**Final Report for Wyoming Bean Commission**

***Jim Heitholt, Prepared February 2023; Funded at $2,787***

# 2023 Dry Bean Performance Evaluation

The University of Wyoming coordinates the dry bean variety performance evaluation at the Powell location in a continuous and on-going program. In cooperation with the National Cooperative Dry Bean Nursery, and with funding from the Wyoming Bean Commission, a wide range of germplasm is evaluated each year, assisting producers in selecting varieties best suited for Wyoming soils and climate.

## Materials and Methods

The experiment was located at the University of Wyoming Research and Extension Center in Powell, Wyoming. The soil, a Garland clay loam, (fine, mixed, mesic: Typic Haplarid), was prepared by roller harrow and leveled in the spring. The entire plot area received 70 units of N, 100 units of P, 60 units of K, 50 units of sulfate-S, 50 units elemental S, 5 units of zinc, 2 units manganese, 1.5 units boron, and 40 units humic acid per acre on May 15. Chemical weed control consisted of a preplant incorporated chemical treatment of 2 pints of Sonalan and 1 pint of Outlook applied on May 16. The plots were planted on May 30 in three-row plots that were 5.5 feet wide by 20 feet long. IH 185 planter units with cone attachments were used, set on 22-inch row spacing. Varisto herbicide was applied postemergence at 1 pint on July 5. The experimental design was a randomized block with 4 replications. Cultivation occurred during the growing season when appropriate. Furrow irrigation was applied on May 17, July 15, July 25, August 4, and August 24. Visual estimates for days to 50 percent bloom (50 percent of plants at second bloom) and days to maturity (50 percent of the plants with one buckskin pod) were made. Subplots of one row by 10 feet were pulled by hand, and those plants were threshed with an Almaco stationary plot thresher. The seed was hand-picked to remove dirt clods, bean chaff, and seed mixtures. Samples were then weighed for clean seed yield per plot and seeds per pound.

## Results and Discussion

Stand establishment was good, with excellent soil and weather conditions. The growing season can be described as wet and cool. June, July, Aug high/low temps (°F) were: 74/42, 84/45, and 84/42, respectively (5 days in July and 7 days Aug were +90°F) with one of the latest trial harvests in the last several years. Flowering, maturity, seed size (i.e., number of seed per pound) and yield data are presented in Table 1 on page 2. Yield was positively correlated with maturity (later maturing types tended to have greater yield). The results of test performed in Powell, WY; Othello, WA; Hatton, ND; Scottsbluff, NE; Quebec, CA, Juana Diaz, PR; Davis, CA; and Frankenmuth/Entrican, MI are provided after page 2.

**Acknowledgments:**

The research came to fruition thanks to Mike Moore, Kyle Webber, Samual George, Keith Schaefer, and Brad May.

**Table 1. Powell R&E Center, Cooperative Dry Bean Nursery Data, 2023**

| Name | Market | Bloom | Buckskin | Seeds | Yield |
|---|---|---|---|---|---|
| Ace | Black | 62 | 105 | 2131 | 3871 |
| Au Sable | Navy | 62 | 106 | 1918 | 3888 |
| B3033350 | Black | 62 | 115 | 2127 | 3487 |
| B3036381 | Black | 63 | 116 | 1976 | 4279 |
| CELRK | LgtRdKd | 54 | 85 | 819 | 1974 |
| CR17-1-7-B2 | Cran | 54 | 87 | 679 | 2370 |
| Charro | Pinto | 60 | 108 | 1151 | 3264 |
| Coral | Pink | 59 | 115 | 1120 | 3529 |
| Eclipse | Black | 62 | 107 | 2065 | 3626 |
| Eiger | Grt Nrth | 59 | 116 | 1272 | 3593 |
| J-3 (UW-PREC) | Pinto | 58 | 105 | 1185 | 3878 |
| LPID-3 (UW-PREC) | Pinto | 56 | 96 | 980 | 3665 |
| La Paz | Pinto | 57 | 105 | 1188 | 3742 |
| ND Redbarn | DrkRdKd | 54 | 94 | 854 | 1829 |
| ND Rodeo | SlDkPnto | 59 | 116 | 1104 | 3694 |
| ND151355 | Black | 63 | 106 | 2220 | 3534 |
| ND151660 | LgtRdKd | 54 | 90 | 833 | 1279 |
| ND171707 | Pink | 57 | 106 | 1279 | 3522 |
| NE1-21-1 | Grt Nrth | 57 | 97 | 1171 | 3755 |
| NE1-21-20 | Grt Nrth | 57 | 103 | 978 | 3670 |
| NE1-21-24 | Grt Nrth | 56 | 112 | 1162 | 3572 |
| NE1-21-25 | Grt Nrth | 57 | 94 | 1188 | 3524 |
| NE1-21-34 | Grt Nrth | 56 | 103 | 1081 | 3025 |
| NE1-21-41 | Grt Nrth | 56 | 95 | 1130 | 2638 |
| NE1-21-42 | Grt Nrth | 56 | 91 | 1192 | 2713 |
| NE1-22-5 | Grt Nrth | 57 | 94 | 1158 | 3708 |
| NE1-22-55 | Grt Nrth | 56 | 114 | 1157 | 4114 |
| NE2-17-37 | Pinto | 56 | 97 | 1123 | 3115 |
| NE2-21-34 | Pinto | 56 | 115 | 1093 | 3613 |
| NE2-21-8 | Pinto | 55 | 93 | 973 | 2983 |
| NTL-1 (UW-PREC) | Pinto | 60 | 113 | 1169 | 3190 |
| Othello | Pinto | 54 | 85 | 1094 | 3514 |
| USDA-Basin | Pinto | 61 | 116 | 1211 | 3144 |
| USDA-Cody | Pinto | 58 | 107 | 1155 | 3792 |
| | **Mean** | 58 | 103 | 1263 | 3327 |
| | **LSD** | 2 | 14 | 68 | 634 |
| | **CV** | 2.3 | 10.0 | 3.8 | 13.6 |

