On-Farm Testing of Early Maturing Soybean

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On-Farm Testing of Early Maturing Soybean

C.C. Steele, L.J. Grabau, and N. Gift

Maturity Group (MG) II soybean varieties have performed well in University of Kentucky tests over the past several years. Early planted (late April/early May) tests in the relatively dry years of 1986 through 1989 showed MG II yields to exceed those of MG III or MG IV. Over the generally wetter years 1990 through 1993, MG III and IV yields were slightly better than those of MG II varieties. Across eight years of data, MG II yield averages were virtually identical to those of MG III and IV. Perhaps growers could plant a portion of their soybean acreage to MG II varieties and gain the advantages of earlier harvest, such as more fall planting options and slightly higher early fall cash market prices, while obtaining similar yields as they could with MG IV varieties.

The Kentucky Soybean Promotion Board funded an on-farm study of early maturing soybean varieties for the 1993 and 1994 growing seasons. In 1993, the study included 14 on-farm tests in 8 counties from Nelson County to Union County. In 1994, three new counties (Simpson, Christian, and Hickman) were added in the Southern Tier and Purchase regions, bringing the total for that year to 9 counties. The project's objective was to test the merits of early maturing soybean varieties across a wide range of on-farm Kentucky conditions. Special concerns included the susceptibility of MG II varieties to the heavier pest pressure they are likely to experience in Kentucky fields than in northern areas, and potential harvest losses of MG II varieties due to low podding heights.

Materials and Methods

Growers were selected with the help of a State Extension Grain Specialist and several county agricultural agents. Each farmer was asked to plant two randomized replications of a strip test which included four MG II varieties and an MG IV check variety. The varieties included in 1993 were 1) Jack, MG II public with SCN resistance, 2) Pioneer 9273, MG II private, 3) IA 2008, public, 4) Stine 2250, MG II private, and 5) Asgrow A4715, MG IV private with SCN resistance. Jack, Pioneer 9273, and Asgrow A4715 were also tested in 1994. On the basis of their yield performance in a 1993 on-station test, Agripro 2880 and Asgrow A2396 were selected for 1994 to replace the other two MG II varieties grown in the 1993 on-farm test. IA 2008 was dropped from the 1994 test due to its consistently low yields in the 1993 on-farm test. While the 1993 on-farm yields of Stine 2250 were acceptable, this variety was dropped for the 1994 on-farm test due to problems in getting the seed in a timely fashion in 1993. Asgrow A4715 was used as the MG IV check variety on the basis of its highly competitive yields in the 1991 to 1993 University of Kentucky soybean variety trials.

Production practices such as planting date, row spacing, seeding rate, and weed control methods were left up to the discretion of individual growers. We provided seed to the growers and visited each field several times during the season to monitor progress.
of the crop. Data collected by the researchers included: stand establishment, early August canopy closure, lowest pod height, mature plant height, lodging, and potential stubble losses if harvest had occurred at 2, 4, or 6 inch combine cutting heights. Growers harvested with their own equipment and measured yields in weigh wagons, generally with the help of the local county extension agent for agriculture. Tests were designated as full season, double-crop (after wheat), or late-planted (planted after June 14, but not following wheat).

**Results and Discussion**

Thirteen tests were completed in 1994. The average yield across all 13 tests was 40 bushels/A, somewhat better than the 1993 yield average of 36 bushels/A across 14 tests. Individual farm yields for 1994, averaged across all five varieties, are shown in Table 1. Farm averages ranged from a high of 64 bushels/A on Joe Sprague’s Union County farm to 17 bushels/A on Joe Hagman’s Hancock County farm. Interestingly, Sprague also had the highest yielding test in the 1993 on-farm study. In 1994, there was a clearer separation between full season and double-crop/late-planted trials than there had been in 1993. In 1994, all but one of the full season tests were significantly better yielding than any of the double-crop or late-planted tests. The exception was Joe Hagman’s full season test, which was planted on soil that had been removed and replaced by the nearby paper plant. Clearly, the wide range of yields in both 1993 and 1994 provided an excellent opportunity to see how MG II varieties would perform under a wide range of Kentucky on-farm conditions.

### Table 1. Average yields of our MG II and one MG IV varieties from 13 on-farm tests in 1994.

<table>
<thead>
<tr>
<th>Farmer</th>
<th>County</th>
<th>Cropping System</th>
<th>Yield (bu/A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sprague</td>
<td>Union</td>
<td>FS*</td>
<td>64**</td>
</tr>
<tr>
<td>Peterson</td>
<td>Nelson</td>
<td>FS</td>
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<td>Ohio</td>
<td>FS</td>
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<td>Hickman</td>
<td>FS</td>
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<td>Hopkins</td>
<td>FS</td>
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<td>Daviess</td>
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<td>O’Nan</td>
<td>Union</td>
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<td>Union</td>
<td>LP</td>
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<td>DC</td>
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<td>Hancock</td>
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<td>Simpson</td>
<td>LP</td>
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<tr>
<td>Hagman</td>
<td>Hancock</td>
<td>FS</td>
<td>17</td>
</tr>
</tbody>
</table>

* FS, full season; DC, double-crop behind wheat; LP, late-planted, but not after wheat.
** Least significant different (LSD 0.05) for comparing mean yields of different farms was 6 bu/A.

