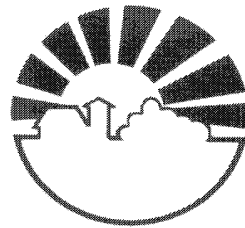


**Bulletin Number B 795
August 2000**

**PERFORMANCE OF
PUBLIC AND PRIVATE
SMALL GRAINS
IN INDIANA, 2000**



**Department of Agronomy
Agricultural Research Programs
Purdue University
West Lafayette, Indiana
Cooperative project with the
Agricultural Research Service
U. S. Department of Agriculture**

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(The authors wish to give credit to Cindy Boone, Department of Agronomy
for preparing and placing the bulletin on the Purdue University web site.)

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Performance of Public and Private Small Grains in Indiana, 2000

INTRODUCTION

Small grains are evaluated annually at several locations in Indiana. These trials are conducted according to the policies and procedures of Indiana Agricultural Research Programs at Purdue University. In this bulletin, results of the year 2000 small grain performance trials are presented for those entries which are believed to be available to producers for seeding purposes. 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 small grain not included in this bulletin does not imply criticism by Purdue University. This bulletin is protected by copyright by the Purdue Research Foundation.

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ext/variety.htm](http://www.agry.purdue.edu/ext/variety.htm)

Bulletin copies may be available, in Indiana, from local county agricultural extension offices.

Performance results for both private and public entries are presented. Certified seed was used for seeding most of the public varieties. Private entries, entered voluntarily by the owner, were accepted in the trial after meeting the 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 small grain performance trial should contact the author by August 1 for fall-seeded small grains and by February 1 for spring-seeded small grains.

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PERFORMANCE TRIAL METHODOLOGY

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

Location of Trials

In the year 2000, trials were conducted at four locations for winter wheat and two locations for spring oats (see Figure 1). The locations, numbered from north to south, are:

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

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

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. Jennings Co., 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

Seedbeds were prepared using conventional farm equipment. A randomized complete block design, with 4 blocks, was used in all trials. The wheat plots were planted in drill strips 35 feet long and 75 inches wide, and the oat plot drill strips were 75 feet long and 70 inches wide. All plots were end trimmed at harvest to approximately 21 feet in length for wheat and 23 feet for oats, and all rows were harvested. Plot width of 75 inches for wheat and 70 inches for oats was used for calculating harvest area for yield.

The plots were harvested with an Almaco plot combine, and were weighed and moisture tested automatically, on the combine, using a Seed Spector II and a Psion HC 110. The Almaco plot weight and moisture 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 the electronic weighing, and moisture testing equipment, on the Almaco plot harvester, are not the same as equipment used to meet official grain sampling standards, but are believed to be suitable for field plot work.

Grain yields from the test plots are reported as estimates of bushels per acre, adjusted to 14 percent moisture content.

Test weights were performed after harvest, in the Vartest building, using standard test weight equipment.

Lodging is expressed in percent from 0 to 100. Plots with a score of 0 to 25 percent are generally harvestable with conventional equipment, from either direction, and at optimum speed. Plots with a lodging score of 25 to 50 percent are harvestable, but may require reduced speed. As lodging percentages exceed 50 percent, harvesting problems escalate quickly and beyond 75 percent some grain may be lost, or damaged by contact with the soil.

Plant height, taken at harvest, was from the center of the plot and was measured to the nearest inch from the soil surface to the top of the head.

Winter killing data, at all locations, are generally taken when the plants were beginning spring growth. The data are based on visual observation and not on actual stand count, and are influenced by differences in plant vigor and vegetative growth. In the year 2000, no winter killing was observed in the winter wheat performance trials.

Date headed is the day when 80 to 90 percent of the heads have ruptured the boot.

Fertilization programs are described in the footnotes of each table. Starter fertilizer was applied, at planting, at all locations, and all winter wheat trials were top-dressed with supplemental nitrogen in the spring.

Soil test results for each of the year 2000 trials are presented in the footnotes. The soil test values for phosphorus (P) and potassium (K) are expressed in parts per million (ppm) instead of pounds per acre (lbs./acre). To change ppm to lbs./acre, multiply ppm by 2. Conversely, to change lbs./acre to ppm, divide lbs./acre by 2.

