



**Non-GMO Food-grade Soybeans  
Quantification Study  
September 2021**

- Assumed to be accurate and known quantities:
  - *USDA National Agricultural Statistics Service (USDA NASS) reports,*
  - *Economic Research Services (ERS),*
  - *World Agricultural Supply and Demand Estimates (WASDE) data and*
  - *Foreign Trade Statistics*

Information from Secondary Sources	2020	2021	2022
Total U.S. Soybean acres planted (millions) <sup>1</sup>	83.1	<b>87.2</b>	88.2
Total U.S. Soybean Bushels (millions)	4,136	<b>4,374</b>	4,459
U.S. Non-GM Soybean acres (millions) <sup>1</sup>	5.0	<b>4.4</b>	4.1
Biotech/specialty soybeans acres (millions) <sup>1</sup>	78.1	<b>82.9</b>	84.1
Average GM soybean yield (bushels/acre) <sup>1</sup>	47.4	<b>50.2</b>	50.6
Estimated metric tons of U.S. soybeans exported (millions) <sup>2</sup>	61.5	<b>56.8</b>	57.5
Estimated bushels of U.S. soybeans exported (millions) <sup>2</sup>	2,260	<b>2,090</b>	2,114

<sup>1</sup>Source: USDA/NASS, September 2021

<sup>2</sup>USDA/World Agricultural Supply and Demand Estimates (WASDE) September 10, 2021, ISSN: 1554-9089

<sup>3</sup>Sources: USDA Agricultural Projections to 2030, February, 2021 (modified to represent % change from 2021 to 2022)

<sup>4</sup>Based on surveyed growers projected % change in non-GMO soybean acres from 2021 to 2022.

Information collected from growers, exporters and QSSB's achieves different objectives, and each piece of information is meant to be complimentary to the overall goal of this research.

- Assess the distribution of non-GMO acres to food/feed-grade or other utilities.
- Quantify non-GMO IP food-grade soybean acres in the U.S. in the years from 2020 to 2022.
- Identify production trends and influencing factors.

## Growers



- How and from where food-grade soybeans are acquired.
- End-use purpose categories such as soymilk, tofu, etc.
- Domestic or export use.
- Countries to which U.S. food-grade soybeans are exported.

## Exporters



- Gather and verify state soybean production.
- Identify other issues that may impact non-GMO and non-GMO food-grade soybean production.

## State Associations



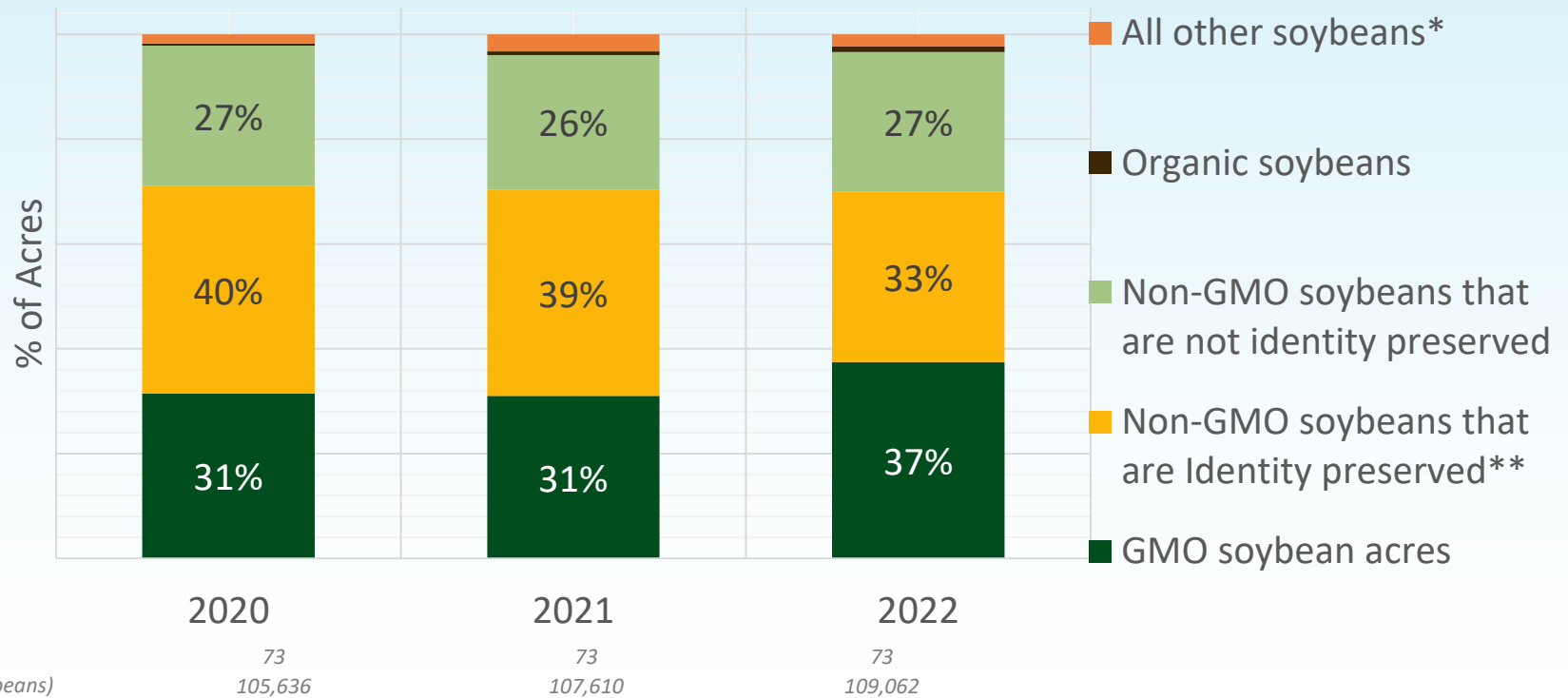


# Results From Non-GMO Growers



# Non-GMO Soybean Growers' Acre Distribution – Grower Responses

- Non-GMO soybeans account for roughly 65% of non-GMO growers' soybean acres, most of which are IP.
- Some IP soybeans will be replaced by GMO soybeans in 2022.

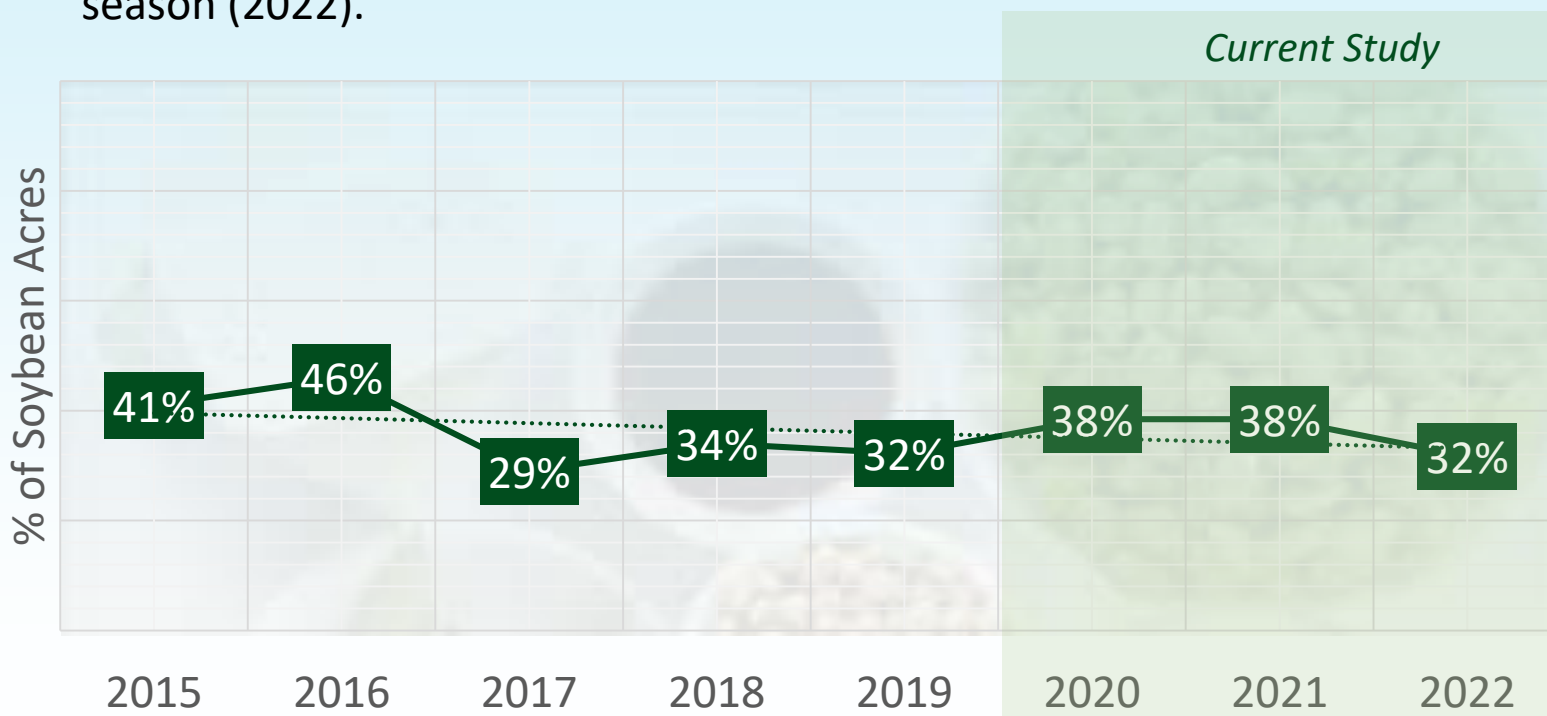


\*All other soybeans include high oleic, commercial soybeans, Catlyxt and are <5%.