# 74th Annual Report
# National Cooperative Dry Bean Nursery

# 2023

**Compiled by**
**Carlos A. Urrea, Coordinator**
**Univ. of Nebraska, Panhandle Res., Ext. & Educ. Center**

**Cooperative Investigation among California, Colorado, Maryland, Michigan, Nebraska, North Dakota, Washington, and Wyoming -State Experiment Stations and Agricultural Research Centers- as part of the Regional W-4150 Multi-State Project**

and

**McGill University, Canada**

and

**Agriculture Research Service – USDA**

## Call for 2024 Cooperative Dry Bean Nursery

### Seed Submissions

It is time to request seed submission for the 2024 Cooperative Dry Bean Nurseries. I want to receive **the list of entries** by **April 5, 2024**, and the seed must be in Scottsbluff, NE, by **April 12, 2024**. All entries will be planted in replicated test plots across several United States and Canada locations. Data for seed yield, 100-seed weight, and several agronomic and marketing characteristics will be taken. They will also be included in several disease nurseries, including bean rust and common bacterial blight. Michigan will conduct canning tests.

**The seed requirements** for each of the three groups are as follows:

1. Small-seeded (Black, Navy, Others): ~**15 lbs/line**.
2. Medium-seeded (Great Northern, Pink, Pinto, Small Red, Others): ~**25 lbs/line**.
3. Large-seeded (Cranberry, Kidney, Others): ~**35 lbs/line**.

**Or 20,000 seeds**

**As in the past, all lines must be:**

- X Western grown (West of the Rocky Mountains)
- X Pathogen free
- X If susceptible to BCMV, an ELISA test will be required.
- X Acceptable commercial quality (no broken, decayed, or off-color seed)
- X **Seed should be untreated.**

**Fees**: This fee structure was decided by the W-1150 members at The Annual meeting in Mayaguez, Puerto Rico, in 2003 as follows:

Public institutions: $150/line submitted.
Private institutions: $300/line submitted.

### NURSERY OPERATIONS

Public institutions that request a nursery will be charged US $150 to defray seed-handling expenses, including treating, bagging, boxing, and shipping costs. Please let me know if your institution will submit the seeds and participate in the field trial for 2024 CDBN. Don't hesitate to contact me if you have any questions or concerns about the submission or participant fees. If you know anyone else who might like to submit seeds or plant the nursery, please let me know.

**Contact and Shipping Information:**

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**Table 1. List of Contributors and Cooperators - 2023**

| Name | Location | Seed Submitted | Planting Seed | Locations No. |
|---|---|---|---|---|
| | | | | |
| Mike Moore, Jim Heitholt | Powell, WY | | yes | 1 |
| Christine Diepenbrock, Antonia Palkovic | Davis, CA | | yes | 2 |
| Phil Miklas | Othello, WA | yes | yes | 3 |
| Juan M. Osorno, Makenson Maisonneuve | Hatton, ND | yes | yes | 4 |
| Carlos Urrea, Cody Kaarstad | Scottsbluff, NE | yes | yes | 5 |
| Francisco Gomez, Evan Wright | Frankenmuth and Entrican, MI | yes | yes | 6 |
| Valerio Hoyos-Villegas, Shamus H. McGuire | Quebec, Canada | | yes | 7 |
| Tim Porch, Giovanni Lorenzo | Juana Diaz, PR | | yes | 8 |

