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Specialty Corn and Soybeans: Production and Marketing in Indiana

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Specialty grains and oilseeds (e.g., popcorn, white corn) have a long tradition as part of Indiana's crop mix, although on relatively few acres when compared to commodity soybeans and dent corn. However, a new wave of specialty grains and oilseeds is enjoying increased interest—an interest sparked in part by advances in biotechnology and low prices for traditional corn and soybeans. This publication addresses questions related to specialty grain production, including:

- How many acres are devoted to specialty grains in Indiana?
- What financial contribution does specialty grains make to Indiana agriculture?
- How different is growing specialty grains from growing commodity grains?
  - — Do specialty grains yield significantly less than more traditional grains?
  - — How much more does it cost to produce specialty grains?
  - — What premiums are available for specialty grains?
  - — How much value is available to the producer of specialty grains?

Specialty Grain Questionnaire

In order to address these questions, the Gibson County Plot Committee and the Purdue University Departments of Agricultural Economics and Agricultural Statistics joined forces to document specialty grain production in Indiana. As part of this process, a specialty grain questionnaire was mailed to 8,000 Indiana corn and soybean producers in March 2000. Of the total producers queried, 3,154 were located in 10 counties in Southwestern Indiana (Daviess, Dubois, Gibson, Knox, Pike, Posey, Spencer, Sullivan, Vanderburgh, and Warrick), while 4,846 were randomly selected from the remainder of the state. Questionnaires were returned by 2,304 producers. This relatively high response rate suggests that the conclusions drawn from the survey and summarized here are reliable.

Specialty grain producers grow a variety of crops (Table 1) and typically devote nearly one third of their acreage to the specialty crop(s). In 1999, specialty grain producers harvested substantially more acres of corn and soybeans than non-specialty producers (874 acres vs. 284 acres respectively), which may indicate that producers of larger acres are better suited for growing specialty grains than smaller producers.

How else do specialty grain producers differ from non-specialty producers? A greater percentage of specialty producers (73%) cite cash grain production as their primary business activity relative to all producers (62%), as is shown in Figure 1. Perhaps this indicates specialty grain producers choose to produce non-traditional crops as a revenue diversification strategy rather than to use livestock production in combination with grains, or it may indicate specialty producers believe grain production is a core skill around which they want to specialize.

Only 15% of the survey respondents actually chose to produce a specialty grain, and it is interest-

Table 1. Specialty Crops Grown by Indiana Respondents in 1999, 2000

Specialty Corn Type	Specialty Soybean Type
Amylose Corn	Clear Hilum Soybeans
Food Grade Corn	Low Saturated Fat Beans
High Lysine Corn	Natto Soybeans
High Oil Corn	Organic Soybeans
Organic Corn	Seed Soybeans
Popcorn	STS Soybeans
Red Corn	Tofu Soybeans
Seed Corn	
Sweet Corn	
Waxy Corn	
White Corn	

ing to consider why some growers chose not to produce. If respondents **did not** plant a specialty grain in 1999 or 2000, they were asked to indicate factors that influenced their decision. "No opportunities to sell the specialty crop" was the most frequently cited reason (Table 2). In addition, 40% of the respondents suggested that additional investment prevented them from raising the specialty crop, while 36% of respondents named "requires too much managerial time" as a reason not to produce.

High variable cost of production was also cited as a reason not to produce the specialty crop (25%), which suggests that profitability is a concern for these non-specialty producers. For this reason, the following section explores whether or not producing specialty corn is actually profitable relative to producing commodity corn.