\*\*Includes any food-grade, feed-grade and all other non-GMO IP acres, excluding organic.

Source (2021 study): How many acres of the following types of soybeans did you plant in the following years [2020, 2021, 2022]? For 2022, please state what you expect to plant. If unsure, please provide your best estimate?

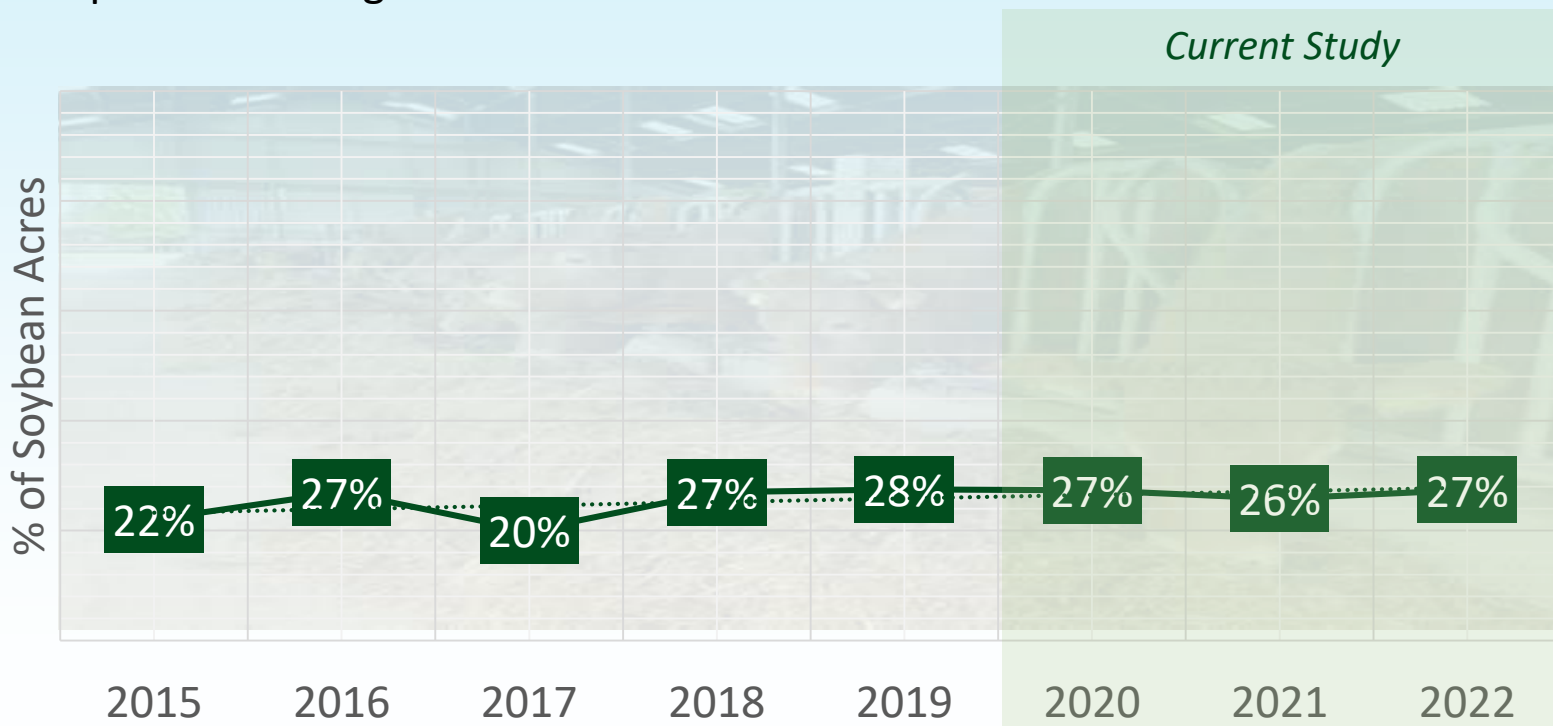
- Increased in 2020 by nearly 20% from the previous year following removal of China's retaliatory tariffs and uptick in overall soybean production.
- Growers intend to decrease the portion of IP non-GMO food-grade acres next season (2022).



Base Growers:	83	82	102	102	101	73	73	73
Base Acres:	-	-	-	-	108,145	105,636	107,610	109,062

Source (2021 study): Of the non-GMO soybean acres you will plant [this season in 2021 / last season in 2020 / next season in 2022], how many acres are the following types? Identity Preserved (IP) Food-grade Non-GMO .

- Accounts for roughly one-fourth to one-third of non-GMO growers' acres.
- Not seeming impacted by trade impasse that led to reduction in soybean production in general.

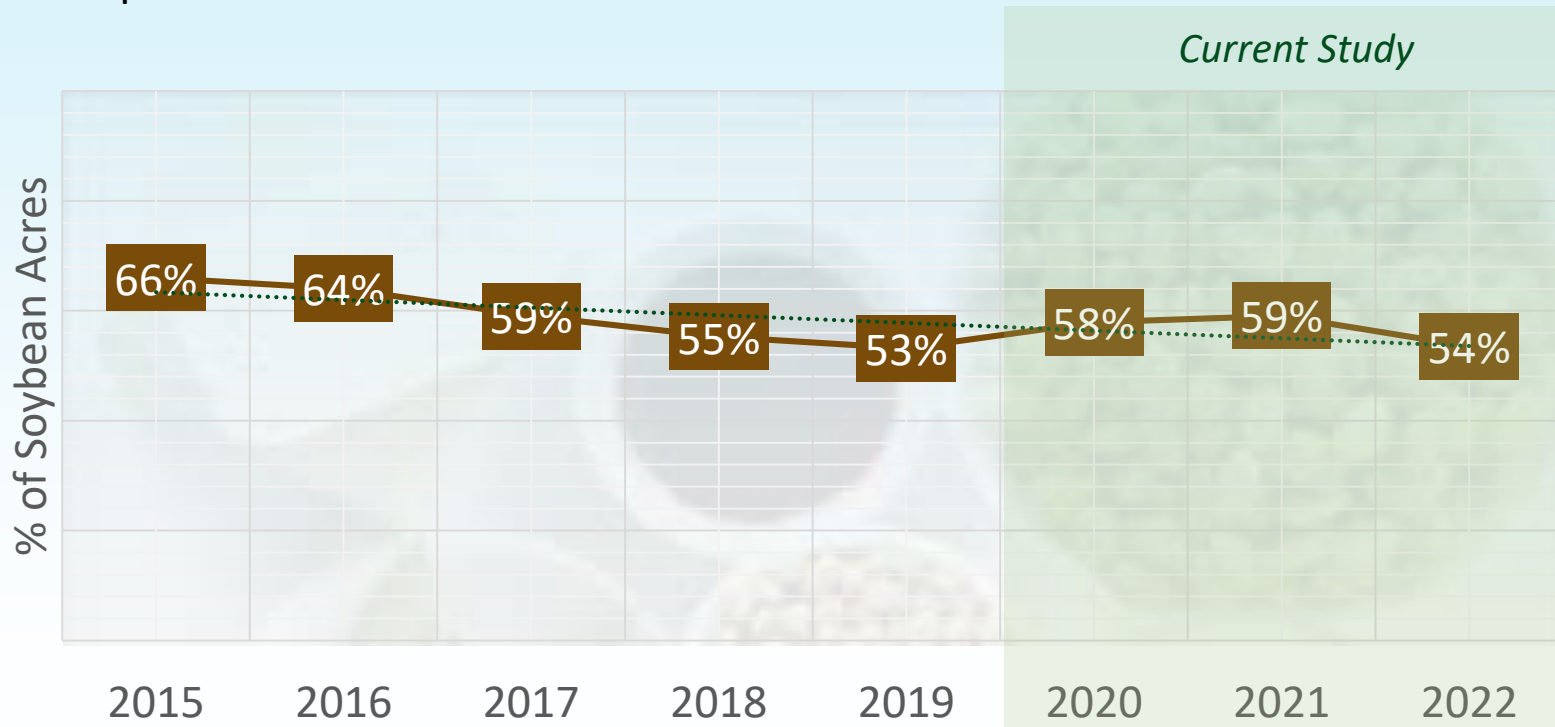


Base Growers:	83	82	102	102	101	73	73	73
Base Acres:	-	-	-	-	108,145	105,636	107,610	109,062

Source (2021 study): Of the non-GMO soybean acres you will plant [this season in 2021 / last season in 2020 / next season in 2022], how many acres are the following types? Feed-grade Non-GMO .

# % Of Non-GMO Soybeans That Are Food-grade Soybeans- Grower Responses

- From 2015 to 2019, IP food-grade acres decreased on average by about 5% year over year to 53% in 2019. In 2020, food-grade acres increased, but is expected to decline to 54% in 2022.