**Table 2. Contact information for 2023 Cooperative Dry Bean Nursery**

| Loc | First Name | Last Name | Affiliation | E-Mail | Phone |
|---|---|---|---|---|---|
| CA | Christine | Diepenbrock | University of CA – Davis | chdiepenbrock@ucdavis.edu | |
| | Antonia | Palkovic | | antoniapalkovic@gmail.com | |
| CO | Barry | Ogg | | Barry.Ogg@Colostate.edu | |
| ID | John | Dean | Idaho Seed Bean Co. | isbco@filertel.com | 208-734-5221 |
| MD | Talo | Pastor-Corrales | USDA-ARS | talo.pastor-corrales@ars.usda.gov | 301-504-6600 |
| | Francisco | Gomez | Michigan State University | gomezfr1@msu.edu | 517-353-0120 |
| | Evan | Wright | | wrigh294@msu.edu | 517-355-2287 |
| ND | Juan | Osorno | North Dakota State University | juan.osorno@ndsu.edu | 701-231-8145 |
| | Martin | Hochhalter | Meridian Seeds | mhochhalter@meridianseeds.co | 701-532-3975 |
| NE | Cody | Kaarstad | University of Nebraska | evalentincruzado2@unl.edu | 308-632-1480 |
| | Carlos | Urrea | | currea2@unl.edu | 308-632-0556 |
| NY | Phillip | Griffiths | Cornell University | pdg8@cornell.edu | 315-787-2222 |
| ON | Peter | Pauls | University of Guelph | ppauls@uoguelph.ca | 519-824-4120 ext 52460 |
| | Tom | Smith | | thsmith@uoguelph.ca | 519-824-4120 ext 8339 |
| OR | Lucas | Nebert | Oregon State University | nebertl@gmail.com | |
| | Jim | Myers | | myersja@hort.oregonstate.edu | |
| QC | Valerio | Hoyos-Villegas | McGill University | valerio.hoyos-villegas@mcgill.ca | 514-398-7856 |
| PR | Tim | Porch | USDA-ARS | timothy.porch@usda.gov | 787-238-8024 |
| | James | Beaver | University of Puerto Rico | j_beaver@hotmail.com | 787-832-4040 ext. 2566 |
| WA | Phil | Miklas | USDA-ARS | phil.miklas@ars.usda.gov | 509-786-9258 |
| WY | Mike | Moore | University of Wyoming | mdmoore@uwyo.edu | 307-754-9815 |
| | Jim | Heitholt | University of Wyoming | Jim.Heitholt@uwyo.edu | 307-776-3104 |

**Table 3. List of 2023 Cooperative Dry Bean Nursery Entries.**

| ENT. | COOPERATOR | CODE | MARKET CLASS |
|---|---|---|---|
| 1 | ND151355 | Black | Osorno |
| 2 | Eclipse | Black | |
| 3 | CR17-1-7-B2 | Cran | Miklas |
| 4 | ND Redbarn | DRK | Osorno |
| 5 | Eiger | GN | Wright |
| 6 | NE1-21-24 | GN | Urrea |
| 7 | NE1-21-41 | GN | Urrea |
| 8 | NE1-21-42 | GN | Urrea |
| 9 | NE1-21-25 | GN | Urrea |
| 10 | NE1-21-1 | GN | Urrea |
| 11 | NE1-21-34 | GN | Urrea |
| 12 | NE1-21-20 | GN | Urrea |
| 13 | NE1-22-5 | GN | Urrea |
| 14 | NE1-22-55 | GN | Urrea |
| 15 | ND151660 | LRK | Osorno |
| 16 | CLERK | LRK | |
| 17 | AuSable | Navy | Wright |
| 18 | Coral | Pink | Wright |
| 19 | ND171707 | Pink | Osorno |
| 20 | Charro | Pinto | Wright |
| 21 | USDA Cody | Pinto | Miklas |
| 22 | USDA Basin | Pinto | Miklas |
| 23 | Othello | Pinto | |
| 24 | La Paz | Pinto | |
| 25 | NE2-21-34 | Pinto | Urrea |
| 26 | NE2-21-8 | Pinto | Urrea |
| 27 | ND Rodeo | SDP | Osorno |
| 28 | NE2-17-37 | SDP | Urrea |

## The 2023 CDBN

The 2022 CDBN comprised 24 test entries and four checks.

**Agronomic nurseries**

There were approximately 1600 seeds supplied to each location sufficient to plant four 4-row replications, 20 to 25 feet long, for each entry. Seed treatment was provided by Syngenta Seed Co. and consisted of Cruiser, Maxim XL + Apron XL (MSDS are included with bean shipment unless the nursery operator requested otherwise).

**Disease Nurseries**

For rust screening, four hundred seeds (untreated) were supplied to Beltsville, MD.