Seeding rates for proprietary wheat entries were chosen by the owner, and ranged from 1.3 to 1.8 million live seeds per acre. Public wheat varieties were seeded at 1.5 million live seeds per acre, and the oat trials were seeded at 1.53 million live seeds per acre.

Seed Size and Plant Populations

Seed size will vary among seed lots for any entry. In extreme cases, the smallest size seed may contain nearly double the number of seeds per bushel in comparison with the largest size seed.

A final stand of 1 to 1.3 million plants per acre, or 30 plants per square foot, is the optimum population for soft red winter wheat production in Indiana. Yields generally plateau at this population, with any additional yield increases due to favorable weather combined with best management practices.

Approximately 90 percent of the live seed sown should emerge, if high quality seed is sown in a firm, moist seedbed. A seeding rate of 1.5 million live seeds per acre should produce a final stand of 1.35 million plants per acre, which is 30 plants per square foot.

The number of seeds per pound may be determined by counting out 100 seeds and weighing them on a gram scale (most grain elevators have one). Divide the weight of the 100-seed sample into 454 (the number of grams in a pound), and multiply by 100 (the number of seeds counted). Example: 100 seeds weigh 3.2 grams; $454 \div 3.2 \times 100 = 14,188$ seeds per pound. Then adjust for germination to determine the final seeding rate. If the seed germinates 95 percent, there will be 13,478 live seeds per pound ($14,188 \times 0.95$). Dividing 1,500,000 by 13,478 gives 111 pounds of seed per acre, or the amount needed to establish a stand of 30 plants per square foot.

This information is useful in deciding the population you want to achieve in the original stand, and for decisions you may need to make regarding an inadequate stand. Ask your seed dealer to furnish the seed count, in number of seeds per pound, and the recommended seeding rate for the seed lot you are planting. Then calculate the pounds per acre needed to provide an optimum population in the original stand.

The same principle applies to oats. However, the original stand is more important in oats, because during some seasons there may be little or no tillering, particularly if seeding is delayed, or moisture is deficient. The recommended oat population is 35 plants per square foot or 1.52 million plants per acre.

A plump-seeded oat variety (3 grams per 100 seeds) would require about 112 pounds of live seeds per acre. Use the same procedure for calculating oat seeding rates and stands as for wheat, but remember that oat populations need to be greater than wheat populations.

Stand reductions, in winter wheat, may occur if winter conditions are severe. The wheat plant, if properly hardened through a gradual hardening process, should be able to tolerate temperatures as low as -5° F without injury. At temperatures of -5° F to -10° F injury could occur if unfavorable conditions such as dry soil, low phosphorus, late planted and/or small plants, or other plant stresses are present. If temperatures reach -10° F or lower, and remain at that temperature for two hours or longer, injury is likely. The extent of the injury will depend on the condition of the plant, how low the temperature goes, and how long it remains at that level.

Snow cover of 1 to 2 inches on wheat offers excellent protection against sub-zero temperatures. If cold weather is forecast, keep a record of the amount of snow cover, the extreme low temperature and the duration of the low temperature. This will be useful information in predicting the possibility of damage to the wheat crop.

When making stand counts on small grains, divide 144 (the number of square inches in a square foot) by the drill row spacing in inches to get the number of linear inches of drill row needed to equal 1 square foot. Example: $144 \div 7$ inches (drill row spacing) = 20.5 inches of linear drill row needed to equal 1 square foot. Make numerous random spot checks throughout the field by counting the number of plants or seeds in 20.5 inches of row length, and average several observations to estimate the population.

For purposes of making yield estimates, each wheat plant should produce one culm (main stem) and one or more tillers. The culm normally produces a head, but under stress the tillers may not produce heads. Less-than-ideal conditions reduce grain production in the tiller first and then in the culm.

One head of wheat usually produces one gram of seed (or grain), which is normally 30 to 32 grains of wheat. One head of wheat per square foot is equal to 1.6 bushels per acre. At 30 heads per square foot (one head per plant), the estimated yield potential is 48 bushels per acre.

At 30 plants per square foot, under ideal growing conditions, each plant may produce two heads (one culm and one tiller), which would have a yield potential of 96 bushels per acre.