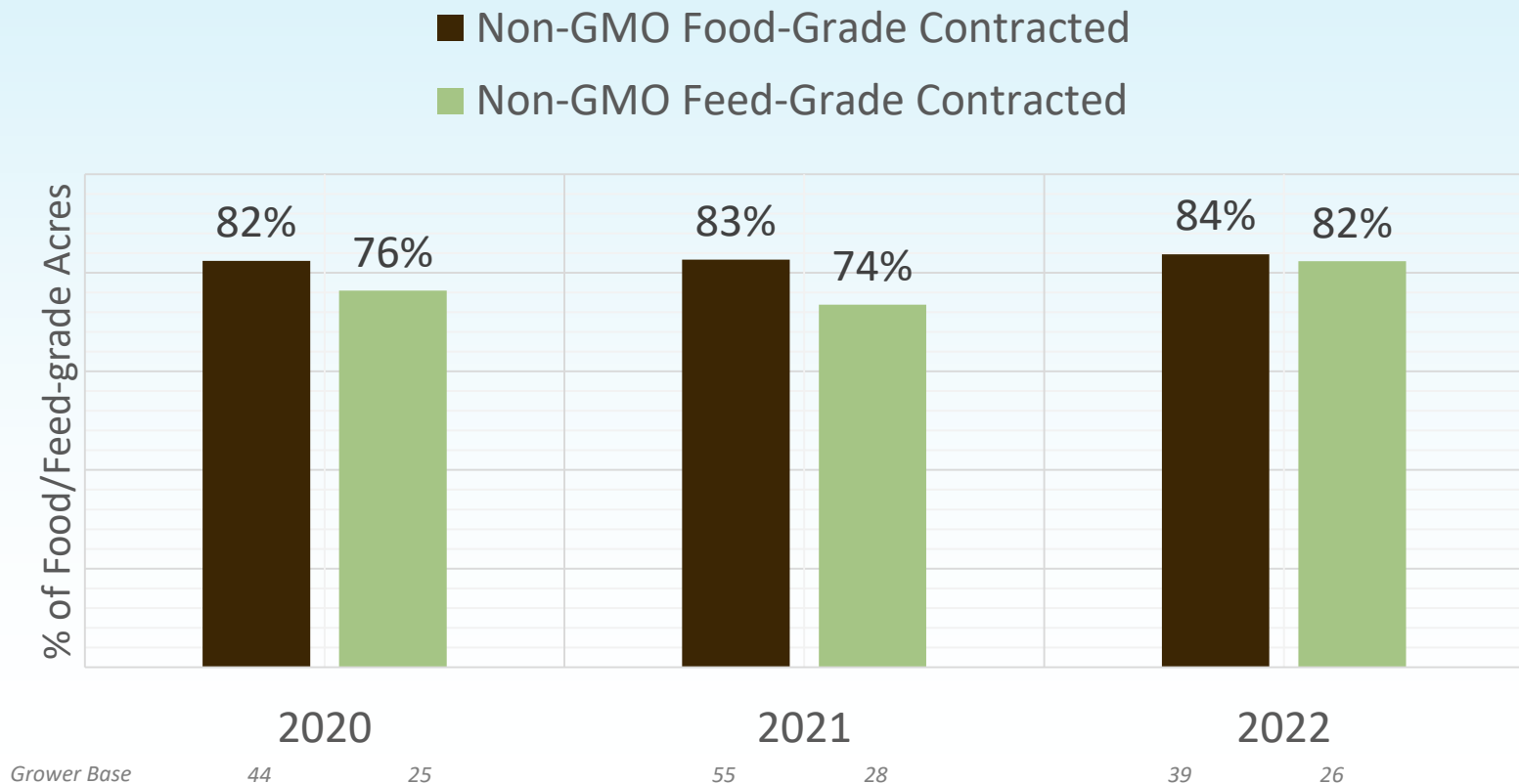
Base Growers:	83	82	102	102	101	73	73	73
Base Acres:	-	-	-	-	108,145	105,636	107,610	109,062

Source (2021 study): Of your total non-GMO soybeans, what percent are the following types [food-grade]? For 2021, please state the percent you expect to be used for the following purposes. If unsure, please provide your best estimate.



# Food-grade and Feed-grade Acres Produced Under Contract -Grower Responses

- Most all non-GMO acres, both food-grade and feed-grade, are produced under contract.



Source (2021 study): Of your total [feed-grade / food-grade] non-GMO soybeans, what percent (%) applies to each of the following categories? % Produced under contract

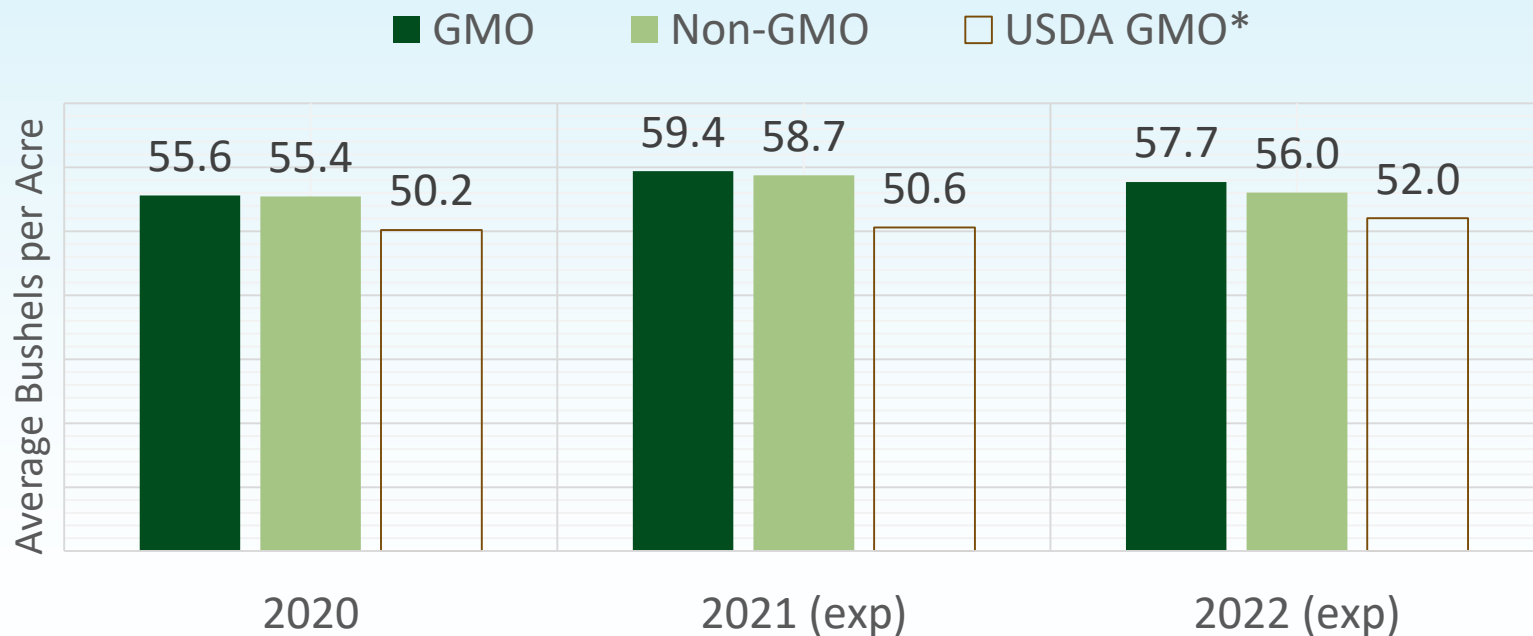


# **Non-GMO Growers Marketing Non-GMO Soybeans**

**Non-GMO Food-grade Soybeans  
Quantification Study  
September 2021**

# GMO vs. Non-GMO Soybean Yields -Grower Responses

- About 1 to 2 bu/acre difference between GMO and non-GMO soybeans
- USDA reports GMO soybean yields are about 6 to 7 bushels less than what growers report in this study. **This may be an instance of sample selection bias (i.e. farmers that engage in better practices).**