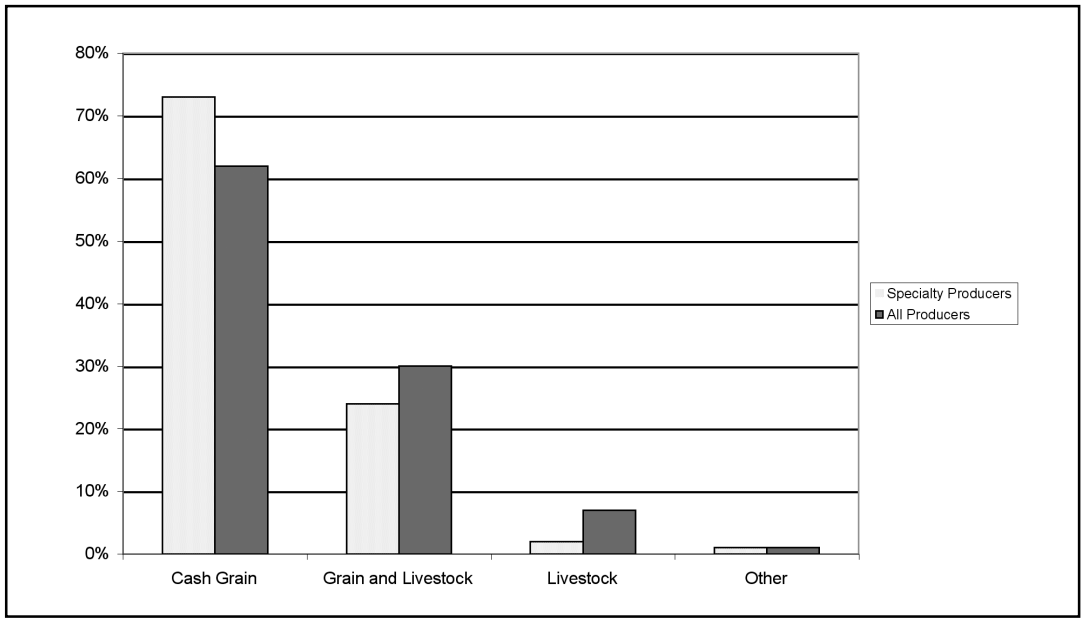

Figure 1. Primary Business Activities: Specialty Producers and All Producers

Table 2. Reasons for Not Producing a Specialty Grain

Reasons	Number of Respondents Who Cited the Reason	% of Total Respondents (N=1114)
No opportunities to sell the specialty crop	641	56%
Additional investment required	463	40%
Requires too much managerial time	418	36%
Variable production costs too high	284	25%

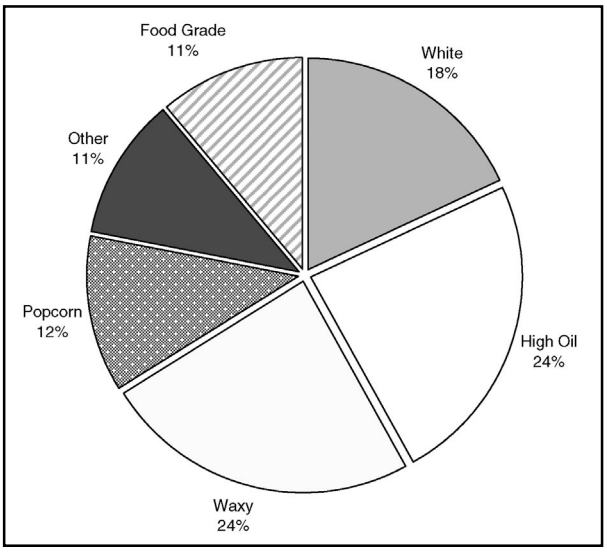

Figure 2. Share of Total Specialty Crop Acres in 1999: All Indiana Responses

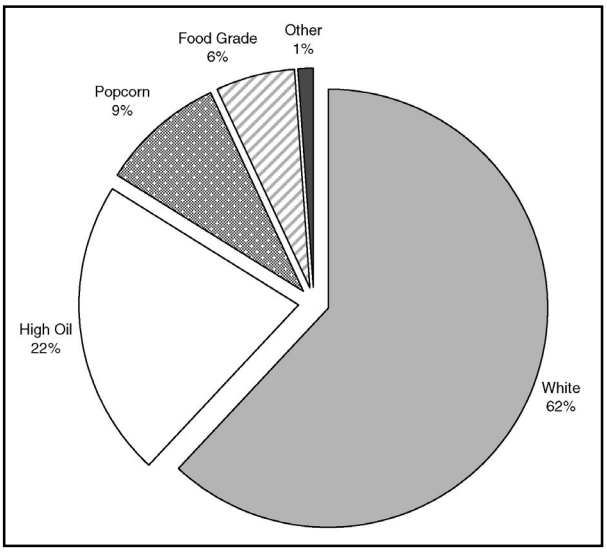

Figure 3. Share of Total Specialty Crop Acres in 1999: Southwest Indiana Responses

Specialty Corn Overview

There are significant differences in the types of specialty corn grown in Indiana versus the Southwest region of Indiana (Figures 2 and 3).

The most popularly grown varieties are waxy and high oil corn—each has a 24% share of harvested acres (Figure 2). Popcorn, food grade corn, and seed corn garner smaller shares, while the "other" category is comprised of several of the remaining varieties listed in Table 1. White corn clearly dominates all other varieties in Southwest Indiana (62% of specialty corn acres in Figure 3), even though it enjoys less of an advantage in the entire state (18% of specialty corn acres). The dominance of white corn in Southwest Indiana is derived from the close proximity of white corn milling facilities as well as export facilities on the Ohio River.