A population of 15 plants per square foot may produce acceptable yields (15 to 20 percent yield loss), but 10 plants per square foot may reduce yields by 50 percent or more, and weed problems are likely.

PERFORMANCE TRIAL RESULTS

An analysis of variance and a test of significance were computed on all performance categories where sufficient data were available. The analysis of variance for bushels per acre yield, was significant at the 10 percent probability level, (this year) for all of the single-year, yield data presented, except for the spring oats trial in Porter County, Location 1.

The Waller-Duncan Bayesian k-ratio t test is used in determining significant differences for the Indiana small grain performance trials. The Bayesian procedure has a direct dependence upon the calculated F-value for entries. As the F-value increases, the Bayesian least significant difference (BLSD) decreases. In computing the BLSD for the test of significance, a k ratio of 100:1 was used. This ratio may be considered in a loose sense to take the place of the 5 percent level of significance. The BLSD value may be used to make all possible pair-wise comparisons, i.e., any two values in the same column of a sub-table may be compared.

Multiple-year results, especially those having the greatest number of years, are generally best for predicting performance. This is because no interaction of entries by years can be computed for one-year data. This interaction (entry by year) is usually larger than the experimental error in one-year analyses.

The coefficient of variability (C.V.) is an indication of the precision of the test. The coefficient of variability is a relative term. It is the ratio of the standard deviation to the grand mean of the test, expressed as a percent. On the western side of Indiana a small grain test with good precision will have a C.V. for yield of 5 percent or less; and on the eastern side of the state, the C.V. will be 10 percent or less. Whenever the C.V. is larger than normal for a test location it indicates that the precision of the test was below normal. When yields are high and the experimental error in the test is small, the C.V. will be small.

Across the years, tests have been performed to determine whether there are specific areas of adaptation for small grain varieties. Is there a variety that is superior on sand, or clay, or adapted to a particular part of the state? To date, there is no evidence to support such a claim.

In long-term averages, those entries that are either at the top or bottom in yield, are generally the same at each test location. For normal production situations, these small grain performance data have broad application in Indiana.

At Location 1, the wheat plots were planted in a firm, dry seedbed on September 27, 1999. Two days after planting, the plots received 0.95 of an inch of rain. On October 4, rain totaled 1.09 inches, and rain for the month of October totaled 1.73 inches. Stands were uniform and vigorous. The first sharp freeze (28° F) came on the nights of October 5 and 6. The average temperature for October was 51° F.

November precipitation totaled 1.12 inches, with all of the rain occurring in amounts of less than half an inch. November temperatures averaged 45° F.

The wheat had time to harden, as December temperatures became increasingly colder. On December 5 the plots received 1.11 inches of rain. On December 24 and 25, temperatures fell to -1° and -2° F respectively. December average temperature was 29° F and precipitation for the month was 3.32 inches.

The coldest winter temperatures were recorded between January 21 and 29, when 7 nights had below zero F temperatures. The coldest temperature was -15° F, recorded on the night of January 23. Snow cover arrived with 2 inches recorded on January 18, and snow continued to accumulate until a depth of 15 inches was recorded on January 30. The snow cover provided excellent protection from cold weather and no cold-temperature winter killing was observed. January precipitation totaled 1.59 inches.

Snow cover remained for the first three weeks of February. Low temperatures were frequently in the single digits during the first half of the month. Moderating weather arrived the last half of the month, and by the last week of the month, snow cover had melted. February precipitation totaled 1.50 inches.

Freeze-thaw action (heaving) was not a serious problem in March. Low (night) temperatures averaged 32° F and day temperature averaged 55° F. March precipitation was 1.63 inches.

April precipitation was 3.91 inches and arrived in showers of less than 1.2 inches. Temperatures moderated, with day temperature averaging 58° F and night temperature averaging 35° F.

May was relatively warm and dry. Precipitation totaled 2.68 inches and arrived in showers of less than two-thirds of an inch. Day temperature averaged 73° F and night temperature averaged 51° F.

June was the wet month of the growing season with 7.63 inches of rain. The showers were generally in amounts of less than 1.5 inches, except for 2.58 inches, which fell on June 21. Temperatures were mild; day temperatures averaged 79° F and night temperature averaged 58° F. On June 9 and 11 (June 10 data missing) 90° F temperature was recorded and this was the highest spring temperature in the wheat growing season.

