

Bulletin Number B 787
November 1999

**PERFORMANCE OF
PUBLIC AND PRIVATE
SOYBEANS
IN INDIANA, 1999**



Department of Agronomy
Agricultural Research Programs
Purdue University
West Lafayette, Indiana

Contents

Introduction	3
Performance Trial Methodology	4
Location of Trials	4
Methods used in the Trials	4
State-wide Weather and Harvest Summary	6
Discussion	7
Sources of Seed	12
Charcoal Rot Observations, Tables A and B.....	15
Soybean Performance Tables 1 through 33.....	18

Acknowledgements

Special thanks for desktop publishing to Carol Summers,
for computer programming to Philip Hess, and
to Cindy Boone for placing the publication on the Internet;
Department of Agronomy.

It is the policy of Purdue University that all persons shall have equal opportunity and access to its programs and facilities without regard to race, color, sex, religion, national origin, age or handicap.

(Copyright 1999 Purdue Research Foundation)

PERFORMANCE OF PUBLIC AND PRIVATE SOYBEANS IN INDIANA, 1999

K. M. Day,
Senior Research Agronomist

W. P. Lorton, Technician

Dr. E. P. Christmas,
Professor of Agronomy

Dr. Charles Mansfield
Extension Agronomist

Department of Agronomy

INTRODUCTION

Soybeans are evaluated annually at several locations in Indiana. These trials are conducted according to the policies and procedures of the Indiana Agricultural Research Programs at Purdue University. In this bulletin, results of the 1999 performance trials are given as well as multiple year averages for those entries tested in the past three test years. Data for experimental entries are not included.

This information is presented under authority granted Indiana Agricultural Research Programs to conduct performance trials, including interpretation of data to the public, and does not imply endorsement or recommendation by Purdue University. Also any soybean not included in this bulletin does not imply criticism by Purdue University. This bulletin is protected by copyright by the Purdue Research Foundation. Permission is granted to reproduce the tables only in their entirety provided that this bulletin, "Performance of Public and Private Soybeans in Indiana", is referenced and the data are not edited, manipulated or reinterpreted. The table number, title, heading and footnotes 1 and 2 must be included. Permission is also granted to reproduce a maturity-group sub-table provided that the complete table heading and footnotes are included with the sub-table. A conspicuous disclaimer which states "endorsement or recommendation by Purdue University is not implied" must accompany any information reproduced from this bulletin.

This bulletin can be accessed electronically from the Purdue University home page. The address is:
<http://www.agry.purdue.edu/ext/variety.htm>

Additional bulletin copies may be available from:

**Agricultural Media
Distribution Center
301 South 2nd Street
Lafayette, Indiana 47901-1232**

Telephone: 765-494-6795
FAX: 765-496-1540

Performance results for both private and public entries are presented. Certified seed was used for seeding the public varieties. Private entries, entered voluntarily by the owner, were accepted in the trial after meeting requirements for eligibility and payment of a testing fee. No verification has been made that the seed, or the quality of the seed, entered in this trial is the same as that offered for sale to the public.

Plans and rules for entering this trial are available, upon request, to anyone at any time. Persons wishing to enter the soybean performance trial should contact the author by February 1.

**K. M. Day
Vartest Building
Agronomy Research Center
4540 U.S. 52 West
West Lafayette, IN 47906**

Telephone: 765-583-1406
No FAX Number Available

PERFORMANCE TRIAL METHODOLOGY

Location of Trials

This section contains information on locations and procedures used in conducting the trials.

In 1999 trials were planted at five locations (see Figure 1). The locations, numbered from north to south are:

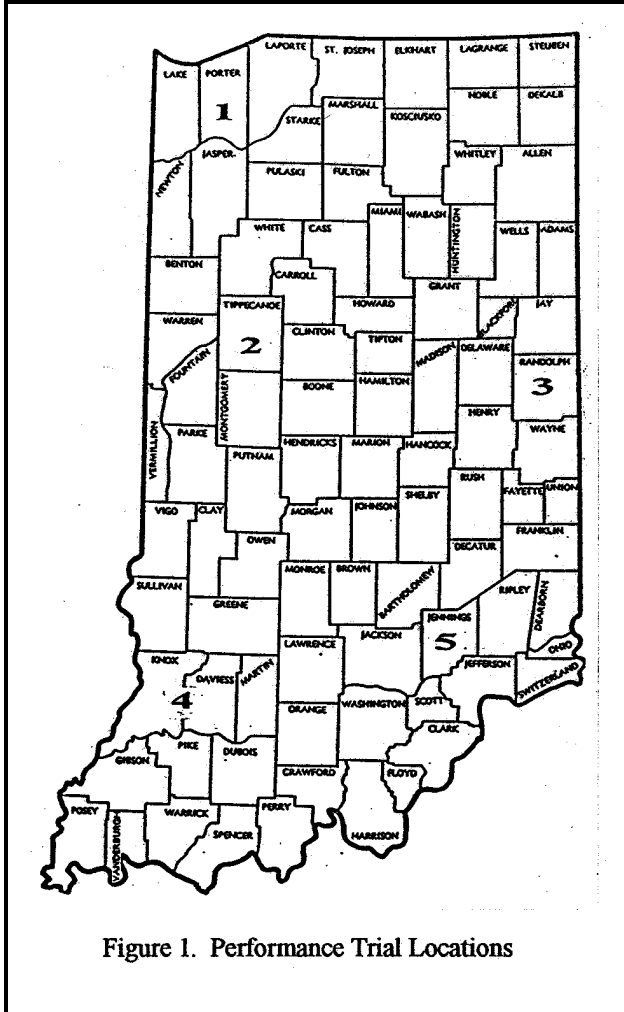


Figure 1. Performance Trial Locations

Location 1. Porter County at the Pinney-Purdue Agricultural Center near Wanatah, on Runnymede loam, a dark gray depressional soil underlain by sandy substrata.

Location 2. Tippecanoe County at the Purdue University Agronomy Research Center near Lafayette, on Drummer silty clay loam, a very dark gray or black, poorly drained depressional soil. Drummer was formerly classified as Chalmers.

