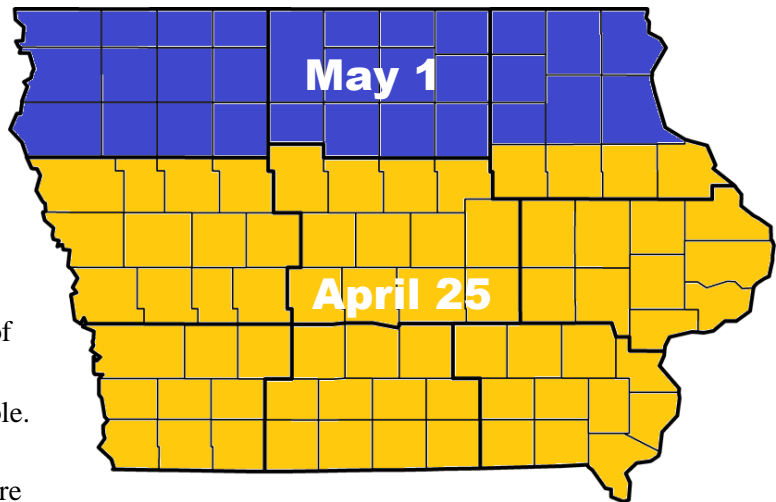


Planting Soybean for High Yield in Iowa

Planting in late April or early May usually maximizes yield of soybean. After variety selection, deciding when to plant the soybean crop is the second most important management decision that impacts yield. Research conducted by Iowa State University shows the best time to plant soybean in Iowa is the last week of April in the southern two-thirds of Iowa and the first week of May in the northern third, if soil conditions are suitable.



Planting the last week of April in the southern two-thirds of the state and the first week of May in the northern one-third of the state is optimal, if soil conditions are suitable.

Yield gains of three to four bushels per acre can be achieved by planting soybean beginning April 25 or May 1 in Iowa (1,2). Soybeans planted at this time produce a larger crop canopy resulting in earlier row closure enabling the crop to maximize photosynthesis by intercepting more available sunlight. Delayed planting can result in significant yield loss (Table 1).

BEST MANAGEMENT PRACTICES

- Begin planting in late April or early May
- Use fungicide seed treatments
- Minimize soil compaction
- Use full-season adapted soybean varieties
- Plant 125,000 plants/acre in 15 inch rows unless the field has a history of white mold or sudden death syndrome
- Select SCN-resistant varieties and rotate with non-host crops

Table 1. Effect of planting date on soybean yield in Iowa.

Planting date	Northern Iowa	Central Iowa	Southern Iowa
	<i>Relative yield (percent of potential yield)</i>		
Late April	100*	96*	98*
Early May	96*	100*	100*
Mid-May	99*	96*	98*
Early June	81	93	89
Mid-June	61	59	82
Early July	33	45	47

* Not significantly different from 100 percent
Source: Whigham et al. (7)

Highly productive fields may be at greater risk for yield decline from late planting. Soybean fields with high yield potential (>50 bushels per acre) may lose 0.3 to 0.7 bushels/acre/day, with the largest yield reductions occurring after May

10. Fields with lower yielding potential may lose approximately 0.1 to 0.2 bushels/acre/day (1).

Planting in late April or early May does not guarantee higher yield, however. Fluctuations in precipitation and temperature from year to year can cause variations in response of soybean varieties to early planting.

CONSIDER SOYBEAN MATURITY

Earlier research evaluated the effect of soybean maturity on yield of ideally- versus late-planted soybean. In northern Iowa, the highest yields were most consistently produced using full-season (2.5 RM) varieties planted from late April to late June (7). In central Iowa, they concluded that all adapted maturities had similar yield from planting dates through late June. However, in southern soybean growing areas of the state full-season varieties tended to yield best from planting dates through early July.

When planting was delayed until mid-July in this area, varieties ranging from 2.2 to 2.9 RM had the greatest yields.

According to these results, full-season varieties can be planted unless planting is delayed beyond late June in northern and central Iowa and beyond early July in southern Iowa. However, in late planting situations, earlier maturity varieties can be used to avoid damage by frost (7).

It is well known that many shorter-season soybean varieties yield as well as longer-season varieties. In addition to avoiding frost damage, short-season varieties may also avoid late-season

soybean diseases. However, the decision to plant short-season varieties to avoid diseases and spread out harvest may come with a yield penalty.