The winter wheat performance trial was harvested on July 7. Yields were higher; test weights near normal; lodging percentages slightly above normal; plant heights shorter than normal; winter killing the same, and heading dates 4 to 5 days earlier than normal. The data should be useful in making selections among the entries.

The spring oats performance trial was harvested July 17. The year 2000 spring oats performance trial is a classic case for not using single year data. Yields are nearly double the yields of previous years, and it is highly unlikely that these yields can be reproduced in production fields or future test plots. Test weights were good, and slightly better than previous years. Lodging percentages were similar to previous years. Plant heights were shorter, and date of heading about 2 days earlier than normal. The oat trial data are interesting, but long term averages, or data from Tippecanoe County are probably more realistic for predicting future performance.

At Location 2, August 1999 precipitation totaled 2.44 inches and September rain totaled 3.47 inches. The September rain came mostly in one rain, which fell on the 29th day of the month. This delayed planting the regular-date-of-seeding wheat trial until October 12, 1999. The trial was planted in a firm moist seedbed, emergence was rapid, and uniform vigorous stands were established.

The late-date-of-seeding wheat trial was planted October 26, 1999. The seedbed was firm and moisture was adequate. Stands were uniform and vigorous, and became well established. October rain totaled 1.45 inches, all of which fell on or before October 17. October temperature averaged 53° F.

November was mild and dry. Temperature averaged 46° F and there was a gradual drop in temperature which hardened the wheat plants. November precipitation totaled 1.29 inches.

The first single digit (6° F) arrived on the night of December 21, 1999, and the low December temperature (-1° F) was on the night of December 25. Snow cover of 1 to 2 inches protected wheat plots during the coldest December weather. Precipitation for December was 1.94 inches.

January was cold and dry. Below zero night temperatures arrived on January 21 and persisted

until near the end of the month. Snow cover, with depths of 7 to 9 inches, provided excellent protection from the coldest temperatures of the month. The coldest January temperature was -11° F on January 21. Precipitation was 1.40 inches.

Snow cover remained the first 10 days of February, and provided protection from single digit night temperatures. Day temperature averaged 43° F and night temperature averaged 25° F. February precipitation was 2.47 inches and came in amounts of less than an inch.

March was dry, with small showers which totaled 1.27 inches for the month. Temperature moderated to 55° F daytime and 32° F at night.

April was mild, but extremely dry. Day temperature averaged 62° F and night temperature averaged 38° F. Light showers of one-quarter of an inch, or less, brought the precipitation total for the month to 1.05 inches.

Soil moisture improved in May. Rainfall total for the month was 5.83 inches. The rain came in showers of less than 1.2 inches. Daytime average temperature was 74° F. Night temperature averaged 54° F.

June was the wet month of the small grain-growing season. Rain totaled 6.24 inches with all of it coming in amounts of less than 1.5 inches. Only two days in June had temperature of 90° F or higher. Day temperature for the month averaged 80° F and night temperature averaged 59° F.

July was also wet. Through July 25, 6.79 inches of rain fell at the Agronomy Research Center. The most rain fell (4.36 inches) on July 10. The July 10 rain caused flooding, and delayed harvest of the spring oats trial.

Both the regular-date of seeding and the late-seeded wheat trials were harvested on June 30. Both trials produced good results. When compared with previous years, yields were higher, test weights similar, lodging scores better, plant height similar, winter killing percentage the same, and date of heading a week to 10 days earlier. The test results should be useful in making selections from among the wheat entries.

The spring oats performance trial was harvested July 18. Yields and test weights were similar to previous years. Lodging percentages were higher than in previous years, due mainly to the 4.36 inch rain which fell on July 10. Plant height was similar to previous years, and date of heading was about a week earlier than normal. The oat variety performance trial data should be useful in making variety selections.

At Location 3, August and September were dry. August rain totaled 1.87 inches, and September 1.24. The wheat trial was planted on September 28, and during the next two days, a total of 1.16 inches of

rain fell. The trial was planted in a firm seedbed and the rain was beneficial in establishing vigorous, uniform stands.