Location 3. Randolph County at the Davis-Purdue Agricultural Center near Farmland, on Blount silty clay loam, a dark grayish-brown, somewhat poorly drained soil.

Location 4. Daviess County on the Jerry Barber farm near Washington, on Iva silt loam, a grayish brown, nearly level, somewhat poorly drained soil, formed in deep loess. Conventional maturity group III and IV soybean trials, in conventional tillage, were planted at this location.

Knox County on the Terry Vieck farm near Vincennes, on Conotton sandy loam, a dark brown, well drained soil, formed on broad outwash plain, with gravel underlay at about 30 inches. Conventional maturity group III and IV soybeans, in conventional tillage, were planted in soil with a history of cyst nematode infestation.

Location 5. Jennings County at the Southeast-Purdue Agricultural Center near Butlerville, on Avonburg silt loam, a light grayish, nearly level, somewhat poorly drained soil, with fragipan in the sub-soil.

Methods Used in the Trials

In 1999, in all of the trials, the soybeans were grouped by maturity, and planted in the respective early or late maturity group at each location. High-germinating seed (usually 90 percent or better) was used in the trial. The soybean plots were planted in a randomized complete block design with four replications at each location. Anticipated maturity differences between adjacent plots were restricted to 10 days or less.

Planting Equipment Used in the Trials. Three different planters were used to establish the trials reported in this bulletin. These different planters (and plant populations), and the procedures used to calculate estimated bushels-per-acre yields, have an impact on the trial results. Statistically valid yield comparisons may be made within the trials conducted using any of these planters, and practical comparisons may be made among the trials planted with the same equipment. Comparisons made between trials conducted using these three different planters could lead to incorrect conclusions.

A John Deere 7100 Max-Emerge planter, modified and configured to plant 4 rows on 20-inch row spacing, and equipped with cone distributors, dropped a pre-counted number of seeds in each 33 linear feet of row.

The John Deere planter was used to plant conventional soybeans in the maturity group II and III trials at locations 1 and 3; and the maturity group III and IV trials at location 4.

For trials planted using the John Deere planter, the planting rate for proprietary entries, selected by the owner, varied from 6 to 8 viable seeds per linear foot of row, with most ranging from 5 to 7. Most public varieties were planted at the rate of 6 viable seeds per linear foot of row (approximately 70 pounds or 157,000 viable seeds per acre).

The Almaco Grain Drill was designed and custom built for research plot work. The drill is equipped with 10 John Deere openers set on 7.5 inch row spacing, and is equipped with spring-loaded press wheels. The drill dropped a pre-counted number of seeds in each 33 linear feet of row. The planting rate for proprietary entries, selected by the owner, varied from 3.0 to 4.5 live seeds per linear foot of row. Public entries were seeded at the rate of 3.0 live seeds per linear foot of row, which would be 209,088 live seeds per acre. Assuming 90 percent emergence, this should produce a stand of 188,179 plants per acre.

The Almaco planter was used to plant all trials at location 2, (conventional soybeans, cyst nematode and Roundup Ready®), and all the trials at location 5 that were planted in conventional tillage seedbeds. Roundup Ready® is a trademark of Monsanto Company.

The Great Plains No-Till Drill is equipped with 10 openers set on 7.5-inch row spacing. The drill is equipped with a belt cone distributor, which dropped a pre-counted number of seeds equivalent to 200,000 seeds per acre. Unless otherwise stated, (for the tillage trials), germination was assumed to be 90 percent for all of the entries. The target population was 165,000 plants per acre assuming that 90 percent of the viable seed emerged. The no-till, and double crop trials, at location 5, were conducted by Dr. E. P. Christmas and were planted with this Great Plains No-Till drill.

When comparing bushels-per-acre yield estimates between the 4 row, 20-inch row spaced trials (John Deere Max-Emerge planter) vs. the solid-seeded trials (Almaco or Great Plains drill), keep in mind that the plot width calculations, for the John Deere 20 inch row plots, are different from the solid seeded plots, and may affect the estimated yield level by as much as 10 to 11 percent.

At location 5, the conventional soybean maturity group III and IV trials, and the Round up Ready®, group III and IV (conventional tillage) trials, were all

solid-seeded, using the same planting and harvesting equipment, similar seeding rates, and the same (plot area) calculations for all four trials. Although it is not statistically valid to compare the data between these four trials at location 5, some practical observations may be made.

Conventional farm equipment was used for seedbed preparation. All conventional soybean plots were treated with herbicides and, when possible, cultivated. Hand weeding was used to remove weeds that emerged late in the season.

At location 2, the Roundup Ready® trial was conducted using conventional tillage, (fall moldboard plowed, spring disked, and field cultivated). At location 5, the Roundup Ready® trial, using conventional tillage, was spring chiseled and field cultivated, and the Roundup Ready® No-Till trial was planted in standing cornstalks. All of the Roundup Ready® trials were sprayed once with Roundup Ultra® just prior to canopy closure, and season long weed control was adequate. Roundup Ultra® is a trademark of Monsanto Company.

Plots in all of the trials were end trimmed prior to harvest, and all rows were harvested for yield. This year all of the trials reported in this bulletin were harvested with an Almaco combine. The combine is equipped with a modified John Deere 900 series head with a floating cutter bar.

For all soybeans, (planted with the John Deere Max-Emerge planter, 4 rows on 20-inch row spacing), plot width was calculated as 7.5 feet (plot center to plot center). This includes the maturity group II, and III trials at locations 1 and 3; and the group III and IV trials at location 4.

The solid-seeded trials, (planted using the Almaco Drill, with 10 rows on 7.5 inch spacing), were calculated as 75 inches wide. At location 2, this includes, 1) conventional soybeans, maturity groups II and III, 2) maturity groups II and III, conventional and Roundup Ready® soybeans, in cyst nematode infested soil, and 3) Roundup Ready® maturity groups II and III (conventional tillage) trials. Also, at location 5; in the conventional tillage trials, 1) conventional soybeans, maturity groups III and IV, and 2) Roundup Ready® soybeans in maturity groups III and IV.

