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| **Table S1**. Overview of the experimental datasets. Data are grouped by study (e.g., datasets 1–6 refer to different hybrids studied in a single location/year). RMG refers to relative maturity group, GDD to R1 refers to cumulative thermal time to reach silking (R1 stage), LN is the final leaf number (including standard error), Phyllochron Linear is the phyllochron estimated by the linear model, Phyllochron Phase 1 is the phyllochron estimated first phase phyllochron estimated by the bilinear model, Phyllochron Phase 2 is the phyllochron estimated second phase phyllochron estimated by the bilinear model, Transition is the transition between phases 1 and 2 of the phyllochron estimated by the bilinear model.All data collected under rainfed conditions except datasets ID: 92, 95, and 98. All data collected under non-limited N fertilizer except datasets ID: 11 and 13. Previous crop was always maize except datesets ID 11 and 12. |
| ID | Group | Location | Planting | Emergence | RMG | GDD to R1 | LN | Phyllochron Linear | Phyllochron Phase 1 | Phyllochron Phase 2 | Transition |
| day | °C-day | leaf | °C-day leaf-1 | °C-day leaf-1 | °C-day leaf-1 | leaf |
| 1 | Hybrid X Relative Maturity | Ames, IA | 2009-05-19 | 2009-05-24 | 114 | 975 | 21.0±0.1 | 46.09 | 60.58 | 25.82 | 11.08 |
| 2 | Ames, IA | 2009-05-19 | 2009-05-24 | 104 | 975 | 21.0±0.1 | 46.46 | 59.82 | 28.95 | 10.73 |
| 3 | Ames, IA | 2009-05-19 | 2009-05-24 | 110 | 975 | 20.0±0.1 | 48.71 | 60.41 | 28.42 | 11.19 |
| 4 | Ames, IA | 2009-05-19 | 2009-05-24 | 112 | 975 | 20.0±0.2 | 49.73 | 61.38 | 27.14 | 11.34 |
| 5 | Ames, IA | 2009-05-19 | 2009-05-24 | 113 | 975 | 19.0±0.2 | 49.03 | 60.93 | 32.86 | 10.20 |
| 6 | Ames, IA | 2015-05-21 | 2015-05-29 | 111 | 975 | 19.0±0.0 | 37.39 | 57.55 | 16.22 | 10.53 |
| 7 | Location x Hybrid | Lewis, IA | 2016-04-24 | 2016-05-12 | 111 | 987 | 17.0±0.3 | 45.02 | 55.13 | 23.26 | 12.03 |
| 8 | Ames, IA | 2017-04-25 | 2017-05-11 | 113 | 1102 | 18.0±0.0 | 45.53 | 61.69 | 35.08 | 8.99 |
| 9 | Crawfordsville, IA | 2017-05-16 | 2017-05-31 | 113 | - | 17.0±0.0 | 50.07 | 55.16 | 38.25 | 10.72 |
| 10 | Lewis, IA | 2017-05-05 | 2017-05-15 | 115 | 1046 | 20.0±0.6 | 39.73 | 60.71 | 30.34 | 8.55 |
| 11 | Rotation x Nitrogen | Ames, IA | 2020-04-22 | 2020-05-02 | 108 | 954 | 19.3±0.3 | 47.83 | 77.97 | 29.72 | 10.50 |
| 12 | Ames, IA | 2020-04-22 | 2020-05-02 | 108 | 1065 | 20.3±0.3 | 43.16 | 72.54 | 38.78 | 8.32 |
| 13 | Ames, IA | 2020-04-22 | 2020-05-02 | 108 | 1065 | 20.7±0.3 | 45.84 | 64.81 | 39.19 | 10.38 |
| 14 | Ames, IA | 2020-04-22 | 2020-05-02 | 108 | 1065 | 20.7±0.3 | 43.70 | 66.83 | 39.78 | 8.98 |
