The Market Potential for IP and Non-GMO Soybeans

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Introduction and Background

Identity Preserved (IP) soybeans are a series of practices to maintain the segregation of soybeans and inputs from pre-planting through growing and harvesting, through handling, storage and delivery through processing and distribution in order to deliver a specific trait or product quality to the final consumer. It is the existence of these traits which justify the additional costs required by the IP supply chain. IP is a system of standards and auditing that exists throughout the marketing chain (Sundstrom) that assures a consistent soybean with desirable market attributes.

IP can be used for conventional, organic, and even GM soybeans (Kennedy). The key aspect of IP is producing a soybean with a characteristic or multiple characteristics that buyers desire and are willing to pay a premium for. Some of these characteristics are size, color, composition, food grade, and non-GMO.

Depending on the individual product traits IP soybeans could be used for a number of food products. These include tofu, tempeh a soybean cake popular in Indonesia, soy milk, natto a Japanese soybean dish that is popular for breakfast, miso a soy based Japanese seasoning, soy sauce, plant-based meat substitutes, soy flour, soy grits, and soy isolate. These products are geared for human consumption and would be considered value added products that would allow soybean producers to obtain a price premium. Currently, most of the IP non-GMO food grade soybeans are used to produce tofu and soymilk (Strategic Marketing Research & Planning). However, there does appear to be opportunities to expand the exports of soybeans for human consumption, especially in Southeast Asia.

In 2021, 87.2 million acres of soybeans were planted, and 4.37 billion bushels were produced in the U.S. Of that amount 4.4 million acres, or 5 percent of all soybeans were non-GMO soybeans (Strategic Marketing Research & Planning). A very rough estimate of the total number of non-GMO soybeans produced in 2021 is 220 million bushels. Or about 5 percent of the total production. The U.S. exports about 47 percent of all the soybeans produced in the U.S. (Strategic Marketing Research & Planning). However, non-GMO food-grade soybeans exports are expected to be 20.42 million bushels, or only approximately 9 percent of non-GMO production. Given the potential growth of soybeans for human use and the potential for consumer rejection of GMO technology, there could be strong interest in exports. Despite the price premiums paid for non-GMO soybeans, the acres of non-GMO soybeans planted is steady or declining slightly (Strategic Marketing Research & Planning).

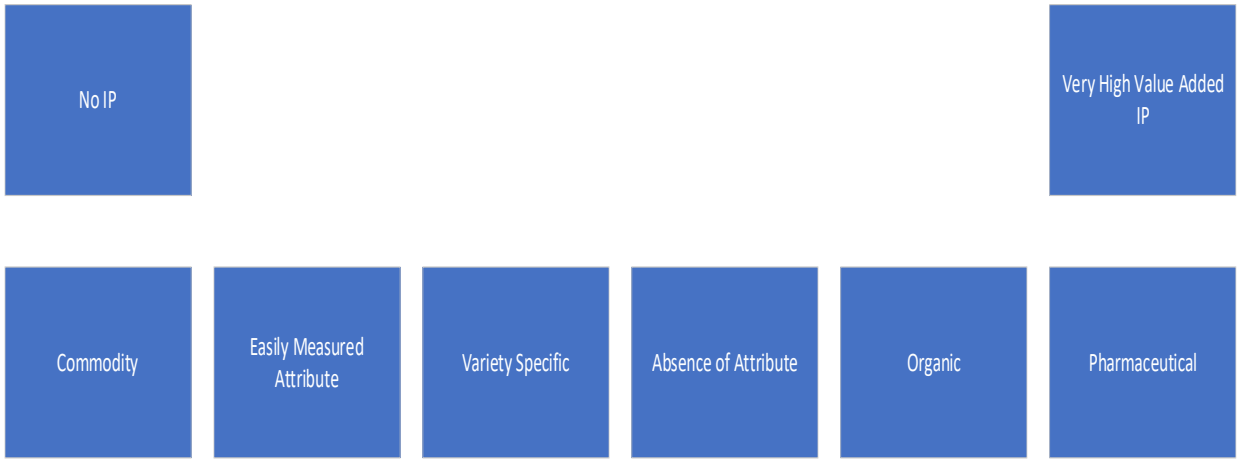
In 2021, Michigan farmers planted 2,150,000 acres of soybeans of which 150,500 acres or seven percent were non-GMO soybeans. Of that amount approximately 89,000 were food grade soybean acres. Major non-GMO soybean producers are Illinois, Indiana, North Dakota, Missouri, and South Dakota (Strategic Marketing Research & Planning).

