**Supplemental Material**

**Supplemental Table 1.** Crop coefficients calibrated for the cultivars Haven and Maris Huntsam by the DSSAT-CERES (Dc), DSSAT-NWheat (Nw), and WheatGrow (Wg) model.

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Crop model | Cultivar | P1V | P1D | P5 | G1 | G2 | G3 | PHINT |  |  |  |
|  |  | **P1V** | **P1D** | **P5** | **G1** | **G2** | **G3** | **PHINT** |  |  |  |
| Dc | Haven | 11.18 | 87.19 | 729.7 | 22.86 | 51.45 | 1.0 | 80 |  |  |  |
| Dc | Maris H. | 63.36 | 63.75 | 760.2 | 25.57 | 50.80 | 1.9 | 80 |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
|  |  | **VSEN** | **PPSEN** | **P5** | **GRNO** | **MXFIL** | **STMMX** | **SLAP1** | **SLAP2** | **TC1P2** | **P2AF** |
| Nw | Haven | 4.80 | 3.30 | 660 | 99 | 3.0 | 3 | 350 | 280 | 1.0 | 0.4 |
| Nw | Maris H. | 3.20 | 2.80 | 740 | 45 | 1.1 | 1.5 | 280 | 270 | 0.6 | 0.6 |
|  |  |  |  |  |  |  |  |  |  |  |  |
|  |  | **IE** | **PVT** | **PS** | **TS** | **FDF** | **SLA** | **HI** | **AMX** |  |  |
| Wg | Haven | 0.84 | 50.5 | 0.000969 | 1.65 | 0.974 | 0.0022 | 0.42 | 40 |  |  |
| Wg | Maris H. | 0.74 | 57.1 | 0.000992 | 1.53 | 0.948 | 0.002 | 0.38 | 39 |  |  |

*P1D: Photoperiod response (% reduction in rate/10 h drop in pp)*

*P1V: Days,optimum vernalizing temperature,required for vernalization*

*P5: Grain filling (excluding lag) phase duration (oC.d)*

*G1: Kernel number per unit canopy weight at anthesis (#/g)*

*G2: Standard kernel size under optimum conditions (mg)*

*G3: Standard,non-stressed mature tiller wt (incl grain) (g dwt)*

*PHINT: Interval between successive leaf tip appearances (oC.d)*

*VSEN: sensitivity to vernalization*

*PPSEN: sensitivity to photoperiod*

*P5: Thermal time (base 0oC) from beginning of grainfill to maturity*

*GRNO: Coefficient of kernel number per stem weight at the beginning of grain filling [kernels (g stem)-1]*

*MXFIL: Potential kernel growth rate [mg kernel-1 day-1]*

*STMMX: Potential final dry weight of a single tiller (excluding grain) (g stem-1)*

*SLAP1: Ratio of leaf area to mass at emergence (cm2/g)*

*SLAP2: Ratio of leaf area to mass at end of leaf growth (cm2/g)*

*TC1P2: For calculating tc1: tiller number from emerg. to term. spik.(=stem elongation)*

*P2AF: Threshold AD in a layer becoming effective on root growth*

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**Supplemental Figure 1.** Relationship between simulated (*a,d,g*) potential grain yield, (*b,e,h*) anthesis, (*c,f,i*) maturity dates and latitude of the different locations for the crop 1 (Haven, dots symbols) and crop 2 (Maris Huntsman, square symbols) for the baseline conditions (black), scenario 1 (1.5°C, red) and scenario 2 (2.0°C blue).