The solid-seeded trials, performed by Dr. E. P. Christmas using the Great Plains no-till drill, were 10 drill rows wide. Row spacing was 7.5-inches, and plot width was calculated as 75 inches wide. This drill was used at location 5, for the maturity groups III and IV, no-till trials for 1) conventional soybeans, 2) Roundup Ready® soybeans, and for the 3) double crop trials.

Observations such as plant height, lodging and maturity were taken from the center rows.

All plots, in the trials reported in this bulletin, (except for the double-crop trials at location 5), were harvested with an Almaco combine, and grain yields were weighed, and moisture tested automatically, on the combine, using a Seed Spector II and a Psion HC 110. The Seed Spector II equipment was calibrated using a Motomco moisture meter and Chantillon scales, and the calibrations were checked throughout the harvest season. It should be pointed out that this equipment is not the same as equipment used to meet official grain sampling standards, but is believed to be suitable for field plot work. All yields were adjusted to 13 percent moisture and are reported as bushels per acre.

Plant height, taken at maturity, is the average length (to the nearest inch) from the soil surface to the tip of the main stem.

Lodging is rated at maturity according to the following scores:

- 1 - Almost all plants erect.
- 2 - All plants leaning slightly or a few plants down.
- 3 - All plants leaning moderately (45 degrees) or 25-50 percent of plants down but still harvestable with conventional equipment.
- 4 - All plants leaning considerably or 50-80 percent of plants down and difficult to harvest with conventional equipment.
- 5 - Almost all of the plants down, and harvest losses would occur with conventional equipment.

Maturity date is when more than 90 percent of the pods are ripe (brown); and days (to maturity) are the number of days from planting to maturity. Delayed leaf drop and green stems are not considered when assigning maturity. About a week of good drying weather may be needed before soybeans are ready to combine after reaching maturity. Soybeans should mature about two weeks before the average date of the first killing frost, which ranges from approximately October 10 in northern Indiana to October 25 in southern Indiana.

Statewide Weather and Harvest Summary

Information contained in this section is gleaned from weekly reports, "Indiana Crop & Weather Report", from the Indiana Agricultural Statistician at Purdue University.

The first crop report for the 1999 growing season, issued April 5, 1999, indicated two-thirds of Indiana soils were more than adequate in topsoil and subsoil moisture. Fieldwork progressed rapidly during the first week of April and continued for three weeks. The April 25 crop report estimated 2 percent of the soybeans were planted.

Wet weather at the end of April and the beginning of May, slowed soybean planting for a few days. Beginning of the second week of May, soybean planting progressed rapidly. By area, northern Indiana soybeans were 16 percent planted; central 28 percent and southern Indiana 11 percent. The last crop report for May, reported soybean planting at 91 percent complete, far ahead of the 57 percent for average. This record progress in soybean planting was only 2 days behind the record, set in 1988.

Rain, the first week of June, slowed soybean planting for a few days. By mid-month the crop was 98 percent planted, and by June 20, planting was virtually completed. The planted soybeans were 99 percent emerged, and the condition of the crop was rated 80 percent good to excellent. By the third week of June, there was a slight decline in the condition of the crop.

Planting of double crop soybeans was finishing up by the fourth of July, and 24 percent of the earlier planted soybeans were blooming. Normally only 6 percent of the soybeans are blooming by July 4. The condition of the crop improved, to 81 percent rated good or better. By July 11, 6 percent of the soybeans were setting pods. From mid-July on, soybeans developed at an unusually rapid pace, and the condition of the crop declined due to hot, dry weather.

August did not bring relief from the stress of hot dry weather. The soybean crop rating dropped to only 38 percent being rated good to excellent. Throughout the state, only 20 percent of the soil was rated as having adequate moisture. At the beginning of August, 53 percent of the soybeans were setting pods, compared to 25 percent for average. At the end of the third week of August, the soybean condition rating declined to 27 percent of the crop rated good to excellent. Mid-August rain was beneficial to the

extent that at the end of August crop rating improved, to 31 percent good or better.

At the end of August, 99 percent of the soybeans were setting pods, compared to 93 percent for average; and 11 percent were shedding leaves.

The soybean condition rating declined again the first week of September to 25 percent good or better. In 1998 the crop was rated 60 good or better at the beginning of September. The 1999 crop was 6 percent mature compared to 5 percent for average. Soils were very dry, with only 13 percent rated adequate and none rated surplus. The soybean condition continued to decline, due to dry weather. The September 12 report stated that 3 percent of the crop was harvested. Harvest advanced at a rapid pace in September, due to extremely dry weather. At the end of September, 97 percent of the soil was rated short to very short on moisture.

The October 3 report stated that 52 percent of the crop was harvested, compared with 28 percent for average. Soybean average moisture was reported to be 10.5 percent. The October 10 report stated that 98 percent of the crop was mature, compared to 87 percent for average. The crop was 70 percent harvested compared to 52 percent for average. Soil moisture was rated 33 to 40 percent adequate and 67 to 88 percent short to very short.

The final crop and weather report for 1999, issued November 1, 1999 reported that, as of October 31, 98 percent of the soybean crop was harvested. Harvest was 12 days ahead of average and only 2 days behind the record pace set in 1987. Soybean moisture content was averaging about 11 percent. Soil moisture was 67 percent short to very short.

In summary, the 1999 growing season, for soybeans, had an excellent start, and made exceptionally good progress until early July. From then on the crop declined due to stress from hot dry weather. However, during harvest, many producers reported yields to be above their expectations.

On October 20, 1999 the Indiana Crop and Livestock Reporting Service reported:

"Based on conditions October 1, 1999 Indiana soybean production is forecast at 221.5 million bushels, 2 percent less than the September forecast, and 4 percent below last year's production of 231.0 million

bushels. The expected yield of 39 bushels per acre is down 1 bushel from last month's forecast and 3 bushels below last year's yield of 42 bushels per acre. The 5.68 million acres for harvest, is 3 percent above last year's, but unchanged from September.