October was dry, with only one good soaking rain (1.01 inches) on October 9. Rainfall for the month was 1.75 inches. Nighttime temperatures dipped to 29° F on October 5 and 6. Temperature for the month averaged 51° F. November was dry, with only 1.27 inches of rain for the month, and temperatures cooled, which hardened the wheat plants in preparation for winter.

December moisture totaled 2.95 inches, all of which arrived in amounts of less than three-quarters of an inch. Temperatures continued to drop, and the first single digit temperatures arrived on the night of December 22, when the thermometer stood at 6° F. Single digit low (night) temperatures remained for four days before warming to night temperatures in the teens. December temperature averaged 32° F.

January was the coldest winter month. From January 21 through 29, most low temperatures were below zero. The coldest temperature was on the night of January 28 and registered -21° F. Snow cover began on January 18 and continued to accumulate until 11 inches were recorded on January 31. Snow cover provided excellent protection from cold temperatures. January precipitation totaled 1.80 inches.

Snow cover remained through the first half of February, providing protection from single-digit low temperatures. Moisture in February totaled 2.49 inches.

March was relatively dry. Nine showers combined produced 1.96 inches of moisture for the month. Day temperatures averaged 55° F and night temperatures averaged 31° F. Freeze-thaw action (heaving) was minimal.

April rain totaled 4.45 inches. Day temperature averaged 61° F and night temperature averaged 36° F. Wheat growth and development made excellent progress in April.

May high temperature averaged 75° F and the low temperature average was 52° F. Rain for the month was 5.0 inches.

June rainfall was 5.06 inches with 5.0 inches arriving before the winter wheat trial was harvested on June 28. Daytime high temperature averaged 80° F, and no 90° F temperature was recorded in the winter wheat growing season.

Results of the winter wheat performance trial are similar to the trial results of preceding years, however, the precision of the test was not particularly good. Severe lodging occurred in some plots, and this lodging reduced the yield in the lodged plots. If used in conjunction with previous years' data, this year's trial results may be useful in making selections from among the entries.

At Location 4, September was warm, with 6 days, during the first half of the month, when temperatures were above 90° F; and extremely dry with only 0.49 of an inch of rain.

October was cooler, and rain for the month totaled 2.19 inches. Virtually all of the rain fell during the first 10 days of the month. The plots were planted on October 15 in a firm moist seedbed. Uniform stands were obtained, and plant growth was vigorous.

November rain totaled 1.49 inches, and night temperature cooled to 18° F by the last day of the month.

December temperatures were cooler, which hardened the wheat plants, and the lowest December temperature was -2° F, which arrived on the night of December 25. December precipitation totaled 3.50 inches.

The lowest winter temperature was -7° F on the night of January 27. From January 21 through 28, night temperatures, for 4 days, were 0° F or colder. Snow cover was light, but probably gave some protection from the coldest temperatures. January precipitation was 4.79 inches

February was warmer, with daily temperatures in the 60° to 70° F range during the last week of the month. February precipitation totaled 4.92 inches.

March temperature ranged from a low of 20° to a high of 77° F. Night temperatures were mostly above freezing, and heaving (freeze-thaw action) was not a serious problem. March precipitation totaled 3.23 inches.

April rain totaled 5.75 inches, and warm temperatures promoted wheat growth. May rainfall totaled 4.39 inches, and temperature ranged from 40° to 87° F. Wheat made excellent progress in growth and development. Disease pressure was less severe than in previous years, due to favorable (dry) weather. Disease development is reported in the Disease Summary section and in Table A.

June received 4.45 inches of rain, and temperatures were in the 80° to 90° F range before the trial was harvested on June 29.

This was the first year, in recent years, when the wheat trials were located in southeastern Indiana. This year's southern Indiana test results are superior to test results from the past several years.

This may be one instance when single year data are better than multiple year averages. This year, yields were much superior, test weights heavier, lodging percentages lower, plant heights normal, winter killing percentages the same, and heading dates earlier, when compared to previous years. This year's data should be useful in making selections from among the entries. Bear in mind, the last two Indiana winters have been mild, and some of the entries might not survive a severe Indiana winter.