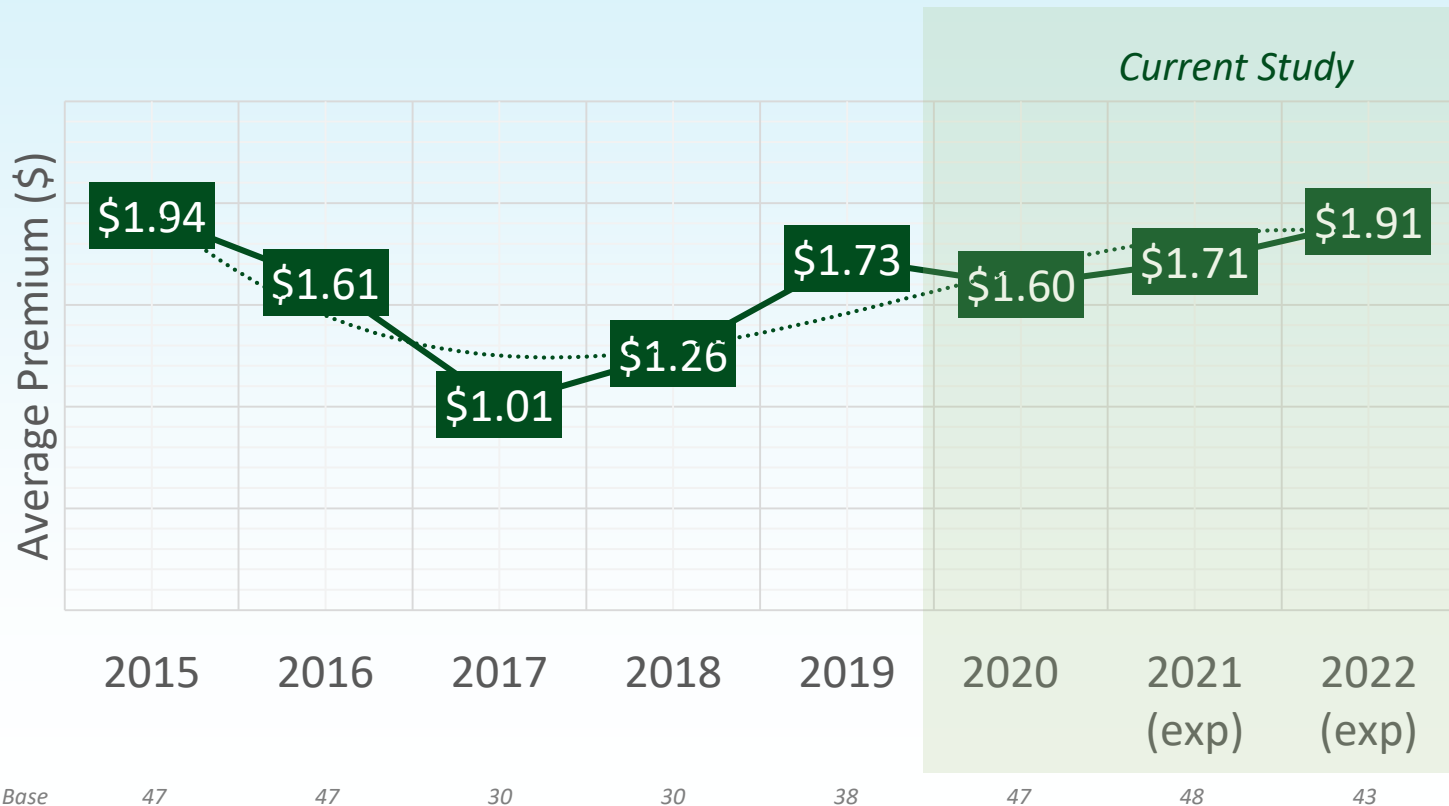


Source (2021 study): What were your yields for the following types of soybeans in the following years [GMO yields, Non-GMO yields]? For 2021 and 2022, please give your expected yields.

\* Source: USDA, September 2021, [https://quickstats.nass.usda.gov/results/945D70A6-E4C8-3DC8-9F05-8B72F034742B?pivot=short\\_desc](https://quickstats.nass.usda.gov/results/945D70A6-E4C8-3DC8-9F05-8B72F034742B?pivot=short_desc). Note USDA yields apply primarily to GMO yields.

# Average Farmgate Premiums Received by Farmers For Food-grade Soybeans By Year - Grower Responses

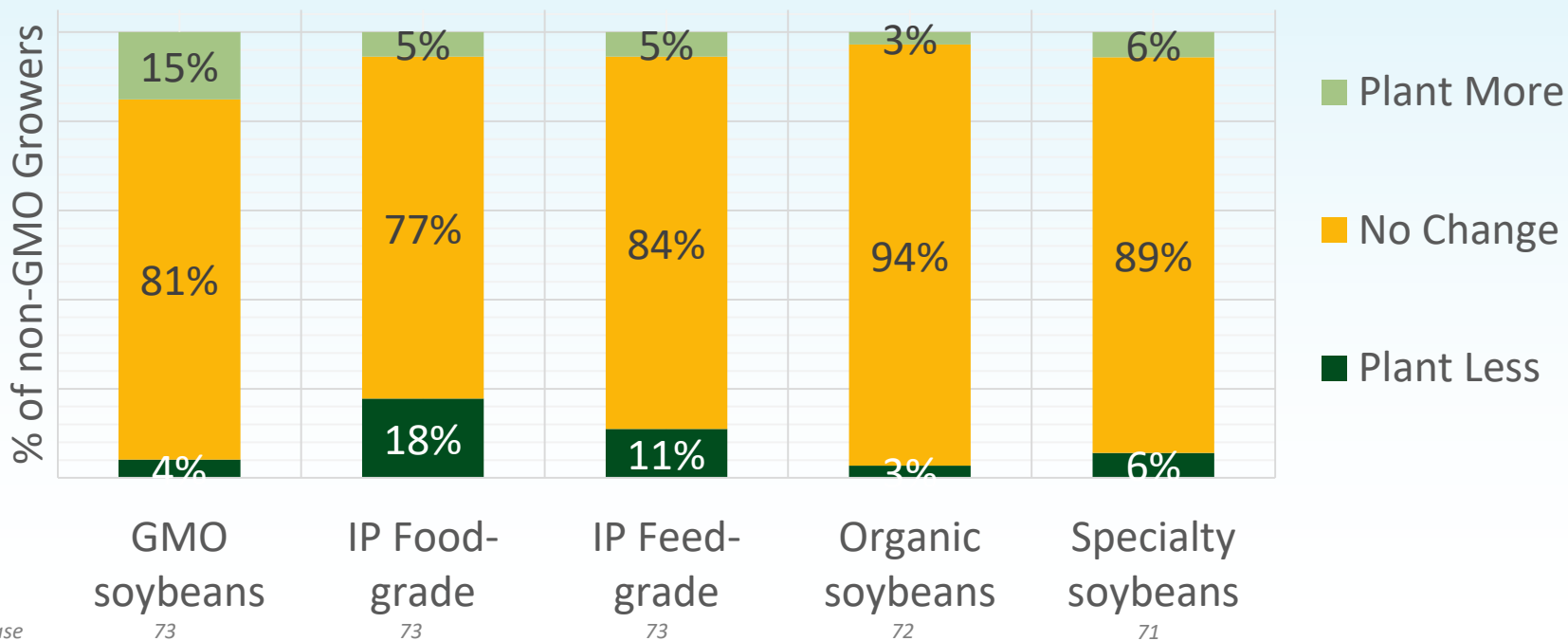
- Growers anticipate an increase in future premiums from \$1.60 in 2020 to \$1.71 this season and \$1.91 in 2022.



Source (2021 study): What premium (\$) did you or do you expect to receive for the following types of identity preserved (IP) non-GMO soybeans in the following years? By premium, I mean the amount above what you receive for your GMO soybeans - Food-grade non-GMO soybeans? Food-grade non-GMO soybeans that are identity preserved?

# Impact of High CME Soybean Prices on Growers Planting Intentions - Grower Responses

- Most growers will not change their current IP non-GMO acreage.
- Commodity prices have negative impact IP non-GMO soybean acres, especially food-grade soybeans.
- Results suggest the reduction in IP non-GMO acres will go to GMO soybean production.

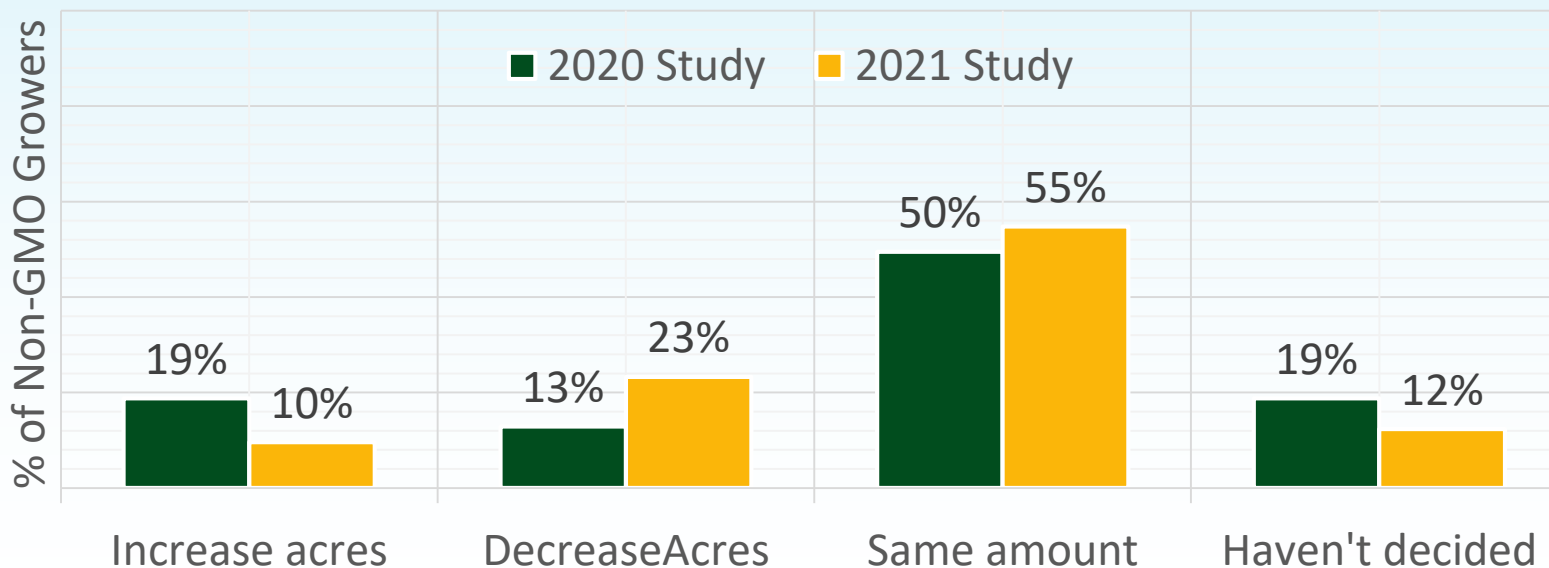


Source (2021 study): What, if any, impact has the recent increase in soybean prices had on your decision to plant the following types of soybeans?