Nationally, soybean production is forecast at 2.70 billion bushels, down 3 percent from September 1, and 2 percent below last year's record of 2.74 billion bushels. The yield forecast at 37.0 bushels per acre, is down 0.9 bushels from last month and is 1.9 bushels below the 1998 final yield. Acreage for harvest is estimated at a record 72.8 million acres, down 1 percent from September 1 but up 3 percent from 1998. Acres expected for harvest were decreased by 475,000 in nine states due to abandonment or harvested for hay.

Continuing the downward trend of recent years, public soybean varieties accounted for only 1.2 percent of the total 5.70 million acres planted in 1999. Private varieties totaled 91.9 percent of Indiana's soybean acreage in 1999, compared with 89.5 percent in 1998.

Leading the way again this year was Pioneer with 27.9 percent. Second place went to Asgrow with 14.7 percent and DeKalb came in third place with 10.3 percent of the total soybean acreage. Becks ranked fourth with 8.9 percent. Unidentified varieties accounted for 6.9 percent of the acreage in 1999.

Indiana soybean farmers practiced conventional tillage on 15 percent of the planted acreage and minimum tillage on 15 percent of the planted acreage, the remaining 70 percent were planted with no-till."

DISCUSSION

It is not possible to absolutely determine or predict the response of plants to the environment. The results of every field trial conducted are influenced by the treatment and by the experimental error. In these trials, the treatment is the soybean entry (variety, brand, or blend) planted in the trial. Experimental error is a composite term to indicate everything that could not be controlled by the person performing the trial. It is not intended to include human error. These trials are conducted on the assumption that all the entries in the trial are equal until evidence is obtained that they are not equal. In order to obtain this evidence it is necessary to determine whether the trial results were influenced most by the entries or by experimental error. To do this an analysis of variance is performed and the relationship of the yielding ability of the entries to experimental error is determined. The analysis of soybean performance trials show that maturity relationships are very predictable whereas yield relationships are the most difficult to predict.

Probability levels have been established to assess the validity of the trial. Generally trials should be significant at the 10 percent probability level. This means 1 trial in 10 could be a fluke and not be detected. In this bulletin, all of the 1999 trials are significant at the 10 percent probability level.

The analysis of variance makes it possible to compute a coefficient of variability (C.V.). The coefficient of variability is a relative term. It is the ratio of the standard deviation to the grand mean of the trial, expressed as a percent. On the western side of Indiana a normal C.V. for soybeans is 5 to 10 percent; whereas on the eastern side it is 10 to 15 percent. Whenever the C.V. is larger than normal for a trial location, it indicates the precision of the trial was below normal. When yields are high and the experimental error is small, the C.V. will be small.

Single-year trials, in this report, generally require yield differences of 7 to 10 bushels for significance. This year, 1999, for single locations, BLSD ($k=100$) yield differences for significance, ranged from 3.0 to 10.8 bushels.

A test of significance must be performed to determine if the yield difference between two entries is due to experimental error or due to the yielding ability of the entries. The single-year trial only reflects what happened in one year at one location and is generally inadequate for predicting how the soybeans may perform in the future. Data from multiple years, and in some instances multiple locations, when combined and

analyzed, provide a superior estimate of how soybeans will perform in the future.

Generally a minimum of three years, of testing, are needed from a trial location to obtain adequate data for predicting performance.

An analysis of variance, which includes years, will show that years have a very strong influence on yields. Also, an analysis of variance that includes locations will show that locations also influence the performance of the entries in the trial.

Brief periods of favorable or unfavorable weather, when the plants are vulnerable to weather stress, can change the yield relationship among entries from year to year. Maturity relationships are photoperiod influenced and are much less affected by weather from year to year.

Often it is not beneficial or appropriate to combine data across locations from these performance trials. The trials are far enough apart from north to south that the entries in the trial may not be adapted to both locations. The trial environments from east to west are also very different, especially in regard to the presence and severity of *Phytophthora* rot. It is important to realize that locations may all provide similar trial results one year and produce quite different results the following year.

This year, 1999, data combinations were made for maturity group II soybeans at locations 1 and 2, for three, two and one year trials, and are reported in table 31.

Data combinations were made for maturity group III soybeans for three, two and one year trials, at locations 1, 3, 4 and 5; and are reported in table 32.

Results of the maturity group IV trials are combined for locations 4 and 5, for three, two and one year trials, and are reported in table 33.

Soybean data from any source must include years (preferably three), must be analyzed, and must have a test of significance before it has any value as a basis for performance prediction.

Trial results are ranked by yield. The Waller-Duncan Bayesian k ratio t test is used for the test of significance. A k ratio of 100:1 was used in computing the Bayesian least significant difference (BLSD) for the test of significance. This ratio may be considered in a loose sense to take the place of the 5% level of significance. The BLSD value may be used to make

all possible pair-wise comparisons among the entries. Yield differences smaller than the BLSD value should be considered due to chance (experimental error) and not due to superior performance.

An asterisk (*) is included in the yield column in each sub-table. The asterisk denotes all yields in the sub-table which are not, statistically, significantly different from the top yield. Do not place undue emphasis on yield differences followed by an asterisk. The BLSD value must still be used to determine if the particular yields being compared are significantly different.

At Location 1, the plots were planted May 19 in an excellent seedbed. Emergence was uniform, plant growth vigorous, and good stands were obtained. The only soaking June rain (1.25 inches) did not arrive until June 27. Prior to that, most of the showers were scattered throughout the month, and were in amounts of less than one-half of an inch. Although the light rains were beneficial, the amount of precipitation was generally inadequate. June precipitation totaled 3.61 inches. During six, of the first thirteen days of June, temperatures reached 90° F or above. Temperatures then moderated for the rest of the month, and temperature averaged 69° F.

The first two days of July received 1.85 inches of rain; the next fifteen days received no moisture. Scattered showers began on July 18, and on six of the next thirteen days, some rain was recorded. The rains were generally in amounts less than one-half of an inch. July precipitation totaled 3.82 inches and temperatures became progressively warmer. During the last ten days of July, nine days were 90° F or warmer. August temperatures were cooler, but the precipitation totaled only 1.69 inches for the month. All of the August rains came in showers of less than one-half of an inch.