Additional Net Revenue from Specialty Corn

Producers plant specialty corn believing that higher profits actually exist—after all, if additional profits are not available, they may as well produce No. 2 yellow corn. At issue is whether or not these profits actually exist. Therefore, survey respondents were asked to report yields, premiums, and additional cost information. The following sections show how the additional net revenue of specialty corn is calculated and report the results of the calculations for 1999.

Specialty Corn Yields

Specialty corn producers were asked to report their average yield per acre in 1999 (Table 3). Care should be taken when interpreting the yield data (Table 3). The specialty corn yields are higher than

Table 3. 1999 Average Yields for Specialty Corn

Corn Type	Yield per Acre (Indiana)	Yield per Acre (Southwest IN)
White Corn	135 bu	136 bu
High Oil Corn	142 bu	142 bu
Waxy Corn	142 bu	N/A
Amylose Corn	97 bu	N/A
No. 2 Yellow Corn*	132 bu	131 bu

* Commodity corn yield reported by the Department of Agricultural Statistics, Purdue University, is shown here for purposes of comparison.

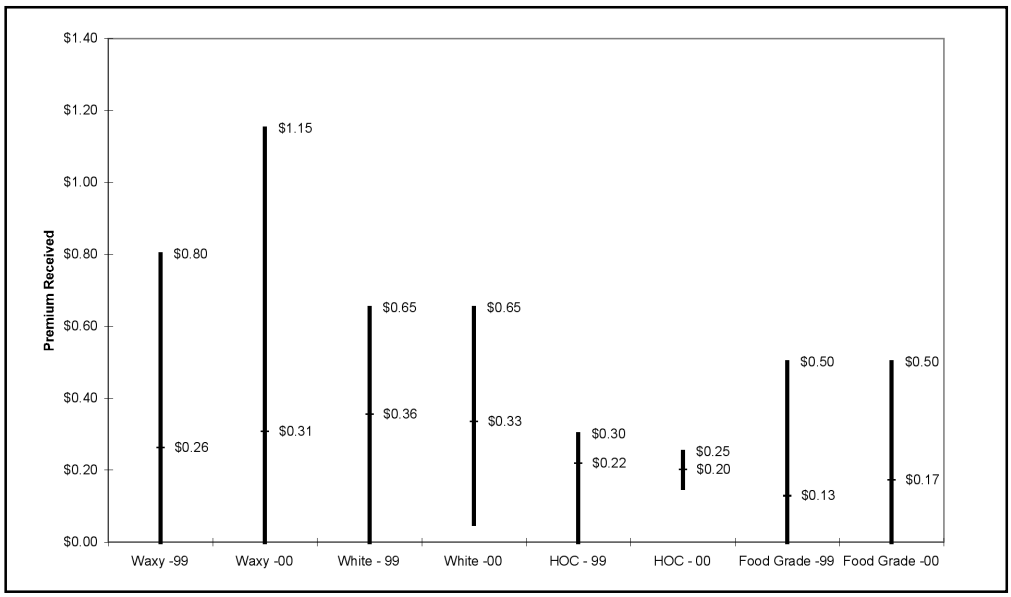

Figure 4. Corn Premium Range ($ per bushel)

the commodity corn yield, but the disparity may well be due to land quality and/or managerial expertise of specialty grain respondents. In particular, the table does not give enough information to suggest if there is a "yield drag" when producing a specialty corn variety.

Specialty Corn Premiums

Survey respondents were asked to report the average premium received in 1999 and the expected premium received in 2000. The high, low, and average premiums reported by specialty corn producers are shown in Figure 4.

There is a substantial range in reported premiums (Figure 4). Waxy corn grown in 1999 (Waxy-99) averaged a premium of $0.26 per bushel, with a maximum premium reported of $0.80 per bushel and a minimum of $0.00 per bushel. The expected premium for waxy corn in 2000 (Waxy-00) ranged from $0.00 per bushel to $1.15 per bushel, with an average expected premium of $0.31 per bushel. White corn producers reported a premium range from $0.00 to $0.65 per bushel for 1999 (White-99).

