Broccoli (*Brassica oleracea*)

Summary of models (Table 2) and analysis led by Nick Andrews, Hiedi Noordijk, and Len Coop, OSU.

Methods: Using events monitored in the field, the lowest C.V. (coefficient of variation) was used to determine lower and upper threshold values based on, depending on variety, between 4 and 10 site-years, all from the Willamette Valley of Western Oregon (2013-2015). Sites included the OSU Vegetable Farm (near Corvallis, OR), the OSU NWREC research farm (near Aurora, OR), Gathering Together Farm (near Philomath, OR), and other farms depending on variety and year. Degree-day values calculated by the default method (Baskerville-Emin single sine formula) using the online calculator at uspest.org.

The main model intervals used to determine thresholds for most varieties was from transplant at 2-4 true leaves to first harvest (about 5" median head diameter) and early flowering (end of harvest) (Table 2).

Results: The final broccoli phenology models all were determine by lowest C.V. (Table 1) to use lower thresholds of 32F (0C), upper thresholds of 70F (21.1C), and single-sine degree-day calculation with a horizontal upper cutoff method. Degree-day models to first harvest had lowest C.V. values between 6.9 and 9.7, versus models using average number of days with C.V. values between 6.9 and 12.7. Degree-day models to last harvest (early flowering) had lowest C.V. values between 3.2 and 8.8, versus models using average number of days with C.V. values between 5.8 and 15.7. The mean absolute deviations (MAD) from transplant to early flowering using average DDs ranged from 2.5 to 6.4 days. Models summarized in Table 2 are available at the website http://uspest.org/dd/model (select nearest weather station using Google map; select "CROPTIME models" at "Model Category" (first) pulldown menu; select any of the listed cucumber models using the "Model:" pulldown menu). Enter up to 4 start dates (planting date or transplant date depending on model selected), end date, and forecast type. Use either model preview on same page or click on button for full model output. Other options available (not described here).

Table 1. Lowest Coefficient of Variation (C.V.) model summaries for several broccoli varieties grown in Western Oregon, 2013-2015.

DDs for transplanted (2-4 true leaves) broccoli varieties

32/70F SSHCO (32 lower thresh, 70 upper thresh, single sine, horiz cutoff DDs)

Variety	Data sets (site – years)	First harvest avg DDs	First harvest DDs %CV	First harvest avg Days	First harvest Days %CV	Early flowering avg DDs	Early flowering DDs %CV	Early flowering avg Days	Early flowering Days %CV	TP - early flower MAD (days)
Arcadia (TP)	8	2281	6.93	72	6.91	2672	3.23	86	5.76	2.5
Green Magic (TP)	10	2103	8.99	67	10.62	2456	5.66	81	15.72	4.1
Emerald Pride (TP)	5	2151	9.77	65	12.7	2518	8.82	77	12.51	6.4
Imperial (TP)	4	2383	9.24	74	8.13	2688	8.23	85	6.45	4.6

Table 2. Model summaries for 4 varieties of broccoli (transplant at 2-4 true leaf stage) grown in W. Oregon, 2013-2015.

Lower temp threshold:	**32 F**	**0.0 C**
Upper temp threshold:	**70 F**	**21.1 C**
Calculation method	**Single sine**	
Cutoff method	**Horizontal**	

First harvest at about 5" median head diameter

Variety	50% head initiation DDF	First harvest DDF	Early flowering (end of harvest) DDF	50% head initiation DDC	First harvest DDC	Early flowering (end of harvest) DDC
Arcadia (TP)	1674	2281	2672	930	1267	1484
Green Magic (TP)	1458	2103	2456	810	1168	1364
Emerald Pride (TP)	1565	2151	2518	869	1195	1399
Imperial (TP)	1753	2383	2688	974	1324	1493