September rain totaled 1.10 inches, with 0.95 of an inch falling on September 29, which was after the maturity group II soybeans were harvested. Five of the first six days of September recorded temperatures of 90° F or higher. Temperatures for the month averaged 61° F.

All of the soybeans were mature well ahead of the first killing freeze.

Compared with previous years, 1999 yields were lower, maturity dates earlier, and other traits similar. The performance data are representative of 1999 growing conditions in northwestern Indiana and should be useful for performance comparisons.

At Location 2, excellent moisture was available when the conventional and Roundup Ready® soybeans were planted on May 20. Two days after planting, 1.03 inches of rain fell, but no serious crusting occurred. Excellent, vigorous, uniform stands were established. May rain totaled 3.63 inches, and temperature averaged 63° F.

Wet soil delayed planting, in the cyst nematode infested soil, until June 9. The plots were planted in dry soil on top and wet soil underneath. Good stands were obtained, and early growth and development were rapid. June had only one soaking rain (1.53 inches) which fell on June 1 and 2. The rest of the precipitation arrived in widely scattered showers of less than one-half inch. Nevertheless weather was generally good for soybean growth and development; rain total was 3.22 inches, and temperature averaged 72° F.

July 1, received 0.28 of an inch of rain, and for the next seventeen days there was no precipitation. July 18, received 0.83 of an inch of rain, and the only soaking July rain (1.56 inches) came on July 20 and 21. The last July rain arrived a week later, when 0.48 of an inch fell on July 28 and 29. Precipitation totaled 3.15 inches. July temperature averaged 77° F, and eight of the last ten days of July had temperatures above 90° F.

August temperatures were cooler than July. The only 90°+ F temperature came on the first day of the month. Average temperature for the month was 70° F. The August rain pattern was similar to July; the only soaking rain (1.84 inches) came on August 13, and from then until the end of the month, scattered showers were, with only one exception, (0.15 of an inch), in amounts of less than one-tenth of an inch.

Virtually no rain fell in September until a violent storm, on September 29, dropped 3.25 inches of rain during the evening and night hours. High winds, measured at 103 miles per hour, destroyed weather station equipment. Large hail, the size of quarters and golf balls, destroyed the maturity group III trials for both the conventional and Roundup Ready® soybeans. Those trials were abandoned and only the date of maturity is presented for the 1999 results. Results of the 1998 trials for maturity group III conventional and Roundup Ready® soybeans are reproduced in conjunction with the 1999 results.

At location 2, the trials planted in "cyst nematode infested soil" were planted in a field with a history of cyst nematode infestation. However, no soil samples

were taken and no cyst counts were made, to determine the level of infestation.

The trials, in cyst nematode infested soil, were a half-mile away from the severe hailstorm, and received only minimal damage.

Compared with previous years, the 1999 trial results, at location 2, are similar to previous years, and should be useful in making performance comparisons, where ever statistically significant data are presented.

At Location 3, the plots were planted May 17 in an excellent seedbed. During the week after planting, rain fell on five of the seven days, and all of the showers were in amounts of less than half of an inch. Emergence was uniform and vigorous, and excellent stands were obtained. May precipitation totaled 2.79 inches and the average temperature was 63° F.

June showers were in amounts of less than one inch, and precipitation totaled 2.50 inches for the month. On six, of the first thirteen days of June, maximum temperatures were recorded at 90° F or above. During the last week of the month, two days had 90° F, or above, temperatures. Average temperature for the month was 72° F.

The largest single July rain (1.95 inches) came on July 7. The next ten days were dry; then rains returned bringing 1.94 inches of moisture, in a series of five showers, from July 18 through July 24. One more beneficial shower (0.67 of an inch) arrived on July 29. July rain totaled 4.74 inches, and the moisture distribution was exceptionally good. Four days, during the first week of July, recorded temperatures of 90° F, or above. Ten of the last twelve days of the month recorded maximum temperatures ranging from 91° to 98° F. Average temperature for the month was 77° F.

The highest August temperature (96° F) was on the first day of the month. For the rest of the month, temperatures were cooler and the average for the month was 69° F. August rain totaled 1.87 inches. The largest shower (0.98 of an inch) came on the first day of the month. Showers during the rest of the month came in amounts of 0.20 of an inch or less.

September rain totaled 1.24 inches, with most of it falling on the last two days of the month. The first week of the month had five days with temperatures of 90° F or warmer, and temperature averaged 64° F for the month.

The three and two year data from location 3 are, statistically, not significant. This means that

differences in yield could be due to chance. The 1999 results indicate significant differences in yield, but in the absence of supporting multiple year data, the 1999 results should be used with caution.

At Location 4, weather data came from the weather station located at the Southwest Purdue Agricultural Center north of Vincennes. The weather station is approximately five miles north of the maturity group III and IV trials conducted in cyst nematode infested soil, at the Terry Vieck farm south of Vincennes. The weather station is approximately 20 miles west of the conventional soybean (maturity group III and IV) trials on the Jerry Barber farm in Daviess County, east of Washington.

The trials conducted south of Vincennes on the Terry Vieck farm (cyst nematode infested soil) were planted on May 24, and the trials on the Jerry Barber farm northeast of Washington, were planted on May 25. The trials at both locations were planted in good seedbeds. Uniform, vigorous stands were obtained

May rain fall, in the location 4 area, totaled 2.86 inches at the Vincennes weather station, and May temperature averaged 66° F.

June received two soaking rains. The first came on June 1 and 2, (about a week after planting), and totaled 1.96 inches. The second substantial rain came on June 14 and totaled 1.89 inches. The rest of the June precipitation was distributed among showers of one-half of one inch. June precipitation totaled 5.46 inches and temperature averaged 73° F.

July moisture came mostly on July 1 and 2 (1.89 inches), and July 10 (2.58 inches). July 20 and 21 rain totaled 0.94 of an inch. This totaled 5.41 inches for the month and left 26 days without precipitation. July was hot. Twenty-one of the thirty-one days of the month, recorded maximum temperatures of 90° F or above. The other ten days had temperatures in the mid to upper 80° F. The last 13 days of the month had maximum temperatures exceeding 90° F. The hottest day of the growing season was on July 31, when the temperature reached 101° F. For the month, temperature averaged 81° F.