Also of interest are high oil corn premiums, which ranged from $0.00 per bushel to $0.30 per bushel in 1999 (HOC-99) and were expected to range from $0.15 to $0.20 per bushel in 2000 (HOC-00). The wide variation in premiums may indicate that there is a significant difference in the quality of specialty corn or perhaps that premiums are largely dependent

Table 4. Additional Costs per Bushel of Producing Specialty Corn in Indiana

	High Oil	Food Grade	Waxy	White
Seed - RC	$0.031	$0.005	$0.026	$0.008
Seed – TF	$0.044	$0.003	$0.001	$0.003
Transportation	$0.016	$0.056	$0.060	$0.036
H & D	$0.006	$0.026	$0.032	$0.030
S & S	$0.008	$0.043	$0.014	$0.018
Fertilizer	$0.000	$0.007	$0.008	$0.006
Herbicide	$0.000	$0.006	$0.000	$0.003
Pesticide	$0.005	$0.003	$0.002	$0.002
Management	$0.001	$0.001	$0.034	$0.008
Quality	$0.000	$0.000	$0.002	$0.001
Total Add'l Cost	$0.111	$0.150	$0.179	$0.115

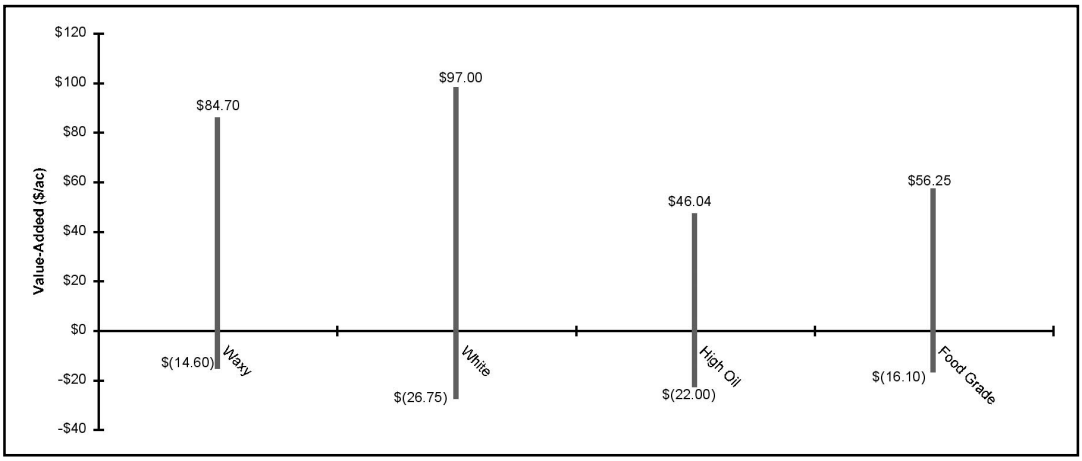

Figure 5. Additional Net Revenue per Acre Calculations: Selected Corn Specialty Types

on individual negotiation. If these theories are true, specialty corn producers have some control over specialty corn premiums.

Specialty Corn Costs

To address the question of whether or not specialty corn is more expensive to grow than commodity corn, respondents were asked to estimate these additional costs and in particular, to categorize them under specific headings. Additional cost categories included additional seed cost (including higher plant population), technology fees associated with specialty corn seed, transportation, handling/drying, storage/segregation, fertilizer, herbicide, pesticide, other more intensive management/production requirements, and quality testing. The additional cost information received from producers of waxy, white, high oil, and food grade corn is shown in Table 4.

High oil corn producers reported the highest per bushel cost for seed (Seed - RC) and for the technology fee (Seed - TF). The greatest additional costs per bushel for waxy corn, food grade corn, and white corn were found in the categories of transportation, handling and drying (H & D), and storage and segregation (S & S). Respondents reported very little additional cost for fertilizer, herbicide, other production and management requirements, or quality testing (Quality). Thus, it is important that new specialty grain producers recognize that additional production costs may be generated in areas that they least expect—the transportation, handling, and storage of the grains. The greatest additional costs per bushel for producing a specialty grain were found for food grade corn, and the lowest were found for waxy corn.

Specialty Corn Additional Net Revenue Calculations

Yield, premium, and additional cost information from the previous sections can all be used to determine if growing specialty corn generates more profit than commodity corn. The difference, if it exists, is the specialty corn's additional net revenue. Additional net revenue can be determined by subtracting the additional costs per acre from the premium received per acre. There is a relatively wide difference in additional net revenue per acre for waxy, white, high oil, and food grade corn (Figure 5). The range was created by subtracting each survey respondent's additional costs per acre from the premium received per acre.