| 15 | Year 1 Planting Date x Relative Maturity | Ames, IA | 2010-04-30 | 2010-05-14 | 93 | 700 | 18.6±0.2 | 46.78 | 59.19 | 22.99 | 9.85 |
| 16 | Ames, IA | 2010-04-30 | 2010-05-14 | 98 | 715 | 19.1±0.3 | 42.92 | 56.96 | 28.17 | 9.27 |
| 17 | Ames, IA | 2010-04-30 | 2010-05-14 | 105 | 807 | 20.5±0.2 | 41.64 | 55.32 | 21.48 | 11.00 |
| 18 | Ames, IA | 2010-04-30 | 2010-05-14 | 112 | 821 | 19.6±0.2 | 48.18 | 61.18 | 26.70 | 10.00 |
| 19 | Ames, IA | 2010-05-17 | 2010-05-24 | 93 | 689 | 18.4±0.2 | 44.06 | 55.55 | 27.26 | 9.01 |
| 20 | Ames, IA | 2010-05-17 | 2010-05-24 | 98 | 704 | 19.3±0.2 | 43.32 | 52.09 | 26.84 | 9.76 |
| 21 | Ames, IA | 2010-05-17 | 2010-05-24 | 105 | 785 | 20.1±0.2 | 39.17 | 52.12 | 26.43 | 10.00 |
| 22 | Ames, IA | 2010-05-17 | 2010-05-24 | 112 | 819 | 18.5±0.2 | 48.39 | 57.13 | 28.41 | 10.33 |
| 23 | Ames, IA | 2010-05-28 | 2010-06-02 | 93 | 748 | 17.9±0.2 | 49.13 | 54.54 | 32.72 | 9.43 |
| 24 | Ames, IA | 2010-05-28 | 2010-06-02 | 98 | 748 | 18.8±0.2 | 46.48 | 51.57 | 29.57 | 10.99 |
| 25 | Ames, IA | 2010-05-28 | 2010-06-02 | 105 | 782 | 20.1±0.2 | 44.19 | 54.93 | 28.45 | 9.31 |
| 26 | Ames, IA | 2010-05-28 | 2010-06-02 | 112 | 797 | 18.8±0.2 | 47.61 | 55.97 | 31.17 | 10.18 |
| 27 | Ames, IA | 2010-06-11 | 2010-06-15 | 93 | 722 | 17.8±0.0 | 44.30 | 55.53 | 24.54 | 9.71 |
| 28 | Ames, IA | 2010-06-11 | 2010-06-15 | 98 | 738 | 18.7±0.0 | 45.04 | 54.01 | 29.70 | 9.93 |
| 29 | Ames, IA | 2010-06-11 | 2010-06-15 | 105 | 774 | 19.5±0.0 | 41.94 | 53.37 | 27.44 | 10.00 |
| 30 | Ames, IA | 2010-06-11 | 2010-06-15 | 112 | 756 | 18.4±0.0 | 46.14 | 57.77 | 31.54 | 9.28 |
| 31 | Ames, IA | 2010-06-25 | 2010-07-01 | 93 | 672 | 17.7±0.0 | 42.39 | 50.31 | 26.50 | 9.59 |
| 32 | Ames, IA | 2010-06-25 | 2010-07-01 | 98 | 698 | 18.4±0.0 | 44.76 | 48.11 | 35.14 | 9.87 |
| 33 | Ames, IA | 2010-06-25 | 2010-07-01 | 105 | 731 | 19.3±0.0 | 44.40 | 46.43 | 31.17 | 11.01 |
| 34 | Ames, IA | 2010-06-25 | 2010-07-01 | 112 | 758 | 17.9±0.0 | 46.34 | 52.06 | 33.06 | 10.00 |
| 35 | Year 2 Planting Date X Relative Maturity | Ames, IA | 2011-05-03 | 2011-05-12 | 93 | 747 | 18.4±0.2 | 48.53 | 53.23 | 29.12 | 9.91 |
| 36 | Ames, IA | 2011-05-17 | 2011-05-25 | 93 | 731 | 18.3±0.2 | 46.76 | 53.65 | 28.62 | 9.76 |
| 37 | Ames, IA | 2011-05-31 | 2011-06-06 | 93 | 727 | 18.4±0.6 | 48.75 | 50.41 | 35.93 | 9.68 |
| 38 | Ames, IA | 2011-06-08 | 2011-06-16 | 93 | 712 | 18.3±0.4 | 44.07 | 49.65 | 33.66 | 9.75 |
| 39 | Ames, IA | 2011-05-03 | 2011-05-12 | 98 | 747 | 19.3±0.1 | 47.50 | 51.51 | 28.64 | 10.35 |
| 40 | Ames, IA | 2011-05-17 | 2011-05-25 | 98 | 764 | 19.3±0.4 | 45.01 | 52.45 | 31.47 | 9.79 |
| 41 | Ames, IA | 2011-05-31 | 2011-06-06 | 98 | 746 | 19.1±0.3 | 48.32 | 48.90 | 32.72 | 11.51 |
| 42 | Ames, IA | 2011-06-08 | 2011-06-16 | 98 | 712 | 19.1±0.6 | 43.81 | 48.73 | 32.38 | 10.22 |