August was cooler than July, and averaged 73° F for the month. Seven days recorded temperature of 90° F or above. August was drier than July. Five days recorded precipitation, and the total for the month was 1.18 inches.

The Vincennes area received virtually no rain during the month of September. Total precipitation for the month was 0.60 inches and most of that (0.53)

came on the last two days of the month. During the first week of September, four days recorded temperatures of 95° F to 97° F. For the month, temperature averaged 68° F.

Soybean performance, in the 1999 maturity group III and IV trials, at the Jerry Barber farm in Daviess Co., appear to be normal, when compared with previous years. The data should be useful in making performance comparisons.

The 1999 maturity group III and IV soybean trials, planted on the Terry Vieck farm in Knox Co., south of Vincennes, were planted in sandy soil which was infested with cyst nematodes. During the growing season charcoal rot appeared in both trials. See tables A and B for Charcoal Rot observations taken by Dr. Charles Mansfield of Vincennes University. Severe drought, Charcoal Rot, and cyst nematodes affected the trials. It is not clear as to which problem had the greatest impact on the trials. Since there are no previous year's data, the 1999 results, if used, should be used with caution.

At Location 5, May precipitation totaled 3.26 inches, and temperature averaged 64° F. The no-till trials (conventional and Roundup Ready® soybeans) were planted May 14. Soybeans planted in conventional tillage seedbeds (conventional and Roundup Ready® soybeans) were planted May 21. All of the trials were planted in good seedbeds, and uniform, vigorous stands were established.

The double crop trials were planted on June 28. June precipitation totaled 5.15 inches and all of the moisture came in showers of less than one inch. The weather was generally mild, with five days of temperatures of 90° F or above, and the average temperature for the month was 73° F.

The first half of the growing season, at location 5, was virtually ideal. Planting was timely, moisture amounts and distribution ideal, and temperatures warm but generally not stressful. That would change during the last half of the growing season, and impact, especially, the double-crop trials.

July was much warmer, with average temperature for the month at 78° F. Four days, from July 4 to 7 had temperatures of 90° F or above. The last twelve days of the month had maximum temperatures at or exceeding 90° F, and the last day of the month reached 102° F. July rain totaled 2.34 inches. The rain came mostly during the first three weeks of the month and in amounts of less than half of an inch.

August was not as hot as July. Eight days in August had maximum temperatures at, or exceeding, 90° F. Temperature for the month averaged 72° F. August precipitation totaled 2.77 inches. The only soaking rain came on August 24 and 25, and delivered 1.80 inches of moisture. The rest of August moisture came in scattered showers of generally one-fourth of an inch or less.

September rainfall totaled 0.47 of an inch, with 0.34 falling on the last day of the month. Six of the first fifteen days of the month, recorded temperatures above 90° F. For the month, temperature averaged 65° F.

For 1999, conventional soybeans in conventional tillage (maturity groups III and IV, tables 18, 19 and 20) were similar to previous year's performance and should be useful in making performance comparisons.

Conventional soybeans, in no-till performance trials (tables 21, 22 and 23), were planted during an optimum date of planting. Yields were higher, maturity earlier and plants taller than in previous years. The 1999 results should be useful in comparing performance.

The Roundup Ready® performance trials in conventional tillage (tables 24 and 25) are similar to the previous year, and should be useful in making performance comparisons.

The Roundup Ready® trials in no-tillage, (tables 26 and 27) performed better than in 1998, due probably, to earlier planting. The 1999 results should be useful in performance comparisons.

In 1999, due to dry weather, yields in the double-crop performance trials, when compared with previous years, were cut virtually in half. When compared to 1999 trials planted in May, yields were approximately one-third of the yields in the earlier planted trials. Data for this year may be useful, when used in combination with the results from previous years.

SOURCES OF SEED

Information concerning certified seed may be obtained from the Indiana Crop Improvement Association, which certifies seed from both public and private sources. Publicly developed varieties, presented in this bulletin, are listed under the Indiana Crop Improvement Association, and the Ohio Seed Improvement Association addresses. Private companies have requested that inquiries concerning proprietary entries, presented in this bulletin, be directed to the addresses listed on the following pages..

Small case letters preceding the entry name are, v-variety, m-mixture (blend), and b-brand. Other names, associated with the entry name, are brand or company names usually associated, in the trade, with the entry name.

Beck's Superior Hybrids, Inc.
6767 East 276th Street
Atlanta, Indiana 46031
Telephone: 317-984-3508

b Beck 281
b Beck 288N
b Beck 289
b Beck 290RR
b Beck 295NRR
b Beck 302RR
b Beck 351
b Beck 352RR
b Beck 354NSTS
b Beck 370RR
b Beck 372RR
b Beck 385NRR
b Beck 386
b Beck 388A
b Beck 402RR
b Beck 419
b Beck 435NRR
b Beck 437STS
b Beck Ex7842
b Beck Ex7848

Callahan Seeds
1122 East 169th Street, Box 367
Westfield, Indiana 46074-0367
Telephone: 317-896-5551

b Callahan 6330
b Callahan 7317
b Callahan 8275
b Callahan 8363
b Callahan 9282RR

Callahan Seeds, continued

b Callahan 9303RR
b Callahan 9323RR
b Callahan 9327RR

Dairyland Seed Company, Inc.
P. O. Box 958, 3570 Highway H
West Bend, Wisconsin 53095
Telephone: 414-338-0163
800-236-0163

v DSR-280/STS
v DSR-246/STS
v DSR-275
v DSR-277
v DSR-293/RR
v DSR-300
v DSR-309/STS
v DSR-314/STS
v DSR-321/RR
v DSR-325
v DSR-327/RR
v DSR-338/STS
v DSR-351/RR
v DSR-363/RR
v DSR-370/STS
v DSR-372/RR
v DSR-377
v DSR-381/RR
v DSR-421/RR