The additional net revenue per acre range for waxy corn begins with a low of -$14.60 per acre and ends with a high of $84.70 per acre (Figure 5). Similarly, the range for white corn went from -$26.75 per acre to $97 per acre. Note that per acre revenue is compared to the net return of No. 2 yellow corn. Thus, a -$26.75 additional net revenue per acre figure does not represent negative profits as such; rather it is a net revenue $26.75 per acre less than if the producer had grown No. 2 yellow corn.

The implication for new specialty crop producers is important: while producing a specialty crop can enhance income on average, it does not occur in every case. At times, the additional costs of specialty crop production outweigh the premium received, and the producer might be better off producing commodity corn.

Table 5. 1999 Value-Added Estimates for Indiana Specialty Corn

Specialty Corn	Survey Acres	Estimated Total Acres	Total Value Added
Waxy Corn	7,284	171,200	$ 5,779,000
White Corn	18,846	130,600	$ 5,171,000
High Oil Corn	11,789	168,300	$ 2,899,000
Yellow Food Corn	4,612	80,500	$ 1,880,000
Total	42,531	550,600	$15,729,000

Table 6. 1999 Value-Added Estimates for Southwest Indiana Specialty Corn

Specialty Corn	Survey Acres	Estimated Acres	% IN Ac.	Southwest IN Value	% of IN Value
White Corn	17,630	101,700	78%	$ 4,154,000	80 %
High Oil Corn	6,223	35,900	21%	$ 821,000	28 %
Yellow Food Corn	1,618	9,300	12 %	$ 183,000	10 %
Waxy Corn	115	700	< 1 %	$ 56,000	1 %
Total	25,586	147,600	N/A	$ 5,214,000	N/A

Selected Specialty Corn's Contribution to Indiana Agriculture

A total value-added contribution to Indiana corn producers can be estimated using the per acre additional net revenue calculations described above, along with adjustments for the statistical proportion that survey respondents make of all Indiana corn producers. The value-added contribution that four corn specialty varieties make in Indiana is shown in Table 5.

As an example, consider the calculations for waxy corn listed in the first row of Table 5. There were 7,284 acres reported by survey respondents. Based on the survey response rate and waxy corn as a proportion of total reported corn acres, an estimate of specialty corn acres in Indiana was calculated. The estimate of 1999 waxy corn harvested acres is roughly 171,200 acres. Using the respondents' premium and additional cost information and weighting by the number of acres grown, white corn is estimated to have provided $5,779,000 of additional value to Indiana corn producers in 1999.

The estimated additional value of white corn ($5,171,000) is very close to that of waxy corn, while high oil corn ($2,899,000) and yellow food grade corn ($1,880,000) also make contributions. In total, the four specialty corn crops generate an estimated $15,729,000 for Indiana crop producers.

Southwest Indiana produces a substantial amount of white corn that contributes significantly to Indiana's total value-added. The value-added estimates for the main specialty corns in Southwest Indiana are shown in Table 6.

There were 17,630 white corn acres reported in Southwest Indiana (Table 6). Using the Southwest Indiana response rate and white corn's proportion of respondents' harvested corn acres, it is estimated that 101,700 acres of white corn were harvested in 1999. The Southwest Indiana white corn acreage comprised 78% of the white corn in Indiana during that year. Furthermore, these acres generated an estimated $4,154,000 of value-added for Southwest Indiana's producers. The value-added is roughly 80% of the estimated white corn value-added for the entire state (Table 6, last column). Similarly, the proportion that Southwest Indiana made of Indiana's high oil corn, yellow food grade corn, and waxy corn value-added is 28%, 10%, and 1% respectively.

Table 7. 1999 Average Yields for Selected Specialty Soybeans

Soybean Type	Yield per Acre
Seed Soybeans	48 bu
STS® Soybeans	47 bu
Tofu Soybeans	40 bu
Commodity Soybeans	39 bu

Table 8. 1999 Estimates of Specialty Soybean Acreage

Specialty Soybean	Survey Acres	10-County Acreage Estimate	Indiana Acreage Estimate
Seed Soybeans	9,998	17,000	190,000
STS Soybeans	7,939	4,700	177,000
Tofu Soybeans	747	1,300	14,000
Total	18,684	23,000	381,000

Specialty Soybean Overview

Producers reported growing the following specialty soybeans: Clear Hilum Soybeans, Low Saturated Fat Beans, Natto Soybeans, Organic Soybeans, Seed Soybeans, STS Soybeans, and Tofu Soybeans (Table 1). However, three of these crops, STS Soybeans, Seed Soybeans, and Tofu Soybeans, comprised over 99% of the harvested acreage in 1999. Seed soybeans had the largest share of acres (49%), followed by STS® soybeans (46%) and then tofu (4%) (Figure 6).