# Intentions to Plant Food-grade Acres at Current Premiums -Grower Responses

Based on current premiums, more non-GMO growers in 2021 report they are likely to decrease acres (23%) than growers in 2020 (13%). Growers report they would like on average a minimum of \$1.88 to produce more non-GMO food-grade soybeans.

**\$1.88** Minimum to consider producing more non-GMO food-grade soybeans



Base Growers: 2020=101, 2021=73.

Source (2021 study): Based on your current premium, are you likely to increase, decrease or plant the same amount of non-GMO food-grade acres in the next year? What is the minimum premium for you to consider planting more non-GMO food-grade acres?



# Non-GMO Exporters, Purchasers, Contractors

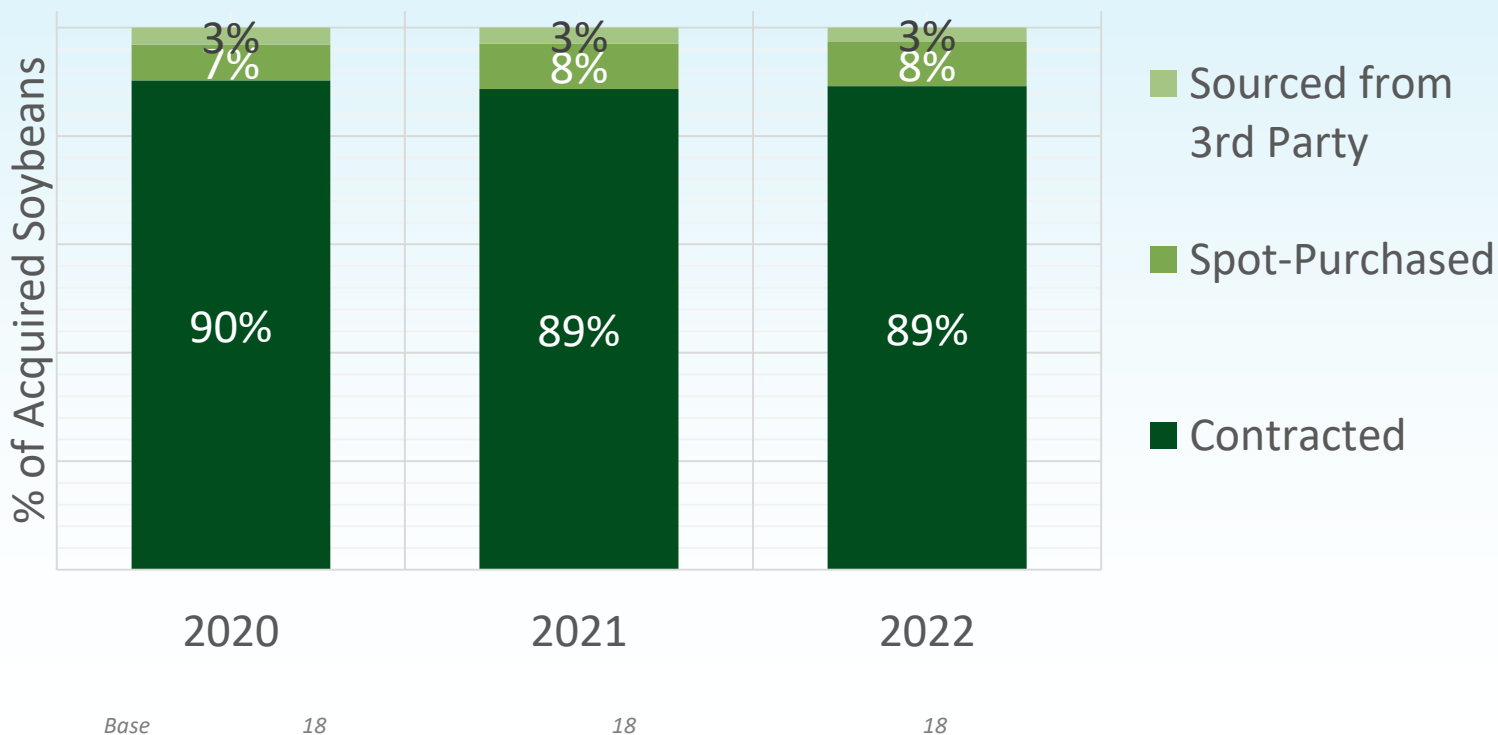


# Non-GMO Soybean Purchases

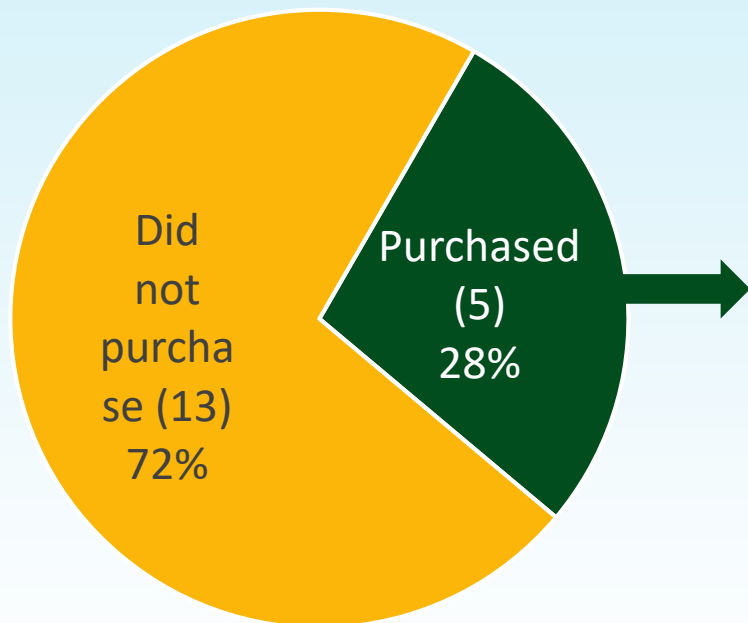
**Non-GMO Food-grade Soybeans  
Quantification Study  
September 2021**



The bulk of soybeans are acquired via contract (89% in 2021). Generally, contracts are for a specified number of soybean acres, according to 72% of exporters.



Source (2021 study): Of all the non-GMO soybeans acquired by your company, what percent (%) will be/were acquired using the following methods in each year indicated below? contracted from growers, spot-purchase from growers, sourced from another company.



**42%** Non-GMO feed-grade soybeans purchased are IP

**74%** Non-GMO feed-grade soybeans purchased are contracted

**41%** Non-GMO feed-grade soybeans exported outside of the U.S.

---

**67%** **Domestic** non-GMO feed-grade soybeans sold to food processors

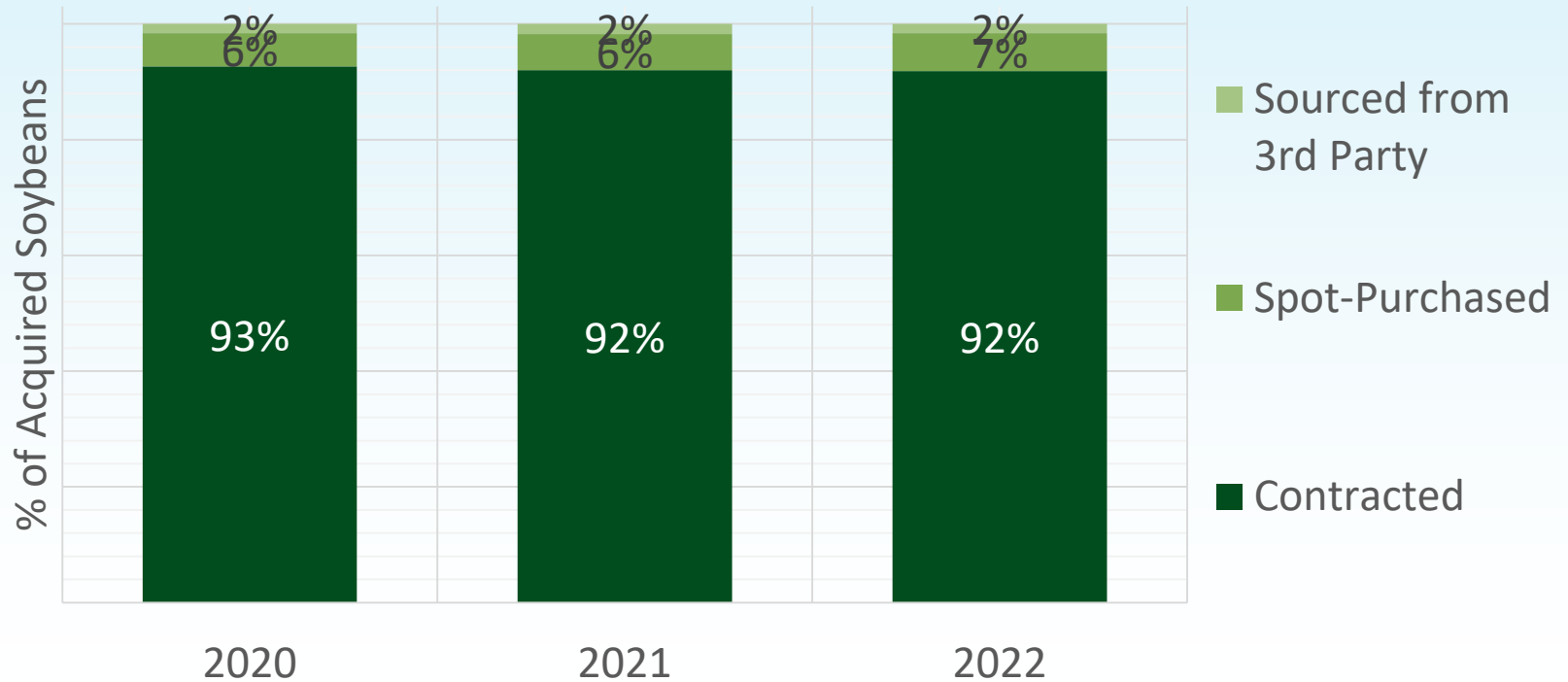
**33%** **Domestic** non-GMO feed-grade soybeans used for livestock feed