| 43 | Ames, IA | 2011-06-24 | 2011-06-30 | 98 | 685 | 18.3±0.5 | 47.95 | 47.49 | 38.82 | 11.17 |
| 44 | Ames, IA | 2011-05-03 | 2011-05-12 | 105 | 799 | 20.4±0.2 | 48.69 | 53.46 | 29.57 | 10.00 |
| 45 | Ames, IA | 2011-05-17 | 2011-05-25 | 105 | 846 | 23.3±0.6 | 44.07 | 54.64 | 28.67 | 10.32 |
| 46 | Ames, IA | 2011-05-31 | 2011-06-06 | 105 | 795 | 20.1±0.3 | 42.81 | 49.35 | 22.72 | 12.22 |
| 47 | Ames, IA | 2011-06-08 | 2011-06-16 | 105 | 731 | 19.4±0.8 | 38.48 | 50.12 | 20.44 | 11.48 |
| 48 | Ames, IA | 2011-06-24 | 2011-06-30 | 105 | 711 | 19.5±0.2 | 43.57 | 46.56 | 32.89 | 11.34 |
| 49 | Ames, IA | 2011-05-17 | 2011-05-25 | 112 | 816 | 19.3±0.5 | 46.26 | 60.43 | 32.20 | 8.64 |
| 50 | Ames, IA | 2011-05-31 | 2011-06-06 | 112 | 808 | 19.7±0.3 | 47.11 | 53.76 | 29.98 | 10.72 |
| 51 | Ames, IA | 2011-06-08 | 2011-06-16 | 112 | 731 | 19.2±0.7 | 45.57 | 53.61 | 34.34 | 9.22 |
| 52 | Ames, IA | 2011-06-24 | 2011-06-30 | 112 | 759 | 18.8±0.3 | 49.18 | 51.98 | 39.65 | 10.04 |
| 53 | Hybrid X Planting Arrangement | Adel, IA | 2017-04-24 | 2017-05-05 | 107 | - | 18.3±0.0 | 51.76 | 70.29 | 36.46 | 8.62 |
| 54 | Adel, IA | 2017-04-24 | 2017-05-05 | 107 | - | 18.3±0.3 | 53.81 | 68.87 | 36.29 | 9.02 |
| 55 | Adel, IA | 2017-04-24 | 2017-05-05 | 107 | - | 18.3±0.3 | 53.01 | 69.45 | 36.46 | 8.84 |
| 56 | Adel, IA | 2017-04-24 | 2017-05-05 | 107 | - | 18.0±0.3 | 50.70 | 70.08 | 32.49 | 8.87 |
| 57 | Adel, IA | 2017-04-24 | 2017-05-05 | 107 | - | 19.7±0.3 | 47.52 | 66.84 | 32.39 | 8.77 |
| 58 | Adel, IA | 2017-04-24 | 2017-05-05 | 107 | - | 19.7±0.3 | 47.62 | 67.14 | 32.39 | 8.70 |
| 59 | Adel, IA | 2017-04-24 | 2017-05-05 | 107 | - | 19.7±0.3 | 47.52 | 66.84 | 32.39 | 8.77 |
| 60 | Adel, IA | 2017-04-24 | 2017-05-05 | 107 | - | 18.7±0.3 | 51.15 | 65.88 | 29.94 | 10.00 |
| 61 | Adel, IA | 2017-04-24 | 2017-05-05 | 107 | - | 19.0±0.3 | 52.90 | 69.69 | 31.61 | 9.28 |
| 62 | Adel, IA | 2017-04-24 | 2017-05-05 | 107 | - | 19.0±0.3 | 51.87 | 72.39 | 33.50 | 8.42 |
| 63 | Adel, IA | 2017-04-24 | 2017-05-05 | 107 | - | 19.0±0.3 | 53.72 | 68.40 | 31.61 | 9.61 |
| 64 | Adel, IA | 2017-04-24 | 2017-05-05 | 107 | - | 18.7±0.0 | 54.77 | 70.44 | 35.86 | 8.76 |
| 65 | Hybrid x Planting Date x Location | Dekalb, IL | 2015-05-02 | 2015-05-20 | 103 | - | - | 42.73 | 54.58 | 16.75 | 11.40 |
| 66 | Dekalb, IL | 2015-05-02 | 2015-05-20 | 108 | - | - | 42.58 | 51.09 | 18.29 | 12.30 |
| 67 | Dekalb, IL | 2015-05-02 | 2015-05-20 | 113 | - | - | 45.51 | 48.15 | 24.39 | 13.39 |
| 68 | Dekalb, IL | 2015-05-02 | 2015-05-20 | 93 | - | 16.0±0.0 | 47.88 | 44.01 | 49.47 | 10.86 |
| 69 | Perry, IL | 2015-04-21 | 2015-05-10 | 109 | - | 19.0±0.0 | 44.23 | 51.36 | 37.11 | 10.31 |