Davis Seed Farms, Inc.
10184 Ted Davis Road
Greens Fork, Indiana 47345-9753
Telephone: 765-886-5148

b Davis D327
b Davis D340STS
b Davis D350N
b Davis D360

Diener Brothers Seeds, Inc.
371 North Diener Road
Reynolds, Indiana 47980
Telephone: 219-984-5837

b Diener DB 2900CR
b Diener DB 2983RR
b Diener DB 3300CR
b Diener DB 3500CR
b Diener DB 3770CR
b Diener DB 3900CR
b Diener DB 3921RR
b Diener DB 4303CR

Garst Seed Company
13423 Kitty Hawk Avenue
Carroll, Iowa 51401
Telephone: 712-792-5760

b D265 Garst
b D308 Garst
b D354RR/N Garst
b D358 Garst
b D398 Garst
b D399RR/N Garst

Glick (Lynn and Myron) Seeds
15120 East Baseline Road
Columbus, Indiana 47203
Telephone: 812-579-6924

b L&M Glick 37RR
b L&M Glick 40RR
b L&M Glick 9381RR

Indiana Crop Improvement Association
7700 Stockwell Road
Lafayette, Indiana 47909
Telephone: 765-523-2535
Fax: 765-523-2536

v Archer Public
v Athow Public
v Chapman Public
v Charleston Public
v Dwight Public
v Edison Public
v Flyer Public
v HF93-035 Public
v Ina Public
v Jack Public
v Kenwood 94 Public
v Maverick Public
v Mustang Public
v Omaha Public
v Pella 86 Public
v Probst Public
v Resnik Public
v Saline Public
v Savoy Public
v Thorne Public
v Tiffin Public
v Williams 82 Public
v Yale Public

LG Seeds, Windfall Service Center
P. O. Box 457
Windfall, Indiana 46076
Telephone: 765-945-7777

v LG 6276
v LG 6284RR
v LG 6336RR
v LG 6366CSTS
v LG 6373STS
v LG 6375RR
v LG 6393RR
v LG 6395TR
v LG 6430RR
v LG 6457CSTS
v LG 6485RR

Martin Seeds, Inc.
10045 West Second Street
Williamsport, Indiana 47933
Telephone: 765-986-2030

b M-0035
b M-9733
b M-9928
b M-9929
b M-9932
b M-Resister

Miles Seed Company
P.O. Box 22879, 2760 Keller Road
Owensboro, Kentucky 42304-22879
Telephone: 800-482-1952

v David Southern Cross
v Exodus Southern Cross
v James Southern Cross
v Jude Southern Cross
v Micah Southern Cross
v Paul Southern Cross

Monsanto
3100 Sycamore Road
DeKalb, Illinois 60115
Telephone: 815-758-9323

Asgrow
v AG3003 Asgrow
v AG3302 Asgrow
v AG3701 Asgrow
v AG3702 Asgrow

Monsanto, continued

Asgrow

v AG3901 Asgrow
v AG4101 Asgrow
v AG4301 Asgrow
v AG4402 Asgrow

DeKalb

v CX 277
v CX 294STS
v CX 295
v CX 300
v CX 339c
v CX 375
v CX 393c
v CX 400
v CX 420c
v CX 450c
v CX 470c
v CX 262RR
v CX 284c
v CX 285RR
v CX 299c
v CX 302c
v CX 303RR
v CX 339c
v CX 343cRR
v CX 367cRR
v CX 383RR
v CX 414cRR
v CX 420c
v CX 433RR
v CX 450c

NextGene Seed
355 Smith Road
Greensburg, Indiana 47240
Telephone: 812-663-5575

b NG 1036Rx
b NG 1037 X
b NG 2909
b NG 3109
b NG 3509
b NG 362R
b NG 370R
b NG 3809
b NG 9029 RX
b NG 9032 STSX
b NG 9034 RX

Ohio Seed Improvement Association
6150 Avery Road Box 477
Dublin, Ohio 43017-0477
Telephone: 614-889-1136

v Defiance Public
v Flint Public
v Sandusky Public

Rupp Seeds, Inc.
17919 County Road B
Wauseon, Ohio 43567
Telephone: 419-337-1841

v Rupp RS 2345
v Rupp RS 2499
v Rupp RS 3119
v Rupp RS 4236RR
v Rupp RS 4242RR
v Rupp RS 4265RR
v Rupp RS 4274RR
v Rupp RS 4289RR
v Rupp RS 4328RR

Seed Consultants, Inc.
P.O. Box 96, 9768 Mill-Jeff Road
Jeffersonville, Ohio 43128
Telephone: 800-708-2676

b SC 350N Seed Consultants
b SC 388 Seed Consultants
b SC 406 Seed Consultants
b SC9388RR Seed Consultants
b SC9438RR Seed Consultants

Strike Brand Genetics
702 SR 28 East, P.O. Box 158
Romney, Indiana 47981
Telephone: 765-538-3145
800-822-7134

b Strike 3080RR
b Strike 3490RR
b Strike 3790RR
b Strike 3890RR

Trisler Seed Farms, Inc.
3274 East 800 North
Indianola, Illinois 61850
Telephone: 217-288-9301

v Trisoy 2770
v Trisoy 2887RR
v Trisoy 2997RR
v Trisoy 3252
v Trisoy 3381

Trisler Seed Farms, Inc., continued

v Trisoy 3497RR
 v Trisoy 3777RR
 v Trisoy 3997RR

United Suppliers, Inc.
30473 260th Street, P.O. Box 538
Eldora, Iowa 50627
 Telephone: 515-858-2341

b US S2409RR U.S. Seeds
 b US S259 U.S. Seeds
 b US S2709RR U.S. Seeds
 b US S289 U.S. Seeds

United Suppliers, Inc., continued

b US S299 U.S. Seeds
 b US S3009RR U.S. Seeds
 b US S3209RR U.S. Seeds
 b US S339 U.S. Seeds
 b US S3609RR U.S. Seeds
 b US S380 U.S. Seeds

Wilfarm, L.L.C.
5401 North Oak Trafficway
Gladstone, Missouri 64118
 Telephone: 800-332-8440

v WF 230RR
 v WF 290RR
 v WF 370RR

Table A. Charcoal Rot observations in the 1999 maturity group III soybean performance trial, conducted in cyst nematode infested soil, in Knox Co., Location 4, southwestern Indiana.