Base =18

Source (2021 study): What percent (%), if any, of the non-GMO feed-grade soybeans purchased in the U.S. by your company are identity preserved (IP)? Of all the non-GMO feed-grade soybeans acquired by your company, what percent (%) will be/were acquired using the following methods in the following years? Of the total non-GMO feed-grade soybeans purchased in the U.S. by your company in the following years, what percent (%) will be used domestically and what percent (%) will be sold for export to countries outside of the U.S.? Of the non-GMO feed-grade soybeans purchased in the U.S. by your company that were/will be used domestically, what is the primary market they will go to?

# How Purchasers Acquire IP Non-GMO Food-grade Soybeans (Unweighted)

IP non-GMO food grade soybeans are mostly acquired via contract with growers.



Source (2021 study): Of all the non-GMO soybeans acquired by your company, what percent (%) will be/were acquired using the following methods in each year indicated below? contracted from growers, spot-purchase from growers, sourced from another company.

# USDA Estimates of Non-GMO Acres by State in 2021

State	All Non-GMO Soybean Acres (USDA Estimate)	Estimated Food-Grade Soybean Acres	% of Total Food-Grade Soybean Acres
Illinois	636,000	375,240	16%
Indiana	513,000	302,670	13%
North Dakota	511,000	301,490	13%
Missouri	399,000	235,410	10%
South Dakota	330,000	194,700	8%
Minnesota	308,000	181,720	8%
Iowa	303,000	178,770	8%
Nebraska	224,000	132,160	6%
Kansas	194,000	114,460	5%
Ohio	194,000	114,460	5%
Wisconsin	189,000	111,510	5%
Michigan	150,500	88,795	4%
Arkansas	61,000	35,990	2%
Mississippi	22,300	13,157	1%
<b>Total</b>	<b>4,034,800</b>	<b>2,380,532</b>	

# States In Which Food-grade Soybeans Are Contracted (Unweighted)

## % of Food-grade Soybean Acres Contracted by State

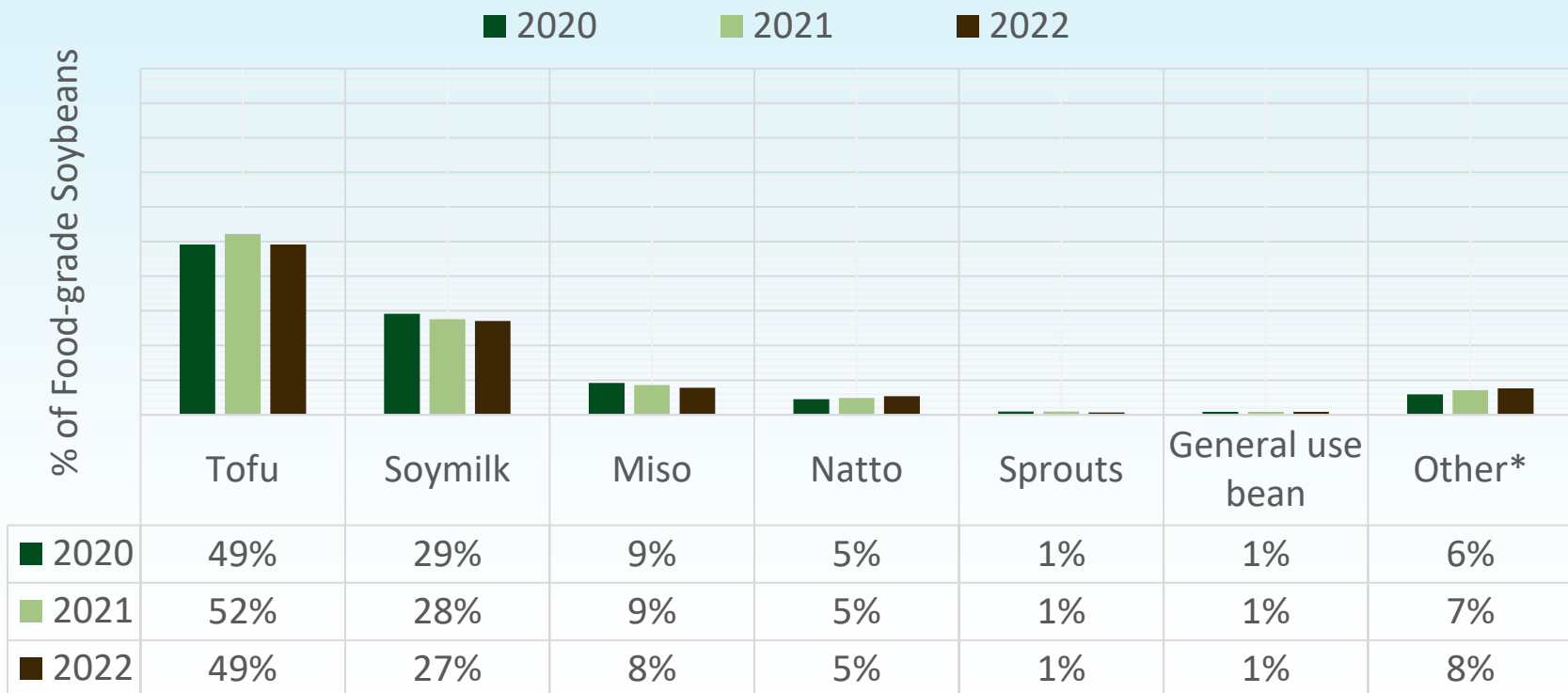
	2020	2021	2022
Minnesota	19%	19%	19%
Michigan	14%	14%	14%
Ohio	14%	14%	14%
Illinois	12%	12%	12%
Iowa	10%	10%	9%
Wisconsin	10%	10%	11%
Missouri	8%	7%	7%
North Dakota	7%	7%	6%
Indiana	4%	5%	4%
South Dakota	2%	2%	2%
Other state	2%	2%	3%

*According to the USDA: “Initially, the soybeans [food-grade soybeans] came from Indiana, Ohio, and Michigan (“IOM Soybeans”) due to high protein content and were shipped in bulk. Gradually, the development of new food-grade varieties has expanded the production of food-grade soybeans into more northern regions of North America and replaced exports of IOM soybeans.”*

Source (2022 study): Of the total IP food-grade non-GMO soybeans purchased by your company in the following years, what percentage (%) is from the following states?

# End-Purpose for Non-GMO Food-grade Soybeans (Unweighted)

Most U.S. produced non-GMO food-grade soybeans will be used for tofu (52%), and soymilk (28%). End uses for U.S. soybeans are not expected to change in the next year.



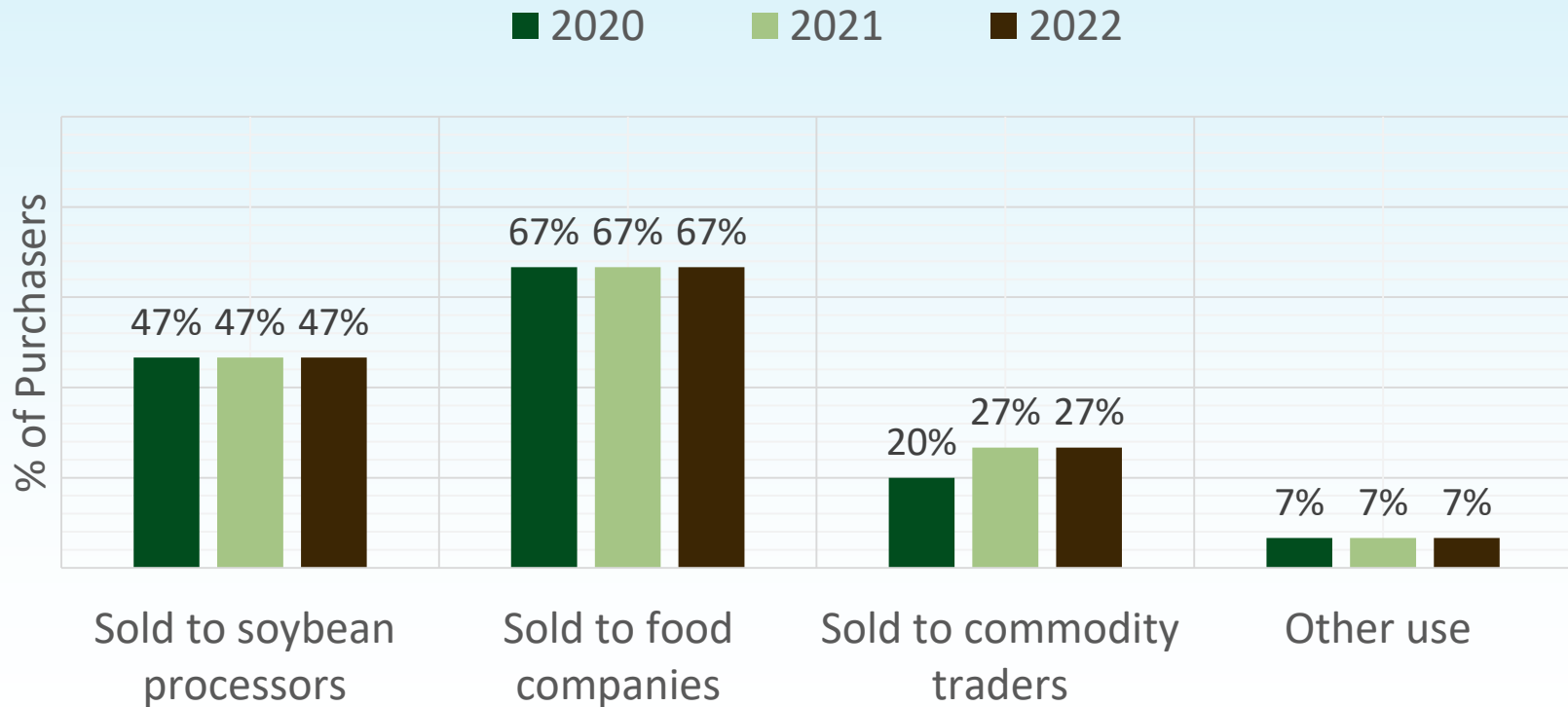
Bases: 2020=18, 2021=18, 2021=18.