## DATA RECORDING AND SCALES

The following were commonly recorded data by the CDBN collaborators. For ease and uniformity of reporting, we shall describe and abbreviate each trait:

1. **Early Vigor (EV)**: Scored on a 1 to 9 scale, where 1= excellent and 9= very poor, within the first 3 weeks after emergence.
2. **Days to Flower (DF)**: Actual number of days from planting to when approximately 50% of plants in a plot have at least one opened flower.
3. **Days to Maturity (DM)**: Actual number of days from planting to when approximately 50% of plants in a plot have at least one dry pod.
4. **Plant Height (PH)**: Record in cm from the base of the plant (soil surface) to the top node bearing at least one dry pod with seed.
5. **Growth Habit (GH)**: Record during flowering and verify when the crop is senescent as type I=determinate erect or upright, II= indeterminate erect, and III= indeterminate prostrate.
6. **Lodging (LG)**: Scored at harvest on a 1 to 9 scale, where 1= 100% plants standing erect, and 9= 100% plants lay flat on the ground.
7. **Pod Clearance (PC)**: Recorded at harvest as a percent of pods on plants not touching the ground or in contact with the soil surface.
8. **Biomass Yield (BY)**: Total plant dry weight recorded at 12% moisture and rounded up to the nearest whole number (lb/a).
9. **Seed Yield (SY)**: Recorded in lb/a at 12 % moisture and rounded up to the nearest whole number.
10. **Harvest Index (HI)**: The ratio of SY/BY expressed in % BY at 12% moisture.
11. **Weight of 100 seeds (SW)**: Weight of 100 randomly taken undamaged seeds in grams at 12 % moisture.
12. **Appearance Desirability (SD)**: An aggregate value for seed size, shape, color, and brilliance for the respective market class recorded by various scales (see footnotes).

A footnote is provided with associated details for other traits and scoring methods.

**Table 4. 2023 CDBN Summary: Yield, 100-Seed Weight, Phenotypical, and Canning Data across locations.**

| Entry | Market Class | Yield | 100-Seed Weight‡ | Days to Flowering | Days to Maturity | Canning Appearance |
|---|---|---|---|---|---|---|
| | | lbs/acre | g | days | days | (1-5)† |
| ND151355 | Black | 2350 | 20.24 | 52 | 100 | 3.0 |
| Eclipse | Black | 2296 | 21.28 | 50 | 99 | 2.9 |
| CR17-1-7-B2 | Cran | 1647 | 64.94 | 45 | 92 | 3.8 |
| ND Redbarn | DRK | 1229 | 51.38 | 45 | 96 | 3.4 |
| Eiger | GN | 3085 | 36.52 | 48 | 101 | 3.2 |
| NE1-21-24 | GN | 2534 | 38.45 | 48 | 97 | 3.5 |
| NE1-21-41 | GN | 2353 | 38.50 | 47 | 94 | 3.7 |
| NE1-21-42 | GN | 2069 | 38.90 | 48 | 96 | 3.1 |
| NE1-21-25 | GN | 2653 | 38.65 | 48 | 95 | 3.7 |
| NE1-21-1 | GN | 2781 | 38.18 | 48 | 94 | 3.9 |
| NE1-21-34 | GN | 2275 | 41.30 | 47 | 98 | 3.6 |
| NE1-21-20 | GN | 2797 | 44.70 | 46 | 97 | 3.9 |
| NE1-22-5 | GN | 2667 | 38.12 | 48 | 98 | 3.6 |
| NE1-22-55 | GN | 2987 | 39.10 | 48 | 96 | 3.4 |
| ND151660 | LRK | 674 | 52.77 | 44 | 93 | 3.2 |
| CLERK | LRK | 1309 | 57.72 | 44 | 92 | 4.2 |
| AuSable | Navy | 2489 | 23.26 | 51 | 96 | 3.7 |
| Coral | Pink | 2654 | 38.56 | 48 | 101 | 3.4 |
| ND171707 | Pink | 3049 | 31.99 | 48 | 100 | 3.1 |
| Charro | Pinto | 2712 | 40.55 | 51 | 98 | 3.6 |
| USDA Cody | Pinto | 2887 | 37.74 | 47 | 97 | 2.9 |
| USDA Basin | Pinto | 2688 | 38.54 | 49 | 101 | 2.5 |
| Othello | Pinto | 2397 | 39.24 | 45 | 87 | 3.9 |
| La Paz | Pinto | 2888 | 37.11 | 49 | 98 | 2.1 |
| NE2-21-34 | Pinto | 2429 | 39.93 | 48 | 101 | 4.1 |
| NE2-21-8 | Pinto | 2366 | 43.91 | 47 | 96 | 2.5 |
| ND Rodeo | SDP | 2691 | 42.04 | 50 | 104 | 2.0 |
| NE2-17-37 | SDP | 2317 | 39.66 | 45 | 97 | 3.3 |
| **GRAND MEAN** | | 2420 | 39.21 | 48 | 97 | 3.3 |

† Canning data from Michigan: these are visual ratings based on overall appearance averaged across a group of ~ 15 evaluators. The scale is 1 to 5, where 1 = undesirable, and 5 = desirable.