Specialty Soybean Yields

The average 1999 soybean yields per acre, as reported by the producers who responded to the survey, are reported in Table 7. The yield of 39 bushels per acre for commodity soybeans is the value reported by Purdue's Department of Agricultural Statistics.

As in the case with corn, specialty soybean yields tend to be higher than the commodity soybean yields reported by Purdue's Department of Agricultural Statistics. The difference may well be attributed to specialty soybean producers' managerial talent and/or land quality.

Based on the survey response rate and the proportion that specialty soybeans made of the respondents' total soybeans acreage, an estimate can be made of the total specialty soybean acres harvested in 1999 (Table 8).

The survey respondents reported 9,998 seed soybean acres in 1999. The estimate for Southwest Indiana is 17,000 acres, and the estimate for all of Indiana is 190,000 acres. Similarly, the estimates for STS soybean acres for Southwest Indiana and all of Indiana are 4,700 acres and 177,000 acres, respectively.

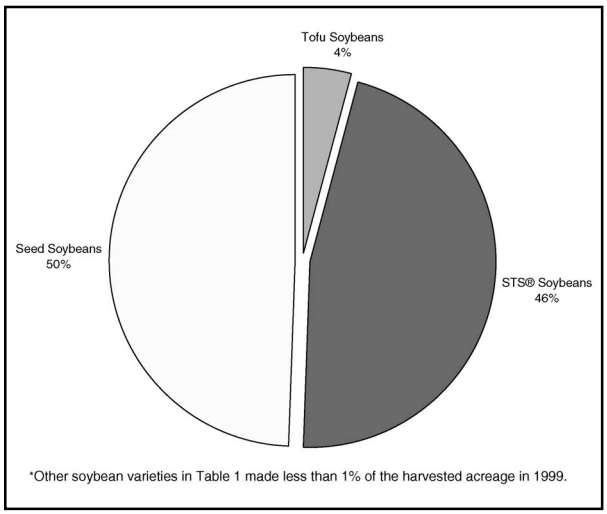

Figure 6. 1999 Share of Indiana Specialty Soybean Acres*

Additional Net Revenue from Specialty Soybeans

Specialty Soybean Premiums

As with specialty corn, specialty soybeans often earn premiums. Survey respondents were asked to report the specialty soybean premiums received in 1999 (Figure 7).

The greatest premium received by producers was for tofu soybeans. The reported premiums ranged from a high of $1.50 per bushel to a low of $.50 per bushel, and the average premium was $0.98 per bushel. Some producers who responded to this survey received no premium for STS Soybeans and Seed Soybeans.

Specialty Soybean Costs

It is important to consider the additional costs associated with specialty soybean production when exploring different production alternatives. Specialty soybean producers were asked to report the additional cost of production, beyond that of commodity

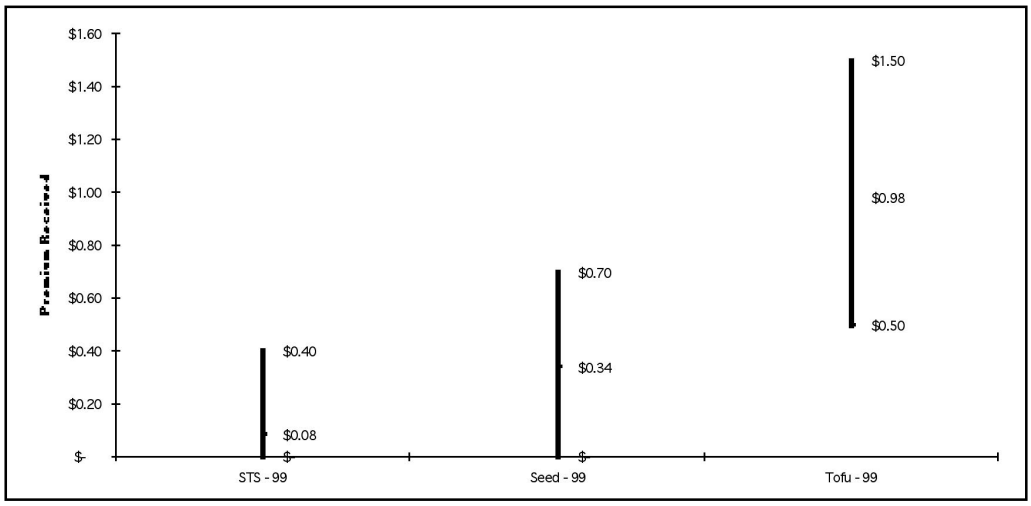

Figure 7. Soybean Premium Range ($ per bushel)