Source (2021 study): Of the IP food-grade non-GMO soybeans purchased by your company in the following years, what percentage (%) are used for the following end-purposes?

\* Other uses include aquaculture, flakes, tempeh and high oleic soybean oil.

# Domestic Use of IP Non-GMO Food-grade Soybeans (Unweighted)

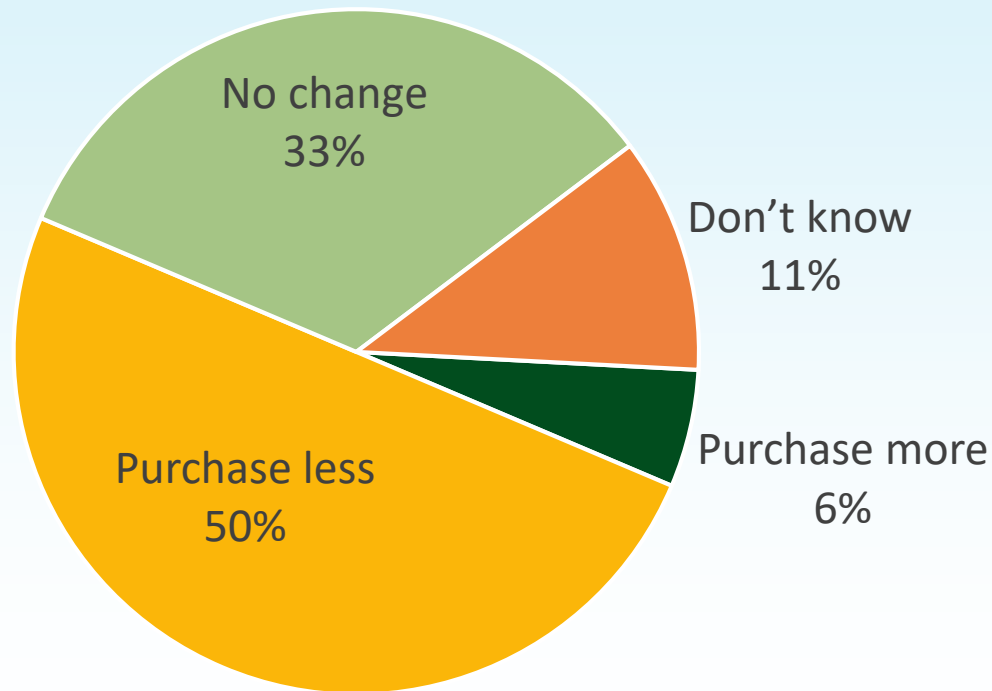
About two-thirds (67%) of purchasers of IP non-GMO food-grade soybeans will sell to food companies. Roughly half will also sell to soybean processors (47%).



Bases: 2020=18, 2021=18, 2022=18.

Source (2021 study): How will the IP food-grade non-GMO soybeans purchased by your company for domestic use be used?

Exporters likely to purchase fewer non-GMO soybeans this year as a result of soybean futures.



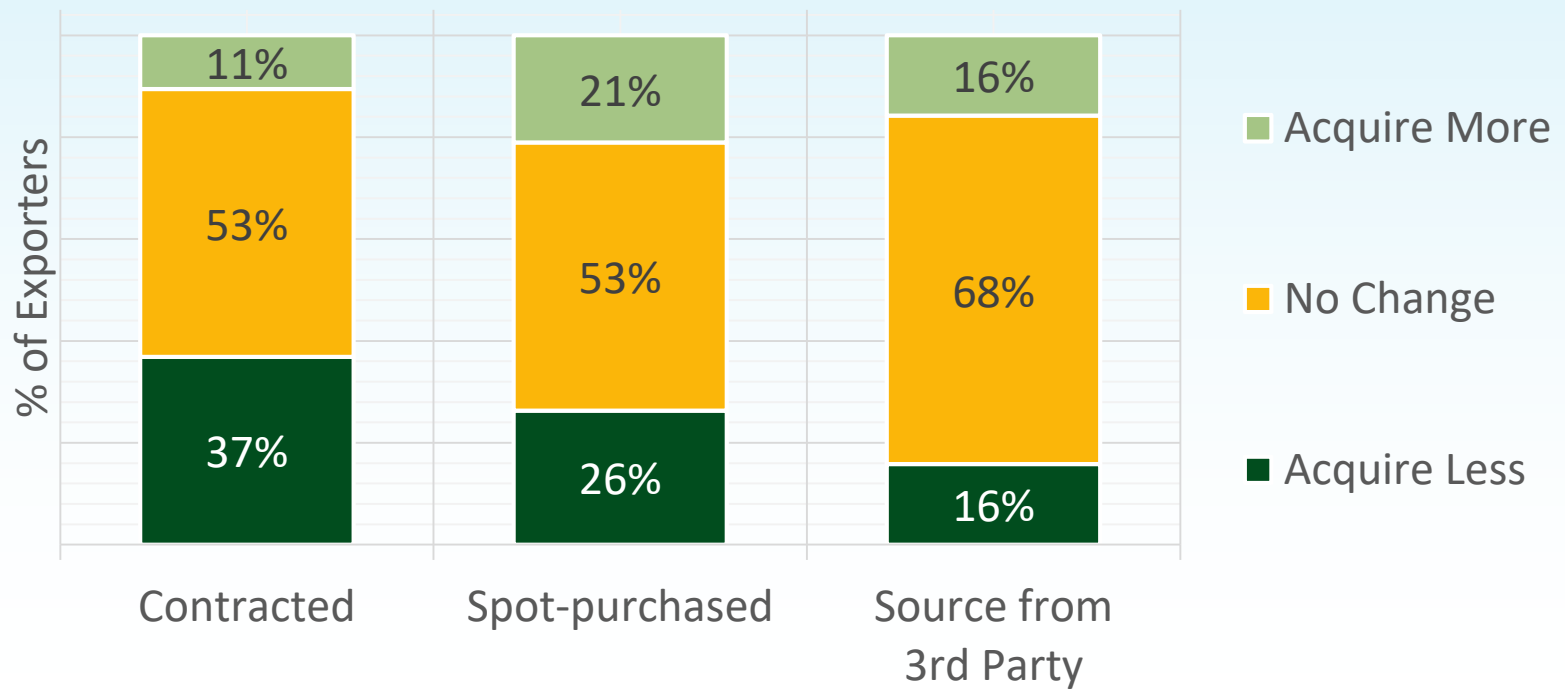
Base =18

Source (2021 study): What impact will the recent increases in soybean futures prices have on your decision to purchase non-GMO soybeans this year?