| Table 5. 2023 CDBN. Summary for seed yield (lbs/acre) for individual locations | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **ID** | **Market Class** | **CA** | **CAN** | **MI** | **ND** | **NE** | **WA** | **WYO** | **Average** |
| | | | | | | | | | |
| ND151355 | Black | 1594 | 1477 | 2292 | 919 | 3669 | 2965 | 3534 | 2350 |
| Eclipse | Black | 1173 | 1604 | 2526 | 847 | 2721 | 3573 | 3626 | 2296 |
| CR17-1-7-B2 | Cran | 1102 | 848 | 579 | 792 | 2685 | 3156 | 2370 | 1647 |
| ND Redbarn | DRK | 144 | 1723 | 1361 | 713 | 1211 | 1618 | 1829 | 1229 |
| Eiger | GN | 2286 | 2925 | 3047 | 1429 | 3879 | 4435 | 3593 | 3085 |
| NE1-21-24 | GN | 945 | 3331 | 2514 | 658 | 2643 | 4072 | 3572 | 2534 |
| NE1-21-41 | GN | 1095 | 2658 | 1808 | 1158 | 3245 | 3867 | 2638 | 2353 |
| NE1-21-42 | GN | 421 | 2786 | 1869 | 423 | 2079 | 4195 | 2713 | 2069 |
| NE1-21-25 | GN | 1402 | 2838 | 2178 | 1218 | 3097 | 4312 | 3524 | 2653 |
| NE1-21-1 | GN | 831 | 2804 | 2845 | 741 | 4351 | 4141 | 3755 | 2781 |
| NE1-21-34 | GN | 997 | 2164 | 2316 | 1034 | 2738 | 3648 | 3025 | 2275 |
| NE1-21-20 | GN | 1380 | 2496 | 2512 | 1112 | 3914 | 4494 | 3670 | 2797 |
| NE1-22-5 | GN | 1132 | 3024 | 1708 | 779 | 3603 | 4308 | 4114 | 2667 |
| NE1-22-55 | GN | 1719 | 3192 | 2636 | 868 | 3895 | 4894 | 3708 | 2987 |
| ND151660 | LRK | 306 | 1230 | 659 | 159 | 411 | | 1279 | 674 |
| CLERK | LRK | 1185 | 1881 | 792 | 463 | 1190 | 1681 | 1974 | 1309 |
| AuSable | Navy | 1539 | 2245 | 1734 | 941 | 3130 | 3944 | 3888 | 2489 |
| Coral | Pink | 1496 | 2654 | 2992 | 1127 | 2699 | 4080 | 3529 | 2654 |
| ND171707 | Pink | 1590 | 3458 | 2581 | 1196 | 4088 | 4908 | 3522 | 3049 |
| Charro | Pinto | 1774 | 3155 | 2488 | 1179 | 3346 | 3776 | 3264 | 2712 |
| USDA Cody | Pinto | 1895 | 2969 | 2390 | 1239 | 3614 | 4313 | 3792 | 2887 |
| USDA Basin | Pinto | 1896 | 2537 | 1965 | 1336 | 3482 | 4457 | 3144 | 2688 |
| Othello | Pinto | 1442 | 2431 | 1548 | 1115 | 3971 | 2759 | 3514 | 2397 |
| La Paz | Pinto | 1917 | 3167 | 2209 | 1346 | 3723 | 4113 | 3742 | 2888 |
| NE2-21-34 | Pinto | 860 | 2464 | 2017 | 1393 | 3879 | 2774 | 3614 | 2429 |
| NE2-21-8 | Pinto | 725 | 2512 | 2236 | 881 | 3721 | 3503 | 2983 | 2366 |
| ND Rodeo | SDP | 900 | 2480 | 2731 | 1104 | 3527 | 4399 | 3694 | 2691 |
| NE2-17-37 | SDP | 692 | 2332 | 1876 | 910 | 3318 | 3978 | 3115 | 2317 |
| **RAND MEAN** | | 1240 | 2478 | 2086 | 967 | 3137 | 3791 | 3240 | 2420 |
| **LSD 0.05** | | | 596 | 528 | 597 | 996 | 819 | 642 | |
| **CV %** | | 50.6 | 17.0 | 12.6 | 45.2 | 15.9 | 14.0 | 14.1 | |

