

Predicting Soybean First Flowering Date

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Soybean flowering date appears to be a critical time for managing the causal agent of Asian Soybean Rust, *Phakopsora pachyrhizi*. Many of the fungicide treatments are recommended to begin when soybeans first flower.

A crop simulation model (CROPGRO—Soybean) [1] was used to predict when soybeans will first flower (growth stage R1) [2] in Kentucky. Weather data from the University of Kentucky Spindletop Farm were used as input, and first predicted dates of flowering were compared with measured dates from several experiments to be sure that the model was accurate. The model was used to predict when R1 occurred for each year of a 29-year period. Table 1 presents the predicted R1 dates, while Table 2 summarizes the number of days between planting and first flowering.

Using These Tables

Anyone trying to schedule field scouting based on these tables should begin checking fields 10 days prior to the predicted first flowering dates in Table 1. First flowering dates vary from year to year due to differences in temperature, and that variation is represented by the “SD (\pm)” or standard deviation in the table.

Statistically speaking, 68% of soybean fields will flower in the time period one standard deviation before the mean to one standard deviation later than the mean. In addition, 95% of the soybean fields will flower in the time period two standard deviations before the mean to two standard deviations later than the mean. For example, a Maturity Group IV soybean variety planted on May 1 is predicted to reach an average first flowering date on June 17, plus or minus four days. So a narrow window for first flowering is actually about June 13 to June 21, while a wider window for first flowering is June 9 to June 24. The variation for first flowering date is greater for soybeans planted early than for soybeans planted late.

Adjusting the Prediction Dates

Soybean maturity group categories and not specific soybean varieties were used to generate these prediction tables. Soybean varieties in the early part of a maturity group category (such as a 3.1 relative maturity in Maturity Group III) will likely reach first flowering a few days earlier than the predicted date, while soybean varieties in the later part of the maturity group category will likely reach first flowering date a few days after the predicted date. For example, a Maturity Group III variety planted on May 1 is predicted to reach first flowering on June 8, plus or minus four days. A soybean with a 3.1 maturity will likely reach first flowering around June 4, while a soybean with a 3.9 maturity will likely reach first flowering around June 12.

Table 1. Predicted first flowering (R1 growth stage) date for different maturity groups and planting dates.

Planting Date	Soybean Maturity Group							
	MG II		MG III		MG IV		MG V	
	Predicted First Flowering Date							
	Mean ¹	SD ² (\pm)	Mean	SD (\pm)	Mean	SD (\pm)	Mean	SD (\pm)
May 1	June 3	2	June 8	4	June 17	4	June 25	5
May 15	June 15	2	June 21	2	June 29	3	July 8	3
May 29	June 27	2	July 5	1	July 12	1	July 19	2
June 12	July 10	1	July 16	1	July 23	1	July 29	1
June 26	July 24	1	July 29	1	Aug 2	1	Aug 8	1

¹ Average flowering date for 29 years of weather data.

² Standard deviation.

Table 2. Predicted number of days between planting date and first flowering (R1 growth stage) date for different maturity groups and planting dates.

Planting Date	Soybean Maturity Group							
	MG II		MG III		MG IV		MG V	
	Predicted Number of Days							
	Mean ¹	SD ² (\pm)	Mean	SD (\pm)	Mean	SD (\pm)	Mean	SD (\pm)
May 1	33	2	38	4	47	4	55	5
May 15	32	2	37	2	45	3	54	3
May 29	30	2	37	1	44	1	52	2
June 12	28	1	34	1	41	1	48	1
June 26	28	1	34	1	37	1	43	1

¹ Average number of days between planting date and first flowering date for 29 years of weather data.

² Standard deviation.

Although the University of Kentucky does not recommend planting soybeans before May 1 in Western Kentucky, some farmers plant before this date. The model had difficulty predicting first flowering dates when soybeans were planted before May 1. This was due in part to frosts that occurred in April in some of the 29 years of weather data. In addition, there were no field data to verify the accuracy of the model for such early planting dates.

The predictions of first flowering dates are based on weather data from Spindletop Farm near Lexington, Kentucky. Flowering depends on both day length and temperature, so the predicted dates may occur slightly earlier in Western Kentucky where temperatures are slightly warmer. Farmers in Western Kentucky and the two southern tiers of counties may want to adjust the predicted first flowering dates ahead two or three days from those presented in the tables (see Figure 1).

The tables contain data for planting every two weeks starting with May 1. The predicted flowering date can be adjusted for planting dates in between those reported. For example, a Maturity Group IV variety planted on May 7 would likely flower around June 23, plus or minus four days, halfway between the predictions for May 1 and May 15 planting dates.

Summary

The tables are a guide to help farmers and field scouts know when to start examining soybeans for flowers as part of an Asian Soybean Rust management program. These tables are guides, and field scouting should begin about 10 days prior to the dates listed in Table 1. For additional questions about Asian Soybean Rust management, go online to www.uky.edu/SoybeanRust, or contact your county Extension agent.

References

1. Boote, K.J., J.W. Jones, G. Hoogenboom, and N.B. Pickering. 1998. The CROPGRO model for grain legumes. In G.Y. Tsuji et al. (eds): *Understanding Options for Agricultural Production*, 99-128. Kluwer Academic Publishers, Great Britain.
2. Pedersen, P. 2004. *Soybean Growth and Development*. Iowa State University Press.

Figure 1. The counties highlighted below may want to move the predicted flowering dates ahead two to three days from those presented in the tables.