Weather Summary

Information presented, in this section, is based on the weekly Indiana Crop and Weather Report, published by the Indiana Agricultural Statistician.

The fall of 1999 was drier than the fall of the previous year. At the end of September, both topsoil and subsoil were rated 70 to 75 percent very short, and 22 to 26 percent short. Only 3 to 4 percent of the state had adequate soil moisture. The September 26 crop and weather report stated that 6 percent of the winter wheat crop was planted, compared to 8 percent for average.

Rain showers, early in October, brought some relief from dry weather. Moisture conditions improved, and 33 percent of the topsoil moisture was rated adequate, but 67 percent of the topsoil moisture was still rated short to very short. By mid-October, 67 percent of the winter wheat crop was planted and 31 percent of the planted wheat had emerged.

The final Indiana Crop and Weather Report, issued November 1, 1999, stated that as of October 31, 1999, 94 percent of the Indiana winter wheat crop was planted and 75 percent of the crop had emerged. The wheat crop was rated 63 percent good to excellent.

Winter was generally mild and dry, and no winter killing (due to cold temperatures) was observed in winter wheat fields.

The first Indiana Crop and Weather Report in the year 2000, (for the week ending April 9), reported that 32 percent of the winter wheat had jointed. This compares to 16 percent jointed for average. The winter wheat condition was rated 73 percent good to excellent. Topsoil moisture was rated 21 percent very short, 29 percent short, 43 percent adequate and 7 percent surplus. Sub-soil moisture was rated 33 percent very short, 37 percent short, 27 percent adequate, and 3 percent surplus.

During April, wheat continued to develop at about twice the normal rate of development. By the end of April, 98 percent of the wheat had jointed compared to 71 percent jointed for the 5-year average. Soil moisture conditions improved the latter part of April.

Wheat heading began early in May (27 percent headed by May 7), and was 99 percent headed by May 28. Soil moisture improved in May, and by the end of the month, 78 percent of the topsoil was rated adequate, and 13 percent surplus. Only 8 percent of the topsoil moisture was rated short, and 1 percent was rated very short.

Rapid wheat development during early spring helped harvest get underway by early June. At the beginning of harvest, the wheat crop condition was rated 84 percent good to excellent. Topsoil moisture was rated 69 percent adequate, 22 percent short, and 3 percent very short. The June 11 Crop and Weather Report, reported 1 percent of the wheat already harvested. Wheat harvested continued until the third week in June, when heavy rain halted most fieldwork across the state. Topsoil moisture was rated 63 percent adequate and 34 percent surplus at the end of June.

Wheat harvest was underway again at the end of June. Harvest progressed rapidly during the first half of July, and by July 16, 99 percent of the crop was harvested.

In summary, the wheat crop got off to a reasonably good start, and went through a mild, dry winter. Spring growth and development was good, aided by late spring rains. Disease development was minimal due to dry weather. Yields were good, although test weights were not high. In using the 1999 and 2000 data, it should be kept in mind that both winters were mild, and some wheat cultivars tested only in those two years, may not survive a severe Indiana winter.

Weather also favored spring oat production. Planting was timely, and the late spring rains benefited not only yields, but test weights as well.

State-wide Harvest Summary

The Indiana Crop and Livestock Reporting Service, in a report issued July 20, 2000 estimated the 2000 Indiana winter wheat production as follows:

Based on conditions July 1, Indiana's 2000 winter wheat crop is expected to total 33.7 million bushels, 6 percent above the June 1 forecast of 31.6 million bushels, but unchanged from production in 1999. The expected yield of 66 bushels per acre is 4 bushels more than the June 1 forecast. If realized, this would tie our record high average with the previous record of 66 bushels per acre established in 1999. Intended acreage for harvest as grain, at 510,000 acres, is unchanged from a year ago, but 22 percent below 1998.

Nationally, winter wheat production is forecast at 1.59 billion bushels, down 2 percent from the June 1 forecast, and down 7 percent from the 1999 crop. Yield is expected to average 44.9 bushels per acre, down 1.8 bushels from the last forecast and down 2.9 bushels from 1999. Area for harvest as grain is forecast at 35.4 million acres, slightly below 1999.

