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PLANTING DATES FOR EARLY MATURING SOYBEAN

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Early maturing soybean cropping systems have been gaining in popularity with producers across the southeastern US, as well as in Kentucky. To our south, some producers in Texas, Arkansas, and Mississippi are using varieties that are two or three Maturity Groups (MG) earlier than those traditionally grown. The main intent in those states has been to avoid late summer drought by using early maturing varieties coupled with early planting. Previous Kentucky research in this area has also emphasized early planting (late April). However, a number of Kentucky growers have had good success using later planting dates for early maturing varieties, particularly in the wetter years we have seen so far in the 1990s.

In Arkansas work done by Mike May and others, yields of early maturing varieties (MG III and IV) planted in mid April were similar to those obtained with mid May planting dates across 1988 and 1989. The main difference between the two planting dates was that the early maturing varieties matured about twenty-five days later when planted in mid May compared to planting in mid April. In Kansas in 1987 through 1990, Dan Sweeney and others found that MG I and MG III varieties both produced slightly more grain when planted in April in narrow rows at high planting rates than when planted in June in wide rows at low planting rates. Under Kansas conditions, moisture stress is almost certain every year; thus they prefer the early planting system.

Early planting dates for early maturing varieties are not always possible. For example, excess water, cool spring temperatures, poor soil drainage, or heavy residue from a previous crop may prevent early planting. In addition, many Kentucky growers are often planting corn at the end of April. Finally, the widespread use of the double crop system of soybean following wheat or barley also has made some growers wonder how early maturing soybean would react to later planting dates. Thus, it was the objective of this project, partially funded by the Kentucky Soybean Promotion Board, to find out how yield of early maturing soybean varieties would react to a wide range of planting dates under Kentucky conditions.

Materials and Methods

One soybean variety from each MG 00 through IV was selected for testing on a well-drained Maury silt loam near Lexington, KY in 1990 through 1993. The following varieties were chosen for their good yield potential in previous UK tests: McCall (MG 00), Glenwood (MG 0), Hardin (MG I), Elgin 87 (MG II), Pella 86 (MG III), and Lawrence (MG IV).

While these public varieties are no longer among the best yielding varieties available in their respective MG, they were chosen to ensure seed availability for the duration of the entire four year test. The agronomic performance of the varieties was compared in late April, mid May, early June, and late June planting dates. Soybean were planted in 15 inch rows for all four planting dates. Planting rate for late April and late June was 6 viable seeds/ft of row (210,000 seeds/A). Planting rate for the mid May and early June planting dates was 5 viable seeds/ft of row (175,000 seeds/A). Actual planting dates are shown in Table 1.

Weed control measures included imazaquin and alachlor (as a pre-plant, shallow incorporated treatment) for all planting dates in all years. Post-emergence treatments were applied on an as-needed basis to all plots within a given planting date, and included acifluorfen, fluazifop-P-butyl, or hand-wicked glyphosate. We also treated soybean with carbaryl two to four times per season for Japanese beetle control. Early planting dates and early maturing varieties appeared to be more subject to attack by Japanese beetle, probably because greatest beetle activity occurred during seed fill.

Soybean were harvested with a small plot combine as each variety matured in a given planting date. Yields are expressed on a 13% moisture basis. The experiments were set up as a separate randomization of a split plot design each season. Whole plots were planting dates, and split plots were varieties. Four replications were used each year. Means separation was based on the least significant difference (LSD) test.

Results and Discussion

While 1990 through 1993 were generally wetter than the four years just before them, important weather differences were still noted among these seasons. In 1990, a very wet and cloudy May, combined with cool temperatures, slowed growth of soybean planted in late April. Both 1991 and 1992 were much more favorable growing seasons; however, the cooler than normal temperatures in the mid summer of 1992 contributed to higher yields. A very cool spring in 1993, followed by very warm summer conditions, hurt yield that season. Averaged across years and varieties, planting dates from late April through early June produced similar average yields (see Table 1), with the late June planting date somewhat lower (41 bu/A). This result fits nicely with previous planting date research done by Herbek and Bitzer in Kentucky, which showed planting dates after June 15 to decline in yield [Soybean Production in Kentucky. Part III. Planting Practices and Double Cropping. (AGR 130)].

Table 1 shows grain yields for MG I through IV for each planting date for each of the four years. [Since McCall (MG 00) and Glenwood's (MG 0) yields were rarely competitive with yields of the later maturing varieties, their results are not shown.]

In 1990, the four varieties did not differ significantly in yield for the late April planting date. For the mid May planting date, Lawrence was well ahead of the other three varieties. When planted in early June, Pella 86 and Lawrence were significantly better than either Elgin 87 or Hardin. By the late June planting date, Elgin 87 was better yielding than the other varieties. The yield of Lawrence and Pella 86 was not statistically better than that of Hardin for the late June planting date.