CONSIDERATIONS FOR SOYBEAN PLANTING

Soil conditions and the weather forecast for 48 hours after planting play an important role in achieving the yield gained by planting in late April or early May. Planting when the soil is too wet or too cold can rob soybean yield.

Soybean tends to be planted after the corn crop has been planted. Typically soil temperatures are not a concern. Soybean planted in late April, however, may be exposed to cool soil temperatures and less than ideal soil moisture conditions. The ideal soil temperature for rapid soybean germination and emergence is between 77 to 86 degrees F but soybean will germinate at soil temperatures of 50 degrees F. Soil temperatures at a 2-inch depth in Iowa do not consistently reach 77 degrees F until late-May to early-June.

Uniform stands of healthy seedlings are sometimes more difficult to obtain with planting into cool, wet soil conditions. Fungicidal seed treatments are a good management tool to help reduce the effects of seedling diseases caused by *Pythium* and *Phytophthora* (4). Seed-applied insecticides are often sold to farmers in combination with seed applied fungicides. Yield gains with this combination are possible but research results thus far do not show consistent yield gains (4).



Seed applied fungicides can reduce seedling loss but yield gains are not as consistent.

Plant soybean varieties with proven resistance to the soybean cyst nematode (SCN) to improve yield. In the absence of adequate host plant resistance to SCN, consistent yield gains from late April or early May planting may be more difficult to achieve in fields infested with SCN and soilborne pathogens that cause diseases such as brown stem rot (BSR) and sudden death syndrome (SDS). These stress factors have been shown to reduce yield, and when BSR or SDS is present in SCN-infested fields, yield loss from SCN can be more severe (5,6).

Plant full season soybean varieties first to take advantage of the entire growing season. They produce the highest yield when grown in adapted environments. Research in Wisconsin reported that planting of adapted varieties resulted in higher seed and pod numbers (3). Planting in late April can also increase the number of seeds per pod and the number of vegetative nodes per plant. These traits work together to increase the likelihood of maximizing yield.

Early planting in combination with best management practices such as utilizing optimum seeding rates, planting in 15 inch rows, choosing varieties with SCN resistance, maintaining good soil fertility, minimizing compaction, maintaining excellent weed control, and using seed-applied and foliar fungicides and insecticides when needed will help enable the soybean plant to achieve optimum yield.

Prepared by Mark Licht, Iowa State University Extension and Outreach and David Wright and Andrew Lenssen, Department of Agronomy, Iowa State University.

... and justice for all

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, gender, religion, age, disability, political beliefs, sexual orientation, and marital or family status. (Not all prohibited bases apply to all programs.) Many materials can be made available in alternative formats for ADA clients. To file a complaint of discrimination, write USDA, Office of Civil Rights, Room 326-W, Whitten Building, 14th and Independence Avenue, SW, Washington, DC 20250-9410 or call 202-720-5964.

Issued in furtherance of Cooperative Extension work, Acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture. Cathann A. Kress, director, Cooperative Extension and Outreach, Iowa State University of Science and Technology, Ames, Iowa.

REFERENCES

1. De Bruin, J.L. and P. Pedersen. 2008. Soybean seed yield response to planting date and seeding rate in the upper Midwest. *Agronomy Journal*, 100:696-703.
2. De Bruin, J.L. and P. Pedersen. 2008. Soybean cultivar and planting date response to soil fumigation. *Agronomy Journal*, 100:965-970.
3. Pedersen, P. and J.G. Lauer. 2004. Response of soybean yield components to management system and planting date. *Agronomy Journal*, 96:1372-1381.
4. Robertson, A., D. Mueller, and S. Wiggs. 2012. 2011 Evaluation of Fungicide and insecticide seed treatments on soybean in Iowa. *Integrated Crop Management News*. <http://www.extension.iastate.edu/CropNews/2012/0222robertsonhodgsonmueller.htm>
5. Swoboda, C.M., P. Pedersen, P.D. Esker, and G.P. Munkvold. 2011. Soybean yield response to plant distribution in *Fusarium virguliforme* infested soils. *Agronomy Journal*, 103:1712-1716.
6. Workneh, F., X.B. Yang, and G.L. Tylka. 1999. Soybean brown stem rot, *Phytophthora sojae*, and *Heterodera glycines* affected by soil texture and tillage relations. *Phytopathology*, 89:844-850.
7. Whigham, K., D. Farnham, J. Lundvall, and D. Tranel. 2000. Soybean replant decisions. Iowa State University. PM 1851.