This study analyzes the rationale for IP soybeans, the potential to grow IP soybeans profitably, and export potential. More and more soybean buyers are interested in soybeans with specific characteristics that need to be traced throughout the supply chain. At current premiums, it appears that IP soybeans can be grown profitably in Michigan. However, producing IP soybeans likely incurs higher costs and require more management oversight than conventionally produced soybeans. Traditional markets for IP soybeans are mature, as the demand for IP soybeans from Japan and South Korea and the European Union is not likely to grow very much. Conversely, Indonesia and Vietnam are markets that appear to have potential for growth.

Rationale for IP Soybeans and Current Price Premiums for IP Soybeans

The fundamental rationale for producing IP soybeans is that they have attributes that buyers desire and for which they are willing to pay a price premium. Secondary reasons are an interest in being less dependent on Roundup Ready soybeans, a way to manage weeds, and an interest in growing organic soybeans. It takes three years to fully transition to organic, but during this time the soybeans produced can be marketed as GMO free. IP soybeans are not necessarily organic, but IP soybeans do have to have one or more characteristics that buyers are willing to pay a premium for and can be traced throughout the supply chain. The continuum for IP soybeans is shown in Figure 1.

Figure 1: The IP Continuum



Source: Bender

In figure 1, moving from left to right increases the level of control the IP system needed and the potential for enhanced prices. Commodity soybeans are undifferentiated and require no product tracing. Soybeans that have an easily measured attribute include soybeans that have a high oil content or a high protein content (Bender). Non-GMO soybeans would be an example of a soybean with an absence of an attribute. Pharmaceutical uses would have exacting quality controls and would be likely grown in a greenhouse setting over a few acres.

The Specialty Soya and Grains Alliance has developed a program, the U.S. Identity Preserved Plan, to market IP products and to make it easier for customers to insure that the products they are buying possess the characteristics desired by the buyers (AGWEEK) and are traceable. IP soybeans are grown on a contract basis.

The Economic Potential

The key question to address is whether or not the additional revenue generated by growing IP soybeans is greater than the costs of producing IP soybeans. Growing IP soybeans does reduce the cost of seed. The additional costs include higher weed management costs, the potential for lower yields, more record keeping (Zeeland Farm Services) and cleaning equipment and other related costs to keep IP soybeans separate from conventionally produced soybeans. Keeping foreign material out of the fields and harvesters and transportation equipment is particularly important because contaminating the IP soybeans could cause the buyer to reject the load.

Other agronomic considerations include avoiding alkaline or saline fields, low lying fields, and fields with low weed pressure. Soybeans after soybeans whether or not they non-GMO varieties is generally not allowed (Prograin).

Table 1 shows the yield differences of different types of soybeans in various locations in Michigan.

Table 1: Yields of Different Types Soybeans in Michigan 2017

Location	Non-GMO	Roundup Ready Early	Roundup Ready Late	Liberty
Allegan	57.2	68.9	59.6	61.1
Clinton	66.7	63.7	67.0	71.5
Clinton	68.0	68.5	62.2	61.9
Hillsdale	56.4	60.6	61.5	61.7
Lenawee	66.3	64.2	64.4	67.3
St. Joseph	76.0	76.2	78.9	0.0
Saginaw	60.9	58.4	57.6	65.5
Sanilac	62.3	66.9	62.9	62.6
Average	**64.2**	**65.9**	**64.3**	**64.5**

Source: Zeeland Farm Services

The average yield among all site for non-GMO soybeans was 64.2, which is less than the average for Roundup Ready early and Liberty but similar to Roundup Ready late. Also, in the cases of some Clinton locations, Lenawee, and Saginaw county locations the non-GMO average was higher than the Roundup averages. Again, management practices appear to be as important as the varieties planted.

There is additional recordkeeping required for growing IP soybeans. This includes keeping records of seed varieties including the lot number of the seed and maintaining records of production practices in adjoining fields. Also, more crop scouting is required to track insects and perhaps increase spraying for insects (soybeanpremiums.org). Contracts usually also specify the delivery location for the IP soybeans (Bender).

Using the CBOT price for March 25, 2022 of $14.91 (CME.com) a bushel for new crop soybeans makes growing IP food grade soybeans profitable as shown in table 2. Table 2 outlines three options, the first is non-GMO soybeans with a premium of $2.00 a bushel, the second is growing non-GMO food grade soybeans with a premium of $3.20 a bushel, and the third is growing roundup ready soybeans. The cost of production figures are based Purdue University's cost of production estimates. The price premiums are based on published premiums for crops grown in 2022. The figures in Table 2 are on a per acre basis.