Yields were considerably higher in 1991 than in 1990. Elgin 87, Pella 86, and Lawrence all produced similar yields for the late April planting date, with Hardin lagging well behind. For the mid May planting date, Hardin, Elgin 87, and Lawrence all outperformed Pella 86. Under conditions of early June planting, Lawrence and Pella 86 appeared to have a slight yield advantage over Elgin 87 and a great yield advantage over Hardin. For the late June planting date, Elgin 87 was superior to all three of the other varieties.

1992 was a record-breaking year for soybean production in Kentucky, and our yields reflected the excellent rainfall and moderate temperature conditions. Pella 86 and Lawrence yielded more than Hardin and Elgin 87 when planted in late April. Elgin 87 and Pella 86 looked strong with mid May planting. For the early June planting, all four varieties produced similar yields. By late June, only Pella 86 failed to keep up the pace with the other varieties.

Overall, yields in 1993 were considerably lower, due to an abnormally cool spring followed by a hot summer. However, Lawrence remained quite impressive, with yields near 60 bu/A for both the late April and mid May planting dates. For both of those planting dates, the other three varieties yielded much less than Lawrence. For the early June planting date, which produced the best average planting date yields for that year, Pella 86, Lawrence, and Elgin 87 had equivalent yields in the low 50 bu/A range. For the late June planting date, Lawrence and Pella 86 had a yield advantage over the two earlier maturing cultivars.

When the data were compiled across all four years, Lawrence had a 3 to 5 bu/A advantage over Elgin 87 for the late April, mid May, and early June planting dates. By the late June planting date, the advantage for Lawrence over Elgin 87 had disappeared. Hardin was unable to compete with any of the later varieties on a consistent basis at any planting date. Across all years and planting dates, the MG IV representative (Lawrence) was slightly better than either the MG II or III representatives (Elgin 87 and Pella 86).

When looking at the response of Elgin 87 to planting date, there was clearly no pronounced advantage to the late April planting we had been recommending based on research done during the drier years of the late 1980s. In fact, yields of Elgin 87 across all four years averaged almost the same for late April, mid May, and early June planting dates. Perhaps most interesting was that yields of Elgin 87 did not fall as sharply when planted after mid June as did the yields of both Pella 86 and Lawrence. Yield of the latest two cultivars fell by 20% when planting was delayed until after mid June. In contrast, yields of Elgin 87 only fell by 10% with a similar delay in planting.

Conclusions

Generally speaking, the four years in this test were good growing seasons. That is probably why the results of this test, which showed MG IV to have a slight advantage over MG II and III across all years and planting dates, differ from our previous work done in the drier years of the late 1980s. Under those conditions, early planting of MG II varieties resulted in a 15% yield advantage over MG IV varieties.

Since the yields of the MG II variety in the test were relatively stable across planting dates ranging from late April to early June, growers interested in planting MG II varieties on their farms apparently do not need to push for early planting dates. Of course, when our weather returns to a dry cycle, or if a producer has drought-prone soils, early planting of early maturing varieties would still be attractive. Under the late June planting conditions commonly practiced in our state's double cropping system, yield performance of MG II was competitive with that of MG IV. Perhaps growers may want to consider planting a portion of their double crop acreage to MG II varieties.

Extension Soils Specialist

Table 1. Yields (bu/A) of MG I through IV soybean varieties at four planting dates in 1990 through 1993 at Lexington, Kentucky.

Planting Date	*Hardin (MG I)*	*Elgin 87 (MG II)*	*Pella 86 (MG III)*	*Lawrence (MG IV)*	*Planting Date Means*
			1990		
April 27	45	44	41	41	43
May 24	44	40	40	50	44
June 6	33	39	49	48	42
June 27	29	38	32	33	33
			1991		
April 25	40	56	56	58	53
May 15	49	50	42	51	48
June 4	38	52	56	57	51
June 25	43	50	43	39	44
			1992		
April 29	54	56	64	60	59
May 19	52	57	56	51	54
June 8	52	55	52	51	53
June 25	46	49	41	45	45
			1993		
April 29	32	41	44	57	44
May 17	34	44	47	59	46
June 2	41	51	53	52	49
June 21	37	40	45	49	43
			Across all four years		
Late April	43	49	51	54	49
Mid May	45	48	46	53	48
Early June	41	49	53	52	49
Late June	39	44	40	42	41
			Across all years and planting dates		
Variety Means	42	48	48	50	47

LSD (0.10) for comparing varieties within a planting date for a given year was 5. LSD (0.10) for comparing varieties within a planting date when averaged across all four years was 2. LSD (0.10) for comparing variety means across all years and planting dates was 1.