Disease Summary

Diseases were not a serious problem in most Indiana wheat fields during 2000. Early in the spring, some varieties showed severe mottling from infection by wheat spindle streak mosaic virus or soilborne wheat mosaic virus. Most varieties grown in Indiana are at least moderately resistant to these viruses and outgrow symptoms. Although some rain fell during the spring vegetative period, there were no sustained periods of rainy weather and therefore leaf blotch was not severe. Rains that fell during flowering and early grain filling of wheat allowed some development of Fusarium head blight (scab), but generally the incidence of this disease was low. Wheat sown on land where corn residue was present was more likely to have Fusarium head blight than wheat sown on land without corn residue. Infection by the aphid-transmitted barley yellow dwarf virus was common. After wheat was mature, plants infected by this virus were often conspicuously moldy.

Severity of leaf blotch and incidence of Fusarium head blight were rated at the Southeast-Purdue Agricultural Center, (Location 4). The fungus *Stagonospora nodorum* was the main cause of leaf blotch, although *Septoria tritici* also contributed to death of leaf tissue. At the time of reading (June 1), symptoms had reached the flag leaf on all varieties, but on most of them, less than 10 percent of the flag leaf area was affected. The range in severity among varieties was not great, as is typical for this disease. Incidence of Fusarium head blight was low, but there were significant differences among varieties. The highest incidence was seen on Clark, which is known to be very susceptible to head blight. Lowest incidences were observed on some varieties described as having some degree of resistance to Fusarium head blight. Most varieties were at the early milk stage of development (Feekes stage 11.1) on June 1.

INFORMATION CONCERNING 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 address. In both the wheat and oat trials, older public varieties are included as check varieties.

Private companies have requested that inquiries concerning proprietary entries, presented in this bulletin, be directed to the addresses listed below.

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

AgriPro Seeds, Inc.
6025 West 300 South
Lafayette, Indiana 47905
Telephone: 765-572-2001

v Foster
v Gibson
v Patton

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

b Beck 101
b Beck 103
b Beck 104
b Beck 107
b Beck 108

Croplan Genetics Land O' Lakes
11937 Exit Five Parkway
Fishers, Indiana 43038
Telephone: 317-915-5078

v 527W
v 539W
v 569W

Diener Bros.
371 North Diener Road
Reynolds, Indiana 47980
Telephone: 219-984-5837

b DB 500W
b DB 555W

Indiana Crop Imp. Assn.
7700 Stockwell Road
Lafayette, Indiana 47909
Telephone: 765-523-2535

Oats

v Armor Public
v Classic Public
v INO 9201 Public
v Jay Public
v Noble Public
v Ogle Public
v Vista Public

Wheat

v Caldwell Public
v Cardinal Public
v Clark Public
v Goldfield Public
v Kaskaskia Public
v Madison Public
v Patterson Public
v Roane Public

Novartis Seeds, Inc.
P.O. Box 729, HWY 158 East
Bay, Arkansas 72411-0729
Telephone: 870-483-7691

v NK Coker 9474
v NK Coker 9543
v NK Coker 9663

Ohio Foundation Seeds
P.O. Box 6, 11491 Foundation Road
Croton, Ohio 43013
Telephone: 614-893-2501

v Hopewell Public

DISCUSSION

Soft Red Winter Wheat

Indiana's climate and soils are well suited for the production of high quality soft red winter wheat, and local industries provide a market for the crop. No one wheat has all of the most desirable characteristics, but each has certain advantages. Performance data are presented in Tables 1 to 6.

At higher fertility levels, resistance to powdery mildew and lodging become important factors. Winter hardiness, yielding ability, straw strength, plant height and grain quality are important points to consider when choosing which wheat to plant. Disease resistance to leaf rust, Septoria blotch, and powdery mildew, and insect resistance to Hessian fly are also very important factors in selection. A few entries are better suited to acid soils where aluminum toxicity is a problem.

Early seeding favors Septoria blotch, barley yellow dwarf virus, spindle streak, and the fungus root and foot rots, especially take-all and Fusarium. Seeding after the fly-free date is suggested to reduce severity of these diseases.