**Table 6. 2023 CDBN. Summary for 100-seed weight (g) for individual locations.**

| Entry | ID | Market Class | CAN | ND | NE | WA | WY | Average |
|---|---|---|---|---|---|---|---|---|
| 1 | ND151355 | Black | 24.0 | 16.0 | 18.9 | 21.9 | 20.4 | 20.2 |
| 2 | Eclipse | Black | 25.0 | 16.9 | 18.9 | 23.7 | 22.0 | 21.3 |
| 3 | CR17-1-7-B2 | Cran | 68.0 | 53.5 | 62.6 | 73.9 | 66.8 | 64.9 |
| 4 | ND Redbarn | DRK | 58.0 | 42.7 | 50.4 | 52.6 | 53.1 | 51.4 |
| 5 | Eiger | GN | 41.0 | 33.7 | 31.7 | 40.5 | 35.7 | 36.5 |
| 6 | NE1-21-24 | GN | 41.0 | 31.1 | 36.6 | 44.5 | 39.0 | 38.4 |
| 7 | NE1-21-41 | GN | 40.0 | 32.6 | 35.2 | 44.6 | 40.1 | 38.5 |
| 8 | NE1-21-42 | GN | 42.0 | 32.2 | 35.9 | 46.4 | 38.1 | 38.9 |
| 9 | NE1-21-25 | GN | 42.0 | 31.7 | 36.8 | 44.5 | 38.2 | 38.7 |
| 10 | NE1-21-1 | GN | 39.0 | 32.2 | 35.6 | 45.4 | 38.7 | 38.2 |
| 11 | NE1-21-34 | GN | 43.0 | 35.5 | 39.5 | 46.6 | 42.0 | 41.3 |
| 12 | NE1-21-20 | GN | 48.0 | 35.3 | 42.9 | 50.9 | 46.4 | 44.7 |
| 13 | NE1-22-5 | GN | 41.0 | 30.4 | 35.3 | 44.7 | 39.2 | 38.1 |
| 14 | NE1-22-55 | GN | 42.0 | 32.0 | 36.9 | 45.4 | 39.2 | 39.1 |
| 15 | ND151660 | LRK | 62.0 | 43.0 | 51.6 | . | 54.5 | 52.8 |
| 16 | CLERK | LRK | 69.0 | 44.7 | 55.1 | 64.4 | 55.4 | 57.7 |
| 17 | AuSable | Navy | 26.0 | 19.7 | 20.6 | 26.3 | 23.6 | 23.3 |
| 18 | Coral | Pink | 43.0 | 31.8 | 35.7 | 41.8 | 40.5 | 38.6 |
| 19 | ND171707 | Pink | 26.0 | 26.3 | 33.9 | 38.3 | 35.5 | 32.0 |
| 20 | Charro | Pinto | 42.0 | 35.5 | 38.4 | 47.5 | 39.4 | 40.5 |
| 21 | USDA Cody | Pinto | 41.0 | 32.5 | 33.7 | 42.3 | 39.3 | 37.7 |
| 22 | USDA Basin | Pinto | 40.0 | 32.8 | 38.3 | 44.2 | 37.5 | 38.5 |
| 23 | Othello | Pinto | 42.0 | 30.1 | 38.2 | 44.4 | 41.5 | 39.2 |
| 24 | La Paz | Pinto | 41.0 | 30.2 | 33.4 | 42.8 | 38.2 | 37.1 |
| 25 | NE2-21-34 | Pinto | 42.0 | 32.6 | 39.3 | 44.2 | 41.5 | 39.9 |
| 26 | NE2-21-8 | Pinto | 47.0 | 32.2 | 42.7 | 51.0 | 46.6 | 43.9 |
| 27 | ND Rodeo | SDP | 42.0 | 36.7 | 40.7 | 49.7 | 41.1 | 42.0 |
| 28 | NE2-17-37 | SDP | 44.0 | 31.4 | 38.5 | 44.1 | 40.4 | 39.7 |
| | **GRAND MEAN** | | 42.8 | 32.7 | 37.8 | 44.7 | 38.1 | 39.2 |
| | **LSD 0.05** | | 6.6 | 2.9 | 2.5 | 3.1 | . | |
| | **CV %** | | 10.9 | 6.5 | 3.3 | 5.0 | 3.7 | |

