced using the bulk breeding method in the field at Lincoln, NE in 2011 to 2012. In 2013, single F₃-derived F₄ head-rows were planted for selection at Lincoln, NE. The F_{3:5} was evaluated as a single four row plot at Lincoln, NE in 2014. NB15420 was identified in 2015 as the experimental line, NB15420, and selected for further testing. The only selection thereafter was to remove off types, usually taller plants or plants with different head characteristics. This line seems to be broadly adapted to rainfed production fields in the central Great Plains.

NE15420 was evaluated in Nebraska replicated yield nurseries starting in 2015 as part of our preliminary yield trial (BDUP15) which was grown in an alpha-lattice incomplete block design with two replications in three locations in Nebraska (Lincoln, Mead, and Sidney). Based on its agronomic performance, it was advanced in 2016 to our barley elite trial which was grown using an alpha-lattice incomplete block design with three replications at the same three locations in Nebraska and also at Colby or Hays, KS. NB15420 was tested in the barley elite trial thereafter, with an additional testing location being added at Stillwater OK in 2017 for a total of five testing locations. Due to severe winters and storms, barley yield trials are often lost. Data from these trials that were successfully harvested are presented in Table 1. The two comparison cultivars are P-954 and P-845. Historically P-954 is one of the most winter hardy barleys in the central Great Plains and P-845 was a high yielding more recent release (2013). In these trials, NB15420 was similar for winter survival to both P-845 and P-945 (data not shown). NB15420 was similar in flowering to P-845 and 4 days earlier than P-954. It was similar to P-954 in plant height and one inch taller than P-845. For grain yield, NB15420 (3974 lbs/a, 82.8 bu/a) was significantly higher than P-845 (3636 lbs/a, 75.8 bu/a) and P-954 (3491 lbs/a, 72.8 bu/a). For grain volume weight, NB15420 was not significantly different from P-845 or P-954.

In 2018-19, it was entered into the USDA-ARS Uniform Winter Barley Trial where it ranked 6th out of 18 entries (data available at: <https://www.ars.usda.gov/southeast-area/raleigh-nc/plant-science-research/docs/nursery-reports/page-2/>). As the data came mainly from the Southeastern USA, the line performed well for being so far from home. Barley diseases are relatively rare in Nebraska with winter survival being the major concern, so limited disease information is available. However data from the USDA-ARS Uniform Winter Barley Trial indicate that NB15420 is susceptible to stripe rust (incited by *Puccinia striiformis* f. sp. *hordei*) and moderately susceptible to Fusarium head blight (incited by *Fusarium* spp.) In 2020, a season

where the yield trial at Mead was severely damaged and delayed by winter injury, NB15420 was also susceptible to late onset stem rust (incited by *P. graminis* f. sp. *tritici*). In Nebraska, winter barley has a normal growth pattern where it escapes *P. graminis* infection.

In positioning NB15420, based on performance data to date, it should be well adapted to rainfed barley production systems in Nebraska, Kansas, and Oklahoma. As P-845 is a parent of NB15420, NB15420 and P-845 should be considered as genetically similar and both should not be grown together if the goal is to add diversity to the barley crop.

NB15420 is a winter barley with prostrate growth in the fall. NB15420 is an awned, tanglumed cultivar. Its field appearance is most similar to P-845. After heading, the canopy is moderately closed and erect. The flag leaf is erect and without wax at the boot stage. The foliage is green with a slightly waxy bloom on the leaf sheath and head. Anthocyanin is absent from the stem and leaf sheath. The auricle is white and clasping. The head is 6-rowed with overlapping lateral kernels for much of the head, clavate and erect. It lacks rachilla hairs. The glume lacks hairs, and the awns are rough with many teeth and longer than the glumes. Kernels are midlong and covered (hulled) with no hairs on the ventral furrow. The hull is semiwrinkled and aleurone is colorless.

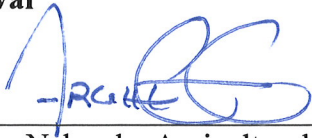
NB15420 has been uniform and stable since 2017. Less than 0.5% of the plants were rogued from the Breeder's seed increase in 2017-20. The rogued variant plants were taller in height (5 - 15 cm) or were awnless. Up to 1% (10:1000) variant plants may be encountered in subsequent generations. The Nebraska Foundation Seed Division, Department of Agronomy and Horticulture, University of Nebraska-Lincoln, Lincoln, NE 68583 will have foundation seed available to qualified certified seed enterprises in 2021 with the first sale of certified seed in 2021 or 2022. The U.S. Department of Agriculture will not have commercial seed for distribution. The seed classes will be Breeder, Foundation, Registered, and Certified. NB15420 may be submitted for plant variety protection under P.L. 10577 with the certification option. Small quantities of seed for research purposes may be obtained from Dr. P.S. Baenziger at the Department of Agronomy and Horticulture, University of Nebraska-Lincoln for at least 5 years from the date of this release. In addition, a seed sample will be deposited in the USDA-ARS National Small Grains Collection, Aberdeen, ID, and this seed is freely available to interested researchers.

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Approval

A handwritten signature in blue ink, appearing to be 'A. R. G.', written over a horizontal line.

Director, Nebraska Agricultural
Experiment Station

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date

Table 1. Head to head comparisons of NB15420 to P-954 and P-845 from trials in Nebraska and Kansas beginning in 2016, and Nebraska, Kansas, and Oklahoma from 2017 to 2020. Data on anthesis date, plant height, grain yield and grain volume weight from trials at three locations (Mead, Lincoln, and Sidney) in Nebraska, Hayes KS or Stillwater OK (total environments in the comparison is N).

	Anthesis Date		Height		Grain Yield		Grain Volume Weight									
	D after Jan. 1		in		lbs/a		lbs/bu									
N	Line NB15420	N	Line NB15420	N	Line NB15420	N	Line NB15420									
P-845	11	133.2	n.s.	14	33.8	34.91	*	15	3636.00	3974	**	7	45.6	46.8	n.s.	
P-954	11	136.2	132.7	**	14	34.14	34.91	n.s.	15	3491.00	3974	**	7	47.4	46.8	n.s.

*, **, n.s. Significantly different at the P=0.05, P=0.01 probability level or not significantly different.

