



## Task Force

### 1999 Indiana Soybean Composition Data

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This fact sheet summarizes the composition data compiled for soybean samples collected in Indiana during the 1999 harvest. District results are presented and composition data from the 1996, 1997, and 1998 crop years are compared.

#### Methodology

Soybean samples were taken directly from the field as part of the annual yield survey conducted by the Indiana Agricultural Statistics Service. All samples were analyzed for moisture, protein, oil, and fiber using a near-infrared transmittance (NIRT) whole grain analyzer (Infratech 1229) available at the Purdue University Grain Quality Laboratory in the Department of Agricultural and Biological Engineering. All results are reported based on a 13% moisture basis (wet).

There were 24 samples available for compositional analysis from six districts. The SW, SC, and SE districts were not represented. Given the number of samples from each crop-reporting district, all of the districts were under-represented

based on the total acres harvested per sample (Table 1). This was again an increase compared to 1997 and 1998. It is hoped that in the future the number of samples can be increased to achieve a production per sample ratio of 2 million bushels, which is similar to the target of the annual American Soybean Association survey.

#### Results

The 1999 statewide protein content average decreased 2.4 percentage points (Table 2) from the previous year, which ended a three-year trend of increasing protein values. The spread between the minimum and maximum protein values decreased for the second straight year to 5.0 points, down from the 1998 low of 5.5 points. In previous years the spread had been 11.6 points (1996) and 11.2 points (1997). Average oil content increased for the fourth straight year to 18.7%, a 0.5 point increase, up from the 18.2% average in 1998, 17.7% in 1997 and 17.3% in 1996. The spread between the range of oil values

**Table 1. Summary of the 1999 Indiana Soybean Acres, Yield, and Production.**

District	Harvested Acres (1000's)	Acres per Sample	Yield (Bu/Ac)	Production (1000 Bu)	Production (Bu) per Sample
NW	767	109,571	40	30,871	4,410,143
NC	693	99,000	40	27,892	3,984,571
NE	568	568,000	33	18,860	18,860,000
WC	683	341,500	38	26,115	13,057,500
C	1,305	217,500	41	53,839	8,973,167
EC	553	553,000	40	22,257	22,257,000
SW	693	0	34	23,708	0
SC	199	0	24	4,806	0
SE	219	0	34	7,492	0
<b>State</b>	<b>5,680</b>	<b>236,667</b>	<b>38</b>	<b>215,840</b>	<b>8,993,333</b>
<b>1998</b>	<b>5,600</b>	<b>155,555</b>	<b>41</b>	<b>235,200</b>	<b>6,533,333</b>
<b>1997</b>	<b>5,400</b>	<b>122,727</b>	<b>44</b>	<b>437,600</b>	<b>5,400,000</b>
<b>1996</b>	<b>5,360</b>	<b>148,889</b>	<b>36</b>	<b>203,680</b>	<b>5,657,778</b>

**Table 2. Summary of the 1999 Indiana Soybean Composition Survey (13% Moisture Basis).**

District	Number of Samples	% Protein		% Oil		% Fiber	
		Avg.	Range	Avg.	Range	Avg.	Range
NW	7	35.1	33.5-37.9	18.8	17.2-21.4	5.4	5.1-5.8
NC	7	35.0	32.9-37.8	18.6	17.7-19.7	5.1	4.7-5.3
NE	1	34.7	NA	18.7	NA	4.9	NA
WC	2	35.7	35.7-35.7	18.2	17.7-18.7	5.2	5.2-5.2
C	6	35.1	33.8-36.0	18.7	17.7-20.2	5.3	5.0-5.7
EC	1	35.9	NA	18.6	NA	5.5	NA
<b>State</b>	<b>24</b>	<b>35.1</b>	<b>32.9-37.9</b>	<b>18.7</b>	<b>17.2-21.4</b>	<b>5.3</b>	<b>4.7-5.8</b>
<b>1998</b>	<b>36</b>	<b>37.5</b>	<b>34.8-40.3</b>	<b>18.2</b>	<b>17.0-19.7</b>	<b>5.3</b>	<b>4.8-5.6</b>
<b>1997</b>	<b>44</b>	<b>37.1</b>	<b>32.9-44.1</b>	<b>17.7</b>	<b>14.3-19.7</b>	<b>5.1</b>	<b>4.7-5.6</b>
<b>1996</b>	<b>36</b>	<b>36.6</b>	<b>31.3-42.9</b>	<b>17.3</b>	<b>15.5-19.8</b>	<b>5.6</b>	<b>5.3-6.2</b>

was 4.2 points, one and a half times more than the 1998 spread, but consistent with the 1996 and 1997 spreads of 4.4 and 4.3 respectively. Average fiber content remained unchanged from 1998 at 5.3%, which is higher than 1997 by 0.2 points, but still lower than the 1996 high of 5.6%. The spread between the range of fiber values was 1.1 points, an increase of 0.3 points compared to 1998 and 0.2 points compared to 1996 and 1997.

An increase in both protein and oil, and a decrease in sample variability of both protein and oil would be desirable from a processor's perspective. More uniform soybeans with higher estimated processed values (EPV) yield more high protein soybean meal, and more pounds of oil for every bushel of soybeans processed (see Grain Quality Fact Sheet #39 for more information). However, our current statewide soybean sample size is too small to draw a conclusion that is representative for the entire state.

The results in Table 2 only give an indication of the composition values of soybeans across Indiana. Conditions during the growing season, variety selection, and soil fertility significantly affect intrinsic values, such as protein, oil, and fiber. Producers need to have their own samples analyzed to get more precise values.