**Table 7. 2023 CDBN for Days to flowering (days) and Days to Harvest Maturity (days) for individual locations.**

| | Market Class | ID | Days to Flowering | | | | | | Days to Harvest Maturity | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | CA | MI | ND | NE | WYO | Mean | CAN | MI | NE | WA | WYO | Mean |
| 1 | ND151355 | Black | 49 | 53 | 46 | 48 | 63 | 52 | 88 | 106 | 97 | 103 | 106 | 100 |
| 2 | Eclipse | Black | 48 | 50 | 45 | 48 | 62 | 50 | 88 | 105 | 93 | 101 | 107 | 99 |
| 3 | CR17-1-7-B2 | Cran | 45 | 41 | 43 | 41 | 54 | 45 | 87 | 98 | 90 | 97 | 87 | 92 |
| 4 | ND Redbarn | DRK | 44 | 40 | 45 | 42 | 54 | 45 | 90 | 104 | 98 | 95 | 94 | 96 |
| 5 | Eiger | GN | 46 | 50 | 39 | 46 | 59 | 48 | 90 | 107 | 94 | 100 | 116 | 101 |
| 6 | NE1-21-24 | GN | 46 | 46 | 45 | 46 | 56 | 48 | 85 | 104 | 91 | 95 | 112 | 97 |
| 7 | NE1-21-41 | GN | 44 | 46 | 43 | 47 | 56 | 47 | 84 | 95 | 98 | 97 | 95 | 94 |
| 8 | NE1-21-42 | GN | 45 | 46 | 47 | 47 | 56 | 48 | 87 | 101 | 99 | 103 | 91 | 96 |
| 9 | NE1-21-25 | GN | 46 | 47 | 43 | 46 | 57 | 48 | 86 | 104 | 93 | 96 | 94 | 95 |
| 10 | NE1-21-1 | GN | 44 | 46 | 47 | 45 | 57 | 48 | 84 | 103 | 90 | 98 | 97 | 94 |
| 11 | NE1-21-34 | GN | 46 | 46 | 41 | 45 | 56 | 47 | 88 | 103 | 98 | 98 | 103 | 98 |
| 12 | NE1-21-20 | GN | 44 | 46 | 40 | 44 | 57 | 46 | 85 | 102 | 93 | 102 | 103 | 97 |
| 13 | NE1-22-5 | GN | 45 | 45 | 48 | 45 | 56 | 48 | 85 | 102 | 95 | 96 | 114 | 98 |
| 14 | NE1-22-55 | GN | 46 | 47 | 43 | 45 | 57 | 48 | 88 | 104 | 93 | 101 | 94 | 96 |
| 15 | ND151660 | LRK | 45 | 39 | 44 | 40 | 54 | 44 | 87 | 106 | 89 | | 90 | 93 |
| 16 | CLERK | LRK | 41 | 37 | 45 | 41 | 54 | 44 | 86 | 92 | 104 | 93 | 85 | 92 |
| 17 | AuSable | Navy | 49 | 49 | 47 | 48 | 62 | 51 | 85 | 100 | 93 | 99 | 106 | 96 |
| 18 | Coral | Pink | 45 | 48 | 43 | 47 | 59 | 48 | 89 | 108 | 95 | 100 | 115 | 101 |
| 19 | ND171707 | Pink | 45 | 47 | 46 | 47 | 57 | 48 | 89 | 107 | 100 | 100 | 106 | 100 |
| 20 | Charro | Pinto | 52 | 51 | 48 | 42 | 60 | 51 | 91 | 104 | 87 | 102 | 108 | 98 |
| 21 | USDA Cody | Pinto | 46 | 49 | 42 | 42 | 58 | 47 | 85 | 103 | 94 | 98 | 107 | 97 |
| 22 | USDA Basin | Pinto | 47 | 50 | 42 | 47 | 61 | 49 | 86 | 105 | 98 | 98 | 116 | 101 |
| 23 | Othello | Pinto | 43 | 43 | 42 | 42 | 54 | 45 | 84 | 85 | 89 | 92 | 85 | 87 |
| 24 | La Paz | Pinto | 47 | 52 | 43 | 47 | 57 | 49 | 86 | 103 | 94 | 100 | 105 | 98 |
| 25 | NE2-21-34 | Pinto | 44 | 47 | 46 | 47 | 56 | 48 | 83 | 104 | 102 | 103 | 115 | 101 |
| 26 | NE2-21-8 | Pinto | 43 | 46 | 45 | 48 | 55 | 47 | 84 | 103 | 100 | 100 | 93 | 96 |
| 27 | ND Rodeo | SDP | 47 | 49 | 47 | 46 | 59 | 50 | 90 | 105 | 105 | 102 | 116 | 104 |
| 28 | NE2-17-37 | SDP | 43 | 45 | 39 | 44 | 56 | 45 | 89 | 103 | 96 | 99 | 97 | 97 |
| | **GRAND MEAN** | | | 46 | 44 | 45 | 57 | 48 | 87 | 102 | 95 | 99 | 102 | 97 |
| | **LSD 0.05** | | | 1 | 5 | 2 | 2 | | 4 | 2 | 4 | 3 | 14 | |
| | **CV %** | | | 1.8 | 8.9 | 2.0 | 2.4 | | 3.5 | 1.1 | 2.3 | 2.0 | 10.0 | |