Table 9. Additional Costs per Bushel of Producing Specialty Soybeans in Indiana

	Tofu	Seed	STS®
Seed - RC	**$0.116**	**$0.009**	**$0.022**
Seed – TF	$0.047	$0.035	$0.004
Transportation	$0.060	$0.003	$0.027
H & D	$0.000	$0.005	$0.005
S & S	$0.035	$0.028	$0.014
Fertilizer	$0.000	$0.022	$0.014
Herbicide	$0.042	$0.053	$0.003
Pesticide	$0.000	$0.000	$0.001
Management	$0.012	$0.059	$0.004
Quality	$0.000	$0.000	$0.000
Total Add'l Cost	$0.312	$0.214	$0.094

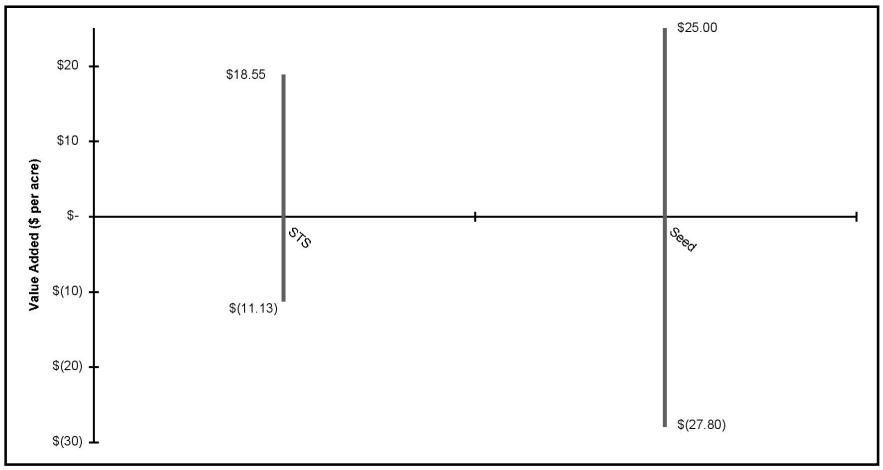

Figure 8. Additional Net Revenue per Acre Calculations: Selected Soybean Specialty Types

Table 10. Reasons for Entering a Specialty Production Contract

Reasons for Entering into a Contract	Number N=170	Percent of Respondents
Additional revenue	156	92%
Access to market	64	37%
Access to seed	48	28%
Reduce price risk	36	21%
Access to technology	23	14%
Reduced input costs *(e.g., cheaper herbicide)*	20	12%
Other	8	5%

soybeans, for each type of specialty soybean (Table 9).

Tofu and seed soybeans appear to have greater additional costs when compared to STS® soybeans. The greatest additional costs for tofu are related to its seed cost (Seed-RC), its technology fee (Seed-TF), and its transportation costs. Conversely, seed soybeans have the greatest additional costs when it comes to more intensive production/management requirements (Management) and herbicide costs, although the seed technology fee and additional transportation costs remain important factors. Clearly, the high premiums for tofu soybeans (reported in Figure 7) are justified given the additional costs expected with tofu production.

Specialty Soybean Additional Net Revenue Calculations

Using the same method adopted for specialty corn, the additional net revenue per acre of specialty soybeans was computed (Figure 8). The additional net revenue per acre range for STS® soybeans extended from -$11.13 to $18.55 per acre. The additional net revenue range for seed soybeans extended from -$27.80 to $25 per acre, with an average additional net revenue of $6.41 per acre. Again, a negative additional net revenue per acre does not mean negative returns as such; rather, a negative value-added means the producer could have earned more if commodity soybeans were produced rather than the specialty variety.