The organisms causing plant disease are continually evolving, and occasionally new strains, races or biotypes appear that can attack previously resistant wheat. Strains of the leaf rust fungus that have overcome the resistance of older wheats are now widespread in Indiana. Likewise, the powdery mildew fungus has overcome the resistance of older varieties. Leaf rust and powdery mildew can reduce yields of susceptible varieties by 20 percent or more. Strains of the loose smut fungus that can infect older wheat varieties are also present in the state. The best time to detect this disease is just after the wheat heads. Certain fungicide seed treatments will control loose smut.

Wheat Hybrids and Blends

Proprietary wheat hybrids were first included in the 1982 performance trials. Some hybrids were produced using a chemical to sterilize pollen in the seed parent. Other hybrids were produced using the cytoplasmic male sterile and nuclear restorer system. Techniques of hybrid wheat production are often less than 100 percent effective. Therefore, the seed produced on the seed parent may not be 100 percent hybrid.

By Indiana law, seed labeled as hybrid must contain at least 75 percent hybrid seed, and if less than 95 percent hybrid, the hybrid percentage must be stated on the seed label.

Seed having less than 75 percent hybrid is considered a blend. Seed from hybrid wheat, like corn, should not be saved for seeding the following year.

Spring Oats

Spring oats are the most heat tolerant of the spring-seeded small grains and are the only spring-seeded small grain adapted for Indiana. Adaptation

to hot weather is usually important in choosing a spring oat. Late maturing varieties perform well, if planted early, in years with ample rainfall and relatively cool temperatures during June and July.

Frequently in Indiana, temperatures are in the upper 80°s and low to mid 90°s F, and moisture becomes a limiting factor when oats are filling. This results in low test weights and reduced yields in late-maturing varieties. The farther south a variety is planted, the earlier maturing and more heat tolerant it must be. Yield, straw strength, grain quality and resistance to barley yellow dwarf virus and crown rust are also important in choosing an oat variety.

Oat performance data are presented in Tables 7, 8 and 9.

Table A. Wheat disease ratings in the year 2000 winter wheat performance trial in Jennings Co., Location 4, southeastern Indiana.

Entry Type and Name (1)		Leaf blotch (2)	Fusarium head blight (3)
v 527W		6.0	0.50
v 539W		5.8	0.52
v 569W		5.0	0.52
b Beck 101		5.5	0.04
b Beck 104		6.1	0.20
b Beck 108		5.1	0.62
v Caldwell	Public	6.1	0.50
v Cardinal	Public	5.0	0.05
v Clark	Public	5.1	1.38
b DB 500W	Diener Bros.	5.8	0.28
v Foster	AgriPro	4.9	0.12
v Gibson		5.2	0.06
v Goldfield	Public	4.2	0.03
v GR 962		7.1	0.78
v Hopewell	Public	4.9	0.68
v Kaskaskia	Public	7.4	0.46
v Madison	Public	5.6	0.98
v NK Coker 9474		4.8	0.01
v NK Coker 9543		5.0	0.12
v NK Coker 9663		5.1	0.45
v Patterson	Public	5.0	0.40
v Patton	AgriPro	5.0	0.02
v <u>Roane</u>	<u>Public</u>	<u>5.0</u>	<u>0.06</u>
LSD 0.5		0.3	0.23

Table A, continued. Wheat disease ratings in the year 2000 winter wheat performance trial in Jennings Co., Location 4, southeastern Indiana.

- (1) Lower case letters indicate entry type as follows: v-variety; b-brand; m-mixture (blend); h-hybrid. Public entries were developed by Agricultural Experiment Stations (Indiana Agricultural Programs) or in cooperation with the Agricultural Research Service of the USDA. Other names are company or brand names, generally associated in the trade with variety, hybrid, or blend names.
- (2) Leaf blotch severity was scored on a scale of 0-10, based on percentage area, of the flag leaf and the two leaves below, that was blighted. Percentage area blighted for these three leaves for scale values 4 through 7 are as follows:

<u>Scale value</u>	<u>Percent area blighted on leaf</u>		
	<u>F</u>	<u>F-1</u>	<u>F-2</u>
4	0-1	5-10	25-50
5	1-5	10-25	50-75
6	5-10	25-50	75-100
7	10-25	50-75	100

- (3) Incidence of Fusarium head blight was scored as the percentage of heads showing symptoms.
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