| 70 | Perry, IL | 2015-04-21 | 2015-05-10 | 114 | - | 19.0±0.0 | 49.02 | 51.71 | 34.95 | 13.06 |
| 71 | Urbana, IL | 2015-04-17 | 2015-05-10 | 103 | 725 | 19.0±0.0 | 38.35 | 43.03 | 35.71 | 10.86 |
| 72 | Urbana, IL | 2015-04-17 | 2015-05-10 | 108 | 725 | 20.0±0.3 | 38.16 | 45.27 | 30.08 | 11.28 |
| 73 | Urbana, IL | 2015-04-17 | 2015-05-10 | 113 | 815 | 19.0±0.0 | 37.22 | 46.21 | 31.10 | 10.50 |
| 74 | Urbana, IL | 2015-04-17 | 2015-05-10 | 93 | 725 | 19.0±0.2 | 37.26 | 42.46 | 27.83 | 12.34 |
| 75 | Urbana, IL | 2015-05-14 | 2015-05-25 | 109 | 784 | 19.0±0.0 | 43.07 | 52.34 | 37.23 | 7.42 |
| 76 | Urbana, IL | 2015-04-18 | 2015-05-08 | 112 | 857 | 19.0±0.0 | 36.99 | 52.66 | 31.14 | 9.20 |
| 77 | Urbana, IL | 2015-05-14 | 2015-05-25 | 112 | 784 | - | 45.20 | 55.08 | 30.50 | 8.33 |
| 78 | Hybrid X Location | Larimore, ND | 2015-04-29 | 2015-05-25 | 73 | - | - | 48.73 | 60.59 | 31.01 | 9.30 |
| 79 | Larimore, ND | 2015-04-29 | 2015-05-25 | 76 | - | - | 42.21 | 67.37 | 24.41 | 7.94 |
| 80 | Larimore, ND | 2015-04-29 | 2015-05-25 | 79 | - | - | 47.18 | 57.28 | 40.30 | 7.65 |
| 81 | Larimore, ND | 2015-04-29 | 2015-05-25 | 82 | - | - | 42.42 | 63.11 | 24.41 | 8.81 |
| 82 | Larimore, ND | 2015-04-29 | 2015-05-25 | 85 | - | - | 43.15 | 59.08 | 29.30 | 8.83 |
| 83 | Larimore, ND | 2015-04-29 | 2015-05-25 | 86 | - | - | 42.79 | 61.66 | 29.30 | 8.12 |
| 84 | Mountain, ND | 2015-04-25 | 2015-05-20 | 73 | - | - | 36.10 | 51.53 | 20.91 | 11.03 |
| 85 | Mountain, ND | 2015-04-25 | 2015-05-20 | 76 | - | - | 39.77 | 55.99 | 33.02 | 7.99 |
| 86 | Mountain, ND | 2015-04-25 | 2015-05-20 | 79 | - | - | 39.50 | 51.87 | 34.85 | 9.21 |
| 87 | Mountain, ND | 2015-04-25 | 2015-05-20 | 82 | - | - | 36.49 | 63.41 | 20.91 | 8.93 |
| 88 | Mountain, ND | 2015-04-25 | 2015-05-20 | 85 | - | - | 41.94 | 65.42 | 20.91 | 9.00 |
| 89 | Mountain, ND | 2015-04-25 | 2015-05-20 | 86 | - | - | 38.18 | 65.42 | 17.42 | 9.07 |
| 90 | Pekin, ND | 2015-04-29 | 2015-05-25 | 79 | - | - | 49.49 | 55.38 | 37.04 | 10.44 |
| 91 | Irrigated X Rainfed | Mead, NE | 2005-04-26 | 2005-05-11 | 103 | 1093 | 18.0±0.0 | 51.19 | 58.02 | 39.55 | 11.60 |
| 92 | Mead, NE | 2007-05-01 | 2007-05-11 | 103 | 984 | 19.0±0.0 | 41.80 | 57.48 | 27.51 | 11.04 |
| 93 | Mead, NE | 2007-05-02 | 2007-05-13 | 103 | 970 | 20.0±0.0 | 38.29 | 58.12 | 26.24 | 9.94 |
| 94 | Mead, NE | 2009-04-22 | 2009-05-07 | 103 | 879 | - | 46.07 | 68.30 | 26.13 | 8.82 |
| 95 | Mead, NE | 2009-04-21 | 2009-05-05 | 103 | 876 | - | 41.52 | 48.55 | 29.72 | 10.90 |
| 96 | Mead, NE | 2011-05-02 | 2011-05-13 | 111 | 882 | - | 48.40 | 62.62 | 34.14 | 8.50 |
| 97 | Mead, NE | 2013-05-13 | 2013-05-21 | 112 | 926 | - | 48.23 | 56.28 | 30.00 | 11.03 |
| 98 | Mead, NE | 2013-04-30 | 2013-05-15 | 112 | 1023 | - | 47.74 | 55.65 | 25.00 | 12.43 |