**Table 8. 2023 CDBN. Miscellaneous Traits Data.**

| Ent | Market Class | ID | CA | MI | NE | Mean | MI | NE | | MI | WA |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Lodging | Plant height | | | Des. Score | Test Weight | Moisture | Canning | Plant Stand |
| | | | (1-9) | cms | | | (1-7)†‡ | lbs/bu | % | (1-5)§ | (1-9) |
| 1 | ND151355 | Black | 1.5 | 38.5 | 57.7 | 48.1 | 4 | 63.9 | 11.7 | 3 | 3.0 |
| 2 | Eclipse | Black | 3.4 | 41.0 | 56.7 | 48.8 | 4.5 | 63.5 | 11.9 | 2.9 | 2.7 |
| 3 | CR17-1-7-B2 | Cran | 4.3 | 37.0 | 45.3 | 41.2 | 4 | 58.6 | 12.4 | 3.8 | 3.3 |
| 4 | ND Redbarn | DRK | 1.2 | 38.5 | 45.7 | 42.1 | 5.33 | 59.4 | 11.7 | 3.4 | 4.7 |
| 5 | Eiger | GN | 3.6 | 40.5 | 55.3 | 47.9 | 5 | 61.3 | 11.5 | 3.2 | 3.0 |
| 6 | NE1-21-24 | GN | 4.0 | 47.5 | 53.0 | 50.2 | 4.5 | 60.4 | 12.1 | 3.5 | 1.7 |
| 7 | NE1-21-41 | GN | 5.9 | 35.0 | 57.0 | 46.0 | 4 | 62.9 | 12.4 | 3.7 | 3.3 |
| 8 | NE1-21-42 | GN | 6.3 | 46.0 | 59.3 | 52.7 | 3 | 62.6 | 12.3 | 3.1 | 5.5 |
| 9 | NE1-21-25 | GN | 6.0 | 38.5 | 52.7 | 45.6 | 4 | 61.9 | 11.5 | 3.7 | 4.8 |
| 10 | NE1-21-1 | GN | 4.0 | 36.5 | 55.0 | 45.7 | 5 | 61.0 | 12.4 | 3.9 | 2.7 |
| 11 | NE1-21-34 | GN | 3.0 | 38.0 | 56.0 | 47.0 | 4.5 | 60.2 | 11.7 | 3.6 | 4.7 |
| 12 | NE1-21-20 | GN | 5.3 | 48.0 | 60.7 | 54.3 | 3.5 | 61.7 | 13.1 | 3.9 | 2.7 |
| 13 | NE1-22-5 | GN | 4.8 | 37.0 | 57.0 | 47.0 | 4 | 61.2 | 11.4 | 3.6 | 3.3 |
| 14 | NE1-22-55 | GN | 3.6 | 37.5 | 50.7 | 44.1 | 4 | 59.3 | 12.4 | 3.4 | 3.3 |
| 15 | ND151660 | LRK | 2.5 | 40.0 | 42.0 | 41.0 | 4 | 58.6 | 11.8 | 3.2 | 8.0 |
| 16 | CLERK | LRK | 1.6 | 37.7 | 44.3 | 41.0 | 3.67 | 54.6 | 12.1 | 4.2 | 4.8 |
| 17 | AuSable | Navy | 3.9 | 42.5 | 59.0 | 50.7 | 6 | 62.3 | 13.2 | 3.7 | 1.7 |
| 18 | Coral | Pink | 4.2 | 36.0 | 61.0 | 48.5 | 5 | 63.5 | 11.9 | 3.4 | 2.3 |
| 19 | ND171707 | Pink | 2.7 | 46.5 | 58.0 | 52.2 | 4.5 | 63.0 | 12.3 | 3.1 | 1.7 |
| 20 | Charro | Pinto | 5.6 | 49.5 | 41.0 | 45.2 | 5.5 | 61.9 | 11.9 | 3.6 | 3.3 |
| 21 | USDA Cody | Pinto | 3.6 | 47.0 | 51.7 | 49.3 | 5.5 | 61.0 | 12.1 | 2.9 | 1.7 |
| 22 | USDA Basin | Pinto | 3.8 | 47.0 | 60.0 | 53.5 | 3 | 63.2 | 12.1 | 2.5 | 2.3 |
| 23 | Othello | Pinto | 7.5 | 32.0 | 54.0 | 43.0 | 3 | 61.4 | 12.3 | 3.9 | 2.3 |
| 24 | La Paz | Pinto | 3.6 | 46.0 | 59.3 | 52.7 | 4.5 | 62.6 | 11.8 | 2.1 | 2.3 |
| 25 | NE2-21-34 | Pinto | 4.8 | 47.0 | 58.7 | 52.8 | 3 | 61.6 | 12.6 | 4.1 | 2.7 |
| 26 | NE2-21-8 | Pinto | 3.9 | 45.0 | 62.3 | 53.7 | 3 | 62.3 | 12.3 | 2.5 | 2.7 |
| 27 | ND Rodeo | SDP | 4.9 | 42.0 | 55.0 | 48.5 | 4 | 62.9 | 12.3 | 2 | 3.0 |
| 28 | NE2-17-37 | SDP | 5.0 | 45.0 | 57.0 | 51.0 | 3.5 | 60.2 | 12.2 | 3.3 | 5.0 |
| | | **GRAND MEAN** | 4.3 | 41.5 | 54.5 | 48.0 | 4.2 | 61.3 | 12.1 | 3.3 | 3.1 |
| | | **LSD 0.05** | | 5.7 | 6.1 | | 0.7 | 2.6 | 1.0 | | 1.6 |
| | | **CV %** | 42.7 | 8.0 | 5.5 | | 10.3 | 2.1 | 3.9 | | 34.0 |

† Desire Score: 1 = worst, 7 or 10 = best.

§ Canning data from Michigan: these are visual ratings based on overall appearance averaged across a group of ~ 15 evaluators. The scale is 1 to 5, where 1 = undesirable, and 5 = desirable.