## Analysis

A statistical analysis was performed on the data collected from the last four years using

Statistical Analysis Software (SAS) to uncover differences between years and between districts within a year. All tests used an alpha of 0.05. District summary values for 1996, 1997, and 1998 can be found in Grain Quality Fact Sheets 31, 36, and 41 respectively. The results of the analysis are summarized in Tables 3 and 4. In Table 3, the years are statistically similar if they have the same letter, while in Table 4, the districts with the same letter are similar within a year.

Yearly trends were apparent in the analysis of data. Statewide protein averages were significantly lower in 1999 compared to the other three years (Table 3). All districts were statistically similar in protein content within each year (Table 4). The NW and NC districts had the highest protein averages in 1996 and 1997, with the NC district having the highest average in 1996 with 37.5% followed by the NW district with a 36.8% average. In 1997, the NW district had the highest average at 37.7%, followed by NC having a 37.6% average. In 1998, the C district had the highest average with 38.3% followed by the EC district, whose average was 38.0%. The EC district had the highest average in 1999 at 35.9%, followed by the WC district with a 35.7% average. The EC and SW districts had the lowest protein averages two out of the four years. The EC district had the lowest protein in 1996 and 1997 with protein averages of 34.4% and 35.4%, respectively. The SW district had the second

**Table 3. Statistical Analysis Across Years.**

	Protein	Oil	Fiber
1996	A	B	A
1997	A	B	C
1998	A	A	B
1999	B	A	B

lowest average in 1996 with a 36.2% average and in 1998 with a 36.5% average. The NE district had the lowest protein content in 1998 and 1999 with averages of 35.9% and 34.7% respectively.

Oil content averages in 1996 and 1997 were significantly lower than the averages in 1998 and 1999 (Table 3). In 1997, 1998, and 1999, all

districts were statistically similar in oil content, while in 1996 the NW district was significantly lower and the SW was higher compared to all other districts (Table 4). The SW district had the highest oil content average in 1996 (18.4%) and in 1998 (18.9%). The C district had the second highest average in 1996 with oil content values of 17.2% and 18.7% respectively, while having the highest average in 1997 (18.3%). The NW district had the highest average in 1999 (18.8%), however, the district had the lowest average in 1996 and 1997 with averages of 16.7% and 17.0% respectively. The NC district had the second lowest average in 1997 (17.1%) and the

**Table 4. Statistical Analysis Across Districts Within a year.**

District	Protein	Average	Oil	Average	Fiber	Average
<b>1996</b>						
NW	A	36.8	A	16.7	A	5.7
NC	A	37.5	A, B	17.2	A	5.5
C	A	36.7	A, B	17.2	A	5.6
EC	A	34.4	A, B	17.1	B	5.9
SW	A	36.2	B	18.4	A	5.6
<b>1997</b>						
NW	A	37.7	A	17.0	A	5.0
NC	A	37.6	A	17.1	A	5.3
NE	A	37.1	A	17.3	A	5.1
WC	A	36.7	A	17.3	A	5.1
C	A	36.7	A	18.2	A	5.0
EC	A	35.4	A	18.1	A	5.1
SW	A	37.2	A	17.9	A	5.3
<b>1998</b>						
NW	A	37.7	A	18.1	A	5.2
NC	A	37.5	A	17.8	A	5.2
NE	A	35.9	A	18.6	A	5.2
WC	A	36.6	A	18.8	A	5.3
C	A	38.3	A	18.2	A	5.3
EC	A	38.0	A	18.0	A	5.3
SW	A	36.5	A	18.9	A	5.3
<b>1999</b>						
NW	A	35.1	A	18.8	A	5.4
NC	A	35.0	A	18.6	A	5.1
NE	A	34.7	A	18.7	A	4.9
WC	A	35.7	A	18.2	A	5.2
C	A	35.1	A	18.7	A	5.3
EC	A	35.9	A	18.6	A	5.5

lowest average in 1998 with 17.8% average. The EC district had the second lowest oil average in 1996 and 1998 with averages of 17.2% and 18.0%, respectively while the WC district had the lowest oil content (18.2%) in 1999.

Statewide fiber averages were significantly similar in 1998 and 1999, while the 1996 average was statistically higher and the 1997 average was statistically lower (Table 3). In 1997, 1998, and 1999, all districts were statistically similar in fiber content, while in 1996 the EC district was significantly higher compared to all other districts (Table 4). The EC district had the highest fiber averages in 1996, 1998 and 1999 with values of 5.9%, 5.3%, and 5.5%, respectively. The NC district had the highest fiber average in 1997 at 5.3%, but had the lowest average in 1996 at 5.5%, and the second lowest in 1998 and 1999 at 5.2% and 5.1% respectively. The NW district

had the second highest average in 1996 and 1999 with a 5.7% and 5.4% average, respectively. However, this district had the lowest average for 1997 and 1998 with 5.0% and 5.2%, respectively.

Purdue University's Grain Quality Laboratory continues to offer composition analysis for whole corn, soybeans, and soybean meal. This service is offered at *no charge* to Indiana producers, elevators, and processors thanks to the Value-Added Grants from the Office of the Indiana Commissioner of Agriculture and a grant from the Mary S. Rice Farm Estate. 450 g (about 1 lb.) may be sent to:

Grain Quality Laboratory  
1146 ABE  
Purdue University  
West Lafayette, IN 47907-1146

For further information, call (765) 494-2285, or send e-mail to [grainlab@ecn.purdue.edu](mailto:grainlab@ecn.purdue.edu), or visit us on the World Wide Web at: <http://www.GrainQuality.org>, where data from a number of county test plots are summarized.

Grain Quality Fact Sheets can be accessed on-line through the World Wide Web at: <http://www.agcom.purdue.edu/AgCom/Pubs/grain.htm>

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