These figures are to provide a general idea of the relative costs and revenues that a grower should expect with respect to growing IP soybeans. Actual costs, yields, and perhaps premiums will be different. If post emergence weed management is required, additional machine fuel, machinery repairs, and pesticide costs will be higher. Also, yields will be impacted. The figures in Table 2 are designed to give producers a general idea of the relative profitability of growing IP soybeans. Actual results will be different. It should be noted that the cost figures only refer to variable costs, fixed costs are not considered, but do not impact the results.

Table 2: Costs and Revenues of IP and GMO Soybeans

	IP Non-GMO Soybeans	IP Food Grade Soybeans	Roundup Ready Soybeans
Item	**Cost Per Acre**	**Cost Per Acre**	**Cost Per Acre**
Clean Planter	$ 0.15	$ 0.15	$ -
Clean Combine	0.15	0.15	0.00
Seed	57.33	57.33	71.00
Fertilizer	116.00	116.00	116.00
Pesticides	108.00	108.00	63.00
Machinery Fuel	20.00	20.00	20.00
Machinery Repairs	18.00	18.00	18.00
Hauling	7.00	7.00	7.00
Interest	10.00	10.00	10.00
Miscellaneous	43.00	43.00	43.00
Total	**379.63**	**379.63**	**348.00**
Yield	58	58	60
Price	16.91	18.11	14.91
Revenue Per Acre	**980.78**	**1050.38**	**894.60**
Gross Margin	**601.15**	**670.75**	**546.60**
Difference IP vs. Roundup Ready	**54.55**	**124.15**	
Assumed Price Premium	$2.00	$3.20	
Break Even Premium	1.06	1.06	

Sources: Purdue University, Snobelen Farms, Great Lakes Grain, Les Young Farms, Ltd.

In this case growing IP soybeans is solidly profitable. The additional profit per acre for non-GMO soybeans is about $54 an acre, and the additional profitability for food grade soybeans is approximately $124 an acre.

Recently surveyed producers indicated that they would need on average a price premium of $1.88 a bushel to produce IP soybeans (Strategic Marketing Research & Planning). This may reflect the higher bookkeeping costs of growing IP soybeans as well as the higher risk of growing non-GMO soybeans. Growing IP soybeans require a higher level of management capability, more crop scouting, and perhaps a greater level of weed management capability. Depending on the market the soybeans are grown for IP soybeans carry a higher risk, as the premium could be lost if quality standards are not met.

The below list outlines the production practices required by Zeeland Farm Services. These requirements are similar to those of Michigan Agricultural Commodities, Inc. and other firms that handle IP soybeans.

Planting

- Keep seeds separate from GMOs in closed containers until used
- Clean planter/drill boxes. Run to get seeds out of flutes. Sweep/blow clean and visually inspect for contaminants before use

- No Night Shade, Pokeberry, Ground Cherry, or Horse Nettle
- Fields where non-GMO seeds are planted are physically separated from other varieties
- GMO variety soybeans will not be planted in the same field as non-GMO variety soybeans
- All GMO varieties shall be kept at a reasonable distance from fields containing non-GMO varieties. No closer than six feet from Non-GMO variety fields
- Flags, marker posts, plot signs, or some other method were used to delineate non-GMO fields.
- A record of previous crop on contract fields will be retained. However, the previous crop cannot be soybeans. Most firms require seed bag tags be kept for recordkeeping

Harvest

- Combines will be blown or swept clean and visually verified to be free of other varieties. Blow bin and rotor off with a leaf blower
- Flush run will be used to assure equipment is free of contaminants including cereals
- Combine once around the outside of the field, dump and send to market as regular beans
- Use leaf blower to clean trucks and wagons
- Beans must be 18 percent moisture or less at harvest
- Beans should be 10 to 15 percent moisture at delivery after harvest, with loads over 13 percent moisture subject to shrink and discount charges
- Loads with greater than 5 percent foreign matter are subject to rejection. Loads between 1 to 5 percent foreign matter will be docked for the percentage of foreign matter over 1 percent