Table 2 shows average variety yields across farms in both 1993 and 1994. To relate the information to common Kentucky cropping systems, we split the tests into full season and double-crop/late-planted groups. In 1993, the top yielding MG II variety (Pioneer 9273) produced full season yields equivalent to those of Asgrow A4715. Both Pioneer 9273 and Stine 2250 produced yields statistically equivalent to those of Asgrow A4715 under double-crop/late-planted conditions in 1993. In the 1994 full season tests, both Jack and Pioneer 9273 were equivalent to Asgrow A4715. The other two MG II varieties, Agripro 2880 and Asgrow A2396, were only slightly behind the MG IV check variety. Under double-crop/late-planted conditions in 1994, the MG IV check easily out-yielded all four MG II varieties. Apparently, dry conditions, which persisted through seed fill of the MG II varieties under double-crop/late-planted conditions in 1994, reduced the yield of these early maturing varieties.

With the exception of the double-crop/late-planted tests in 1994, the best MG II varieties clearly “held their own” against Asgrow A4715, which was the most popular single soybean variety in Kentucky in 1994. Careful MG II variety selection appears to be important. For example, IA 2008 performed poorly in our 1993 tests (Table 2). However, as shown by our 1994 data, a number of high-yielding MG II varieties are available.

Table 3 permits a closer look at variety performance on individual farms in 1994. Of particular interest was how MG II varieties might compare to Asgrow A4715 under excellent growing conditions. For the single highest yielding test (Sprague), three
of the four MG II varieties were as
high or higher yielding than Asgrow A4715. Similar results were obtained
in Sprague’s 1993 full season test,
which was the highest yielding test of
the 14 conducted in 1993. When we
averaged yields of all varieties across
the top five 1994 tests, the MG II
varieties produced 55 bushels/A, equal
to Asgrow A4715. Clearly,
MGII yields were
competitive with
a top-notch MG IV variety when
grown under
high-yield condi-
tions. Joe
Hagman’s full
season test in
Hancock County
on disturbed top-
soil resulted in
poor yields of all
varieties tested,
indicating that
MG II varieties
may perform
similarly to MG IV varieties on
marginal land. Many of the remaining
1994 tests showed Asgrow A4715 to
out-yield most or all of the MG II
varieties (Table 3). While an unusual
rainfall pattern in some of the state in
1994 (relatively dry August, wetter
September) may account for this, these
results still raise a question about the
yield potential of MG II varieties when
planted late and subjected to dry con-
ditions during seed-fill. It is worth
noting that MG II varieties produced
considerably higher yields under late
April/early May planting conditions
than did MG IV varieties in the dry
years of 1986 to 1989. Therefore, it
would be inappropriate to categorize
MG II as having low yield potential
under droughty Kentucky conditions.

Stubble harvest losses are a con-
cern with MG II varieties. Across all
1994 studies, lowest pod heights of the
were not as serious in that season as in
1994. In any case, growers consider-
ing the use of MG II varieties should
be equipped to achieve combine cut-
ting heights below the 4 inch level.

Conclusions

Farm average yields varied widely
over the two years tested, providing an
excellent op-
portunity to
evaluate se-
lected MG H
varieties.
With the ex-
ception of the
drought
stressed
double-cropl
late-planted
tests in 1994,
the best MG H
varieties com-
pared favor-
ably with
Asgrow A4715. Also,
MG II has
produced
higher Ken-
tucky yields than MG IV during pre-
vious dry seasons. MG II varieties
may be best adapted for full season
planting dates to reduce the risk of
drought stress during seed-fill. Grow-
ers considering MG II should be pre-
pared to reduce combine cutting height
in order to minimize stubble losses.
Table 3. Yield comparisons at individual farms in 1994 test.

<table>
<thead>
<tr>
<th>County</th>
<th>Farmer</th>
<th>Cropping System</th>
<th>Asgrow A715</th>
<th>Jack</th>
<th>Pioneer 9273</th>
<th>Agripro 2880</th>
<th>Asgrow A2396</th>
<th>Average</th>
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* FS, full season; DC, double-crop behind wheat; LP, late-planted, but not after wheat.
** LSD (0.05) for comparing varieties within a farm was 6 bushels/A.