Entry Type and Name(1)	Charcoal Rot(2)	Entry Type and Name(1)	Charcoal Rot(2)
v Athow Public	M	b D354RR/N Garst	M
v Athow Public	M	b D354RR/N Garst	M
v Athow Public	M	b D354RR/N Garst	
v Athow Public	S	b D354RR/N Garst	
b Beck 385NRR		b D358 Garst	L
b Beck 385NRR		b D358 Garst	M
b Beck 385NRR		b D358 Garst	
b Beck 385NRR		b D358 Garst	
v Charleston Public	M	b D399RR/N Garst	
v Charleston Public	S	b D399RR/N Garst	
v Charleston Public	S	b D399RR/N Garst	
v Charleston Public	S	b D399RR/N Garst	
v CX 339c	M	v Edison Public	M
v CX 339c		v Edison Public	M
v CX 339c		v Edison Public	
v CX 339c		v Edison Public	
v CX 393c		v HF93-035 Public	M
v CX 393c		v HF93-035 Public	S
v CX 393c		v HF93-035 Public	S
v CX 393c		v HF93-035 Public	S
v Defiance Public	M	v Maverick Public	M
v Defiance Public	M	v Maverick Public	M
v Defiance Public	M	v Maverick Public	M
v Defiance Public		v Maverick Public	S

Table A, continued. Charcoal Rot observations in the 1999 maturity group III soybean performance trial, conducted in cyst nematode infested soil, in Knox Co., Location 4, southwestern Indiana.

Entry Type and Name(1)	Charcoal Rot(2)	Entry Type and Name(1)	Charcoal Rot(2)
v Pella 86	Public M	v Thorne	Public M
v Pella 86	Public S	v Thorne	Public
v Pella 86	Public S	v Thorne	Public
v Pella 86	Public VS	v Thorne	Public
v Probst	Public	v Williams 82	Public
v Probst	Public	v Williams 82	Public
v Probst	Public	v Williams 82	Public
v Probst	Public	v Williams 82	Public
v Resnik	Public M	v Yale	Public M
v Resnik	Public	v Yale	Public M
v Resnik	Public	v Yale	Public M
v Resnik	Public	v Yale	Public
v Saline	Public M		
v Saline	Public		
v Saline	Public		
v Saline	Public		

Conducted on the Terry Vieck Farm near Vincennes. Terry Vieck, cooperator.

Soil type: Conotton sandy loam.

Soil test for Cyst Nematode Maturity Group III: pH 6.3, P 108 ppm (very high), K 130 ppm (medium).

Date of planting: May 24, 1999.

Date of harvest for Maturity Group III : October 5, 1999.

(1) Lower case letters indicate entry type as follows: v-variety, b-brand, or m-mixture (blend).

Public entries were developed by Agricultural Experiment Stations (Indiana Agricultural Research Programs) or in cooperation with the Agricultural Research Service of the USDA.

Proprietary names are company or brand names generally associated in the trade with variety, brand or blend names.

(2) Visual observations, taken by Dr. Charles Mansfield of Vincennes University, on the level of Charcoal Rot in the individual plots are as follows:

L = very small amount of Charcoal Rot observed.

M = moderate Charcoal Rot

S = extensive Charcoal Rot in most plants, with plants dying prematurely.

VS = most plants dying prematurely.

Not all entries had visible signs of Charcoal Rot

Note: The cyst nematode count, in Blocks 1 and 2, was 12.5 cysts (high) per 250cc of soil.

In Blocks 3 and 4, the count was 40 (very high) per 250cc of soil.

(Copyright 1999 Purdue Research Foundation)

Table B. Charcoal Rot observations in the 1999 maturity group IV soybean performance trial, conducted in cyst nematode infested soil, in Knox Co., Location 4, southwestern Indiana.

Entry Type and Name(1)	Charcoal Rot(2)	Entry Type and Name(1)	Charcoal Rot(2)	
b Beck 435NRR		v Ina	Public	M
b Beck 435NRR		v Ina	Public	L
b Beck 435NRR		v Ina	Public	
b Beck 435NRR	M	v Ina	Public	VS
v CX 420c	S	v James	SouthCross	
v CX 420c		v James	SouthCross	
v CX 420c		v James	SouthCross	L
v CX 420c	L	v James	SouthCross	
v CX 450c		v LG 6457CSTS		
v CX 450c		v LG 6457CSTS		
v CX 450c		v LG 6457CSTS		
v CX 450c		v LG 6457CSTS		VS
v Flyer	Public	v Mustang	Public	
v Flyer	Public	v Mustang	Public	
v Flyer	Public	v Mustang	Public	VS
v Flyer	Public	v Mustang	Public	VS
		v Omaha	Public	
		v Omaha	Public	
		v Omaha	Public	
		v Omaha	Public	VS

Conducted on the Terry Vieck Farm near Vincennes. Terry Vieck, cooperator.

Soil type: Conotton sandy loam.

Soil test for Cyst Nematode Maturity Group IV: pH 6.6, P 122 ppm (very high), K 131 ppm (medium).

Date of planting: May 24, 1999.

Date of harvest for Maturity Group IV: October 5, 1999.

(1) Lower case letters indicate entry type as follows: v-variety, b-brand, or m-mixture (blend).

Public entries were developed by Agricultural Experiment Stations (Indiana Agricultural Research Programs) or in cooperation with the Agricultural Research Service of the USDA.

Proprietary names are company or brand names generally associated in the trade with variety, brand or blend names.

(2) Visual observations, taken by Dr. Charles Mansfield of Vincennes University, on the level of Charcoal Rot in the individual plots are as follows:

L= very small amount of Charcoal Rot observed.

M = moderate Charcoal Rot

S = extensive Charcoal Rot in most plants, with plants dying prematurely.

VS = most plants dying prematurely.

Not all entries had visible signs of Charcoal Rot

Note: The cyst nematode count, in Blocks 1 and 2, was 50 cysts (very high) per 250cc of soil.

In Blocks 3 and 4 the count was 30 (very high) per 250cc of soil.

(Copyright 1999 Purdue Research Foundation)