Storage

- All fill and unload equipment should be flushed and cleaned of other commodities
- Clean the fill device: the bottom of the leg or auger: run non-GMO beans through leg if previous use is GMO beans
- Clean unload/load-out auger with water and visually inspect to see that all beans have been cleaned out
- All bins used to store non-GMO soybeans will be swept and blown clean with a leaf blower and be free of other varieties and sealed after filling
- All bins used to store non-GMO grain will be labeled with Identity Preserved stickers

Transportation

- All trucks used to transport non-GMO soybeans will be clean and visually verified to be free of all other varieties
- All trucks used to transport non-GMO soybeans will be labeled with a sign identifying “Identity Preserved” product
- Drivers will be clearly instructed as the identity preserved nature of the shipment

To minimize the likelihood of contamination, IP soybeans should be planted and harvested before GMO soybeans. While the previous points are primarily geared toward the farmer, all actors along the IP soybean supply chain need to isolate and track the movements of IP soybeans. Handlers are likely to minimize costs by having a separate system for IP and non-IP soybeans, this also applies to barges and ships (Bullock, Desquilbet, and Nitsi).

Prices are generally based on prices on at the Chicago Board of Trade after adjusting for the local basis. A premium is then added for those soybeans that meet the standards set in the contract.

Potential Export Markets

Due to its excellent grain handling facilities as well as its ability to trace products throughout the supply chain, the U.S. is very well positioned to sell IP soybeans. This strengthens the U.S.'s ability to export IP soybeans.

In 2012, approximately 8.3 percent of all the soybeans and 11.3 percent of the soybean meal imported into the European Union (EU) was non-GMO. On a soybean meal basis this was about three million tons. Total EU consumption of soybeans and soybean derived products was about 31 million tons of which about 29 million tons were imported. The primary point of entry is the Netherlands, but the major markets are Germany, Hungary, France, the United Kingdom, Sweden, Italy, and Austria (Tillie and Rodriguez-Cerezo). The major exporters to the EU are the U.S., Brazil, and Argentina (Tillie and Rodriquez-Cerezo).

Brexit may provide additional opportunities as Great Britain is no longer subject to EU agriculture regulations and policies. As a result, Great Britain may be open to imports from non-EU nations. Hungary and Sweden almost exclusively use non-GMO soybeans (Tillie and Rodriguez-Cerezo).

The EU requires that all food and feed ingredients that contain more that 0.9 percent genetically modified material be labeled. It should be noted that the EU is a mature market, future growth is likely to be limited because the population is stable and is likely to decline in the future unless there is an increase in immigration from other countries.

One market region with a great deal of potential for IP soybeans is Southeast Asia. In 2017, this area imported almost four million tons of soybeans (Loh). Unlike Europe, many of the soybeans used in Southeast Asia are used for human consumption. The three largest importers of non-GMO food-grade soybeans are Japan, South Korea, and Taiwan (Strategic Marketing Research & Planning). However, the demographics of these markets make additional growth problematic. The populations of Japan and Taiwan are declining, and the population of South Korea is growing at less than 0.1 percent per year.

Two countries with particular potential are Vietnam and Indonesia. Vietnam has a strong interest in food grade soybeans, and Indonesia is the third largest customer and importer of U.S. soybeans (Loh). The population of Vietnam is approaching 100 million, with per capita GDP after adjusting for the cost of living of $8,200; and the population of Indonesia is more than 275 million, with a per capita GDP after adjusting for the cost of living of $11,400 (CIA) making Indonesia a middle-income country. These countries also have a growing middle class which means that they are likely to increase the demand for soybeans.

U.S. soybeans have several desirable characteristics that importing countries desire. These include high quality, disease and insect pressure is managed, the U.S. has the ability to develop varieties for human food uses, and state of the art processing facilities (Jeradechachai).

Summary

Some users of soybeans are increasingly interested in IP soybeans with specific characteristics. This is especially true for export markets that require non-GMO soybeans. IP soybeans require traceability and incur additional costs all along the supply chain. Therefore, in order to obtain soybeans with these

characteristics price premiums need to be offered. Also, to insure that the soybeans have these characteristics, the soybeans need to be grown under contract, and production and tracking practices have to be in place to meet the contractual obligations. It is important for producers to work closely with the firm that will market the soybeans.

Despite these concerns it appears that the current premiums make it profitable to grow IP soybeans. Farmer premiums are generally in the $2 to $3 a bushel range which more than offset the cash costs of growing IP soybeans. To be successful a farmer will need to be an excellent manager and recordkeeper. Also, because the producer has to meet the quality standards to obtain the full premium, growing IP soybeans has a higher risk.

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