Table 11. Provisions Found in Specialty Grain Contracts

Activities Required by Contract	Number	Percent of Respondents (N=170)
Deliver to specific location.	152	89%
Deliver on specific dates.	125	74%
Plant a variety from a designated list.	121	71%
Store the crop on farm.	121	71%
Provide samples for quality testing.	72	42%
Specific pricing method (e.g., only forward contracts).	68	40%
Specific pricing window (e.g., Sept-Jan. only).	63	37%
More intensive production management such as pesticide or herbicide programs.	52	31%
Specific handling equipment and instructions.	50	29%
Use specific harvesting equipment or follow specific harvesting.	46	27%

Table 12. Least Desirable Aspects of a Specialty Grain Contract

Least Desirable Aspects of Contract	Number	Percent of Respondents N=170
Delivery date unknown	83	49%
Delivery location	56	33%
Additional costs	51	30%
Yield penalty	47	28%
Quality standard	45	27%
Identity preservation	42	25%
Loss of control	37	22%
Timing of payment	26	15%
Additional investment	16	9%
Input requirements	15	9%
Other	11	7%

Contracting Highlights

Production contracts often have stipulations regarding the crop's pricing method, logistics, and quality. To better understand the role of contracts in specialty crop production, producers were questioned about the specifics of their agreements with buyers.

Producers enter into contractual arrangements for many reasons (Table 10). Many respondents (92 %) indicated additional revenue as a reason for entering a production contract. Just over one-third of the respondents (37%) indicated that access to market as a reason for entering a contract. Access to seed and reducing price risk were cited as reasons for contracting by 28% and 21% of the respondents respectively.

Respondents observe different provisions in their contracts. In particular, a majority of producers reported that their contract stipulates the planting of a variety from an approved list, storage on the farm, a specific delivery time, and a specific delivery location (Table 11).

As noted in Table 11, contracts frequently contained provisions for managing delivery logistics (e.g., deliver to a specific location is noted in 89% of contracts reported, deliver on specific dates is found in 74% of contracts, store crop on-farm is required by 71% of contracts). Such provisions may be essential for grain buyers to manage the arrival of grain supplies. Managing quality is accomplished when designating varieties (71% of contracts) or by sampling for quality testing (42% of contracts). More stringent quality control provisions were observed less frequently; only 31% required a specific pesticide or herbicide program, 29% required specific equipment and 27% required specific harvest practices. Finally, pricing mechanisms were also found in a minority of contracts.

When asked for the three least desirable aspects of their contracts, producers found uncertainty around the delivery date to be the most problematic, followed by the distance to the delivery location. Table 12 lists the least desirable aspects of contracts by survey respondents and the number of respondents that selected each aspect.

Summary and Conclusions

Specialty grain and oilseed production is increasing in Indiana, but the decision to produce a specialty grain should not be taken lightly. This publication answers some of the questions surrounding specialty grain production as reported by those producing specialty grains today. A few key conclusions are the following.

- Specialty grain markets are increasing in Indiana, but opportunities do not exist for every producer who seeks them. In fact, the most frequently cited reason for not producing a specialty grain was a lack of market opportunities. These opportunities tend to exist near processing facilities and export terminals.
- Most, but not all, producers report receiving a premium for producing a specialty grain. However, the size of the premium varies widely both by the type of grain grown and by producer. If interested in a specialty grain opportunity, producers are advised to research what premiums are (and have been) available.
- Specialty grains often require additional production costs, so accurate cost information is essential. Producers are encouraged to solicit information regarding additional costs from grain buyers, Extension educators, university specialists, and seed companies.
- Additional costs for producing specialty grains may occur where least expected. For instance, most producers pay additional transportation and management costs when producing specialty grains.
- Compared to that for growing commodity corn and soybeans, the additional net return for specialty grains can be dramatic—but not for all producers. Some surveyed producers would have generated more profits by producing commodity grains rather than specialty grains.
- A majority of specialty grain producers sign contracts, arguing that contracts generate more revenue and give better access to markets, seed, and technology.
- Most specialty grain contracts have logistical requirements, including delivery to a specific location, delivery at a specific time, and on-farm storage. Thus, specialty grain producers need to be flexible when engaging in contract production. The logistical provisions were also the stipulations producers disliked the most about specialty grains. These logistical provisions can result in:
  - — Increased storage costs, with bins tied up and potentially unavailable for next year's harvest;
  - — Increased transportation costs, because farmers pay the trucking costs; and
  - — Delayed delivery that increases the risk of grain spoilage and resulting discounts.

Specialty grain production in Indiana presents unique opportunities and challenges. The Gibson County Plot Committee and the Departments of Agricultural Economics and Agricultural Statistics at Purdue University have formed a partnership to better understand the advantages and disadvantages of specialty grain production. One part of this investigative process is the producer survey, summarized in this publication. The results of the survey shed light on the profitability of and requirements for producing specialty grains. Interested producers are encouraged to contact their local Extension educator, university specialist, and grain buyer for additional information.

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