# Impact of Soybean Futures on Purchasers' Non-GMO Soybeans Acquisition Methods

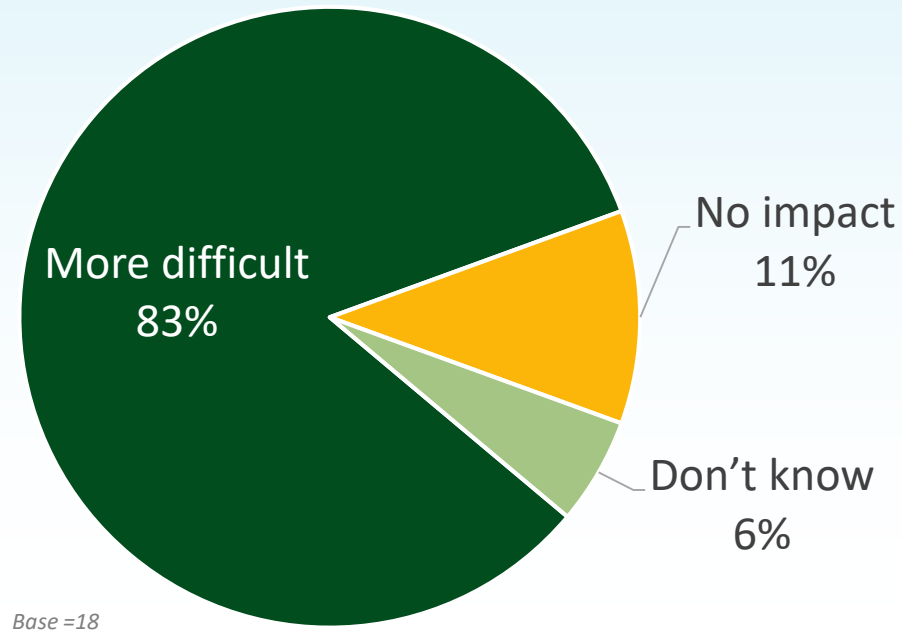
Reduction in non-GMO soybean purchases will mainly impact contracted acres. One exporter explains, *“Growers will raise more GMO soy due to the lack of food-grade requirements at today's futures prices. Weed control with Roundup Ready soy will also limit our non-GMO acres at these historically high soy futures prices.”*



Source (2021 study): So that we may better understand the impact of soybean futures prices on non-GMO soybean purchases, please indicate how recent increases in soybean futures prices will impact how you purchase non-GMO soybeans this year.

# Impact Of Recent Increase In Soybean Futures On Purchasers' Ability To Contract Soybeans

Exporters agree recent increases in soybean futures make it more difficult to contract non-GMO soybeans (83%), as one exporter explains, *“The problem this year has been the timing of the market move. If this move happens in the summer, it doesn't matter because contracts on sales and production side are both done. The difficulty in this move has been contracting your sales last fall and still trying to cover contracts this spring. It makes it very difficult to match the two up.”*



Source (2021 study): What, if any, impact has the recent increase in soybean futures prices had on your ability to contract soybeans?

*High futures/basis levels reward the farmer to keep things simple and plant what they know (GMO). The non-GMO premiums on export side are somewhat soft relative to selling to local processor and offer little drive for farmer to plant something new/different.*

*Two-fold - increases in CBOT and COVID economies overseas have decreased demand. Buyers are more cautious in purchases. Second, growers do not believe premiums offered are worth as much when CBOT is high.*

*Simply put, it is harder to get the farmer's attention with a \$1-\$3 non-GMO premium when commodity soybeans are already \$15+. However, when soybean prices are in the basement, many farmers need that non-GMO premium just to break even.*



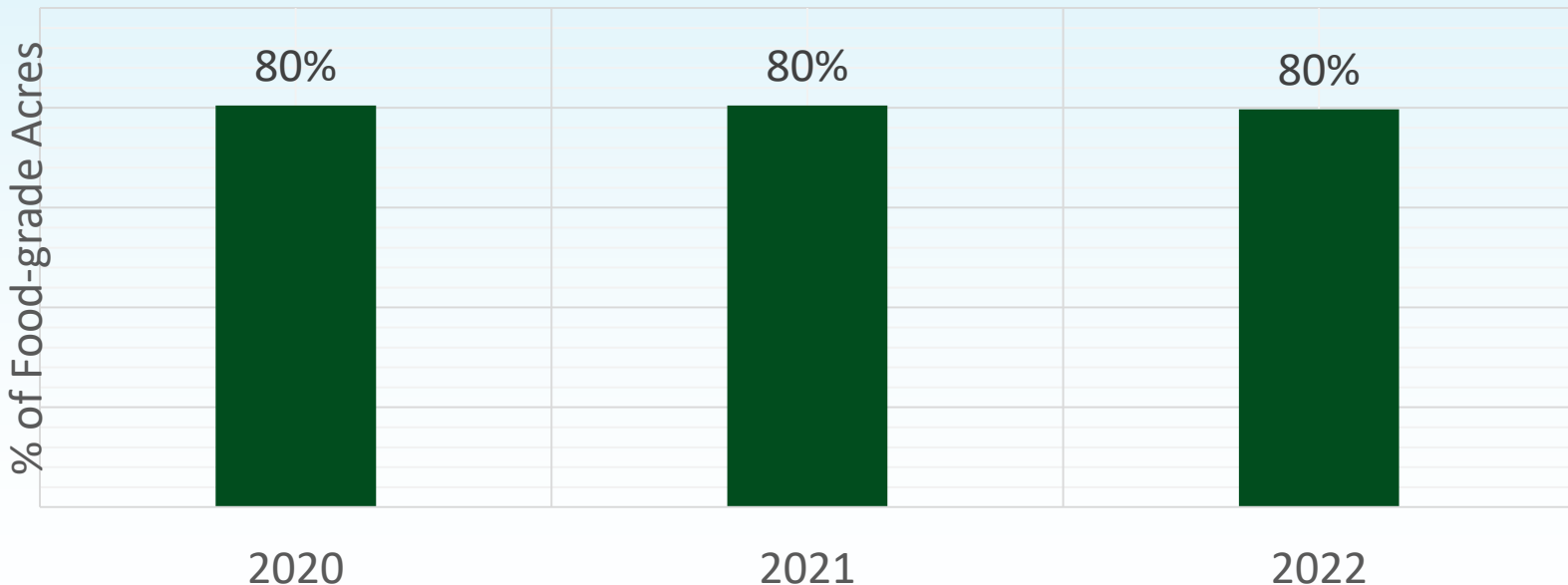
# Non-GMO Soybean Exports

**Non-GMO Food-grade Soybeans  
Quantification Study  
September 2021**



# Non-GMO Food-grade Soybeans That Are Exported (Unweighted)

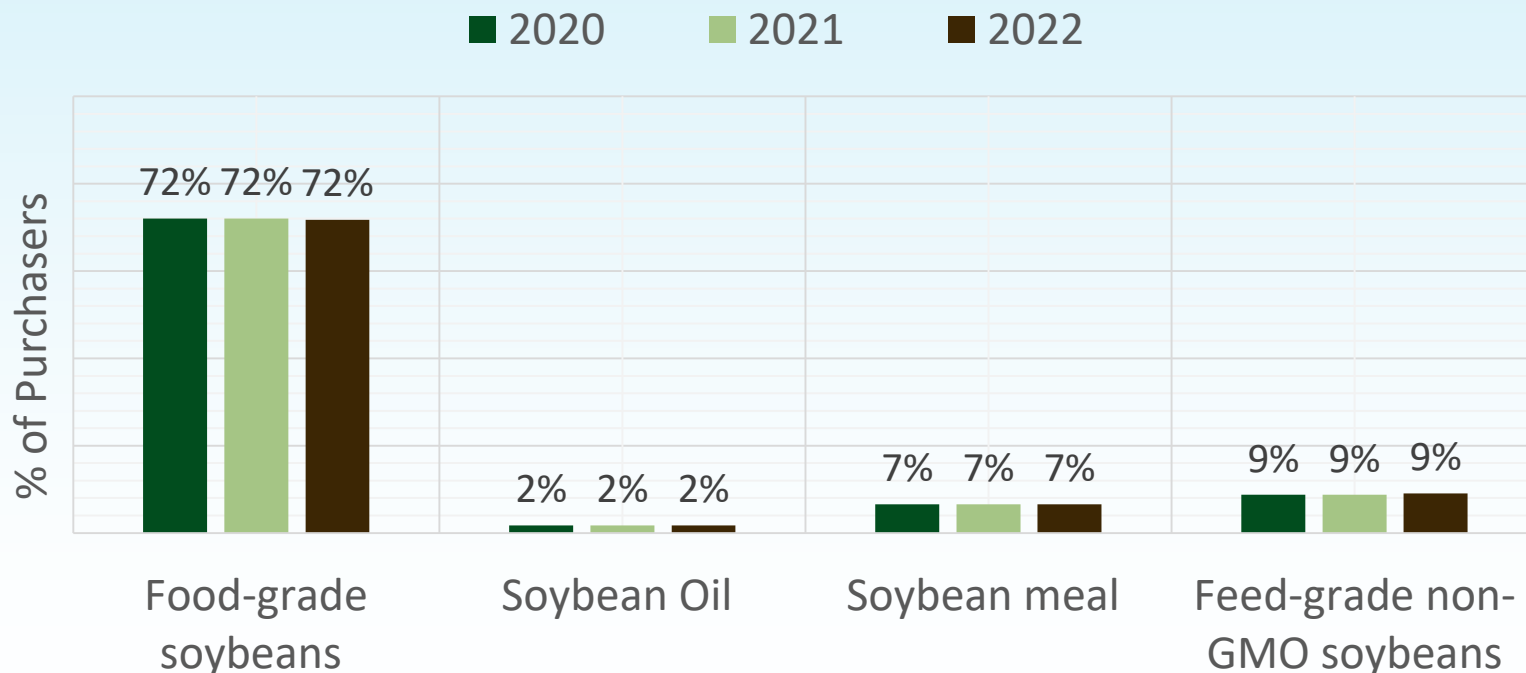
Roughly 80% of non-GMO food-grade soybeans produced in the U.S. will be exported to other countries in 2021. This figure is roughly the same as the previous year and is expected to be about the same in 2022.



*Source (2021 study): Of the IP food-grade non-GMO soybeans purchased in the U.S. by your company in the following years, what percent (%) will be used domestically and what percent (%) will be sold for export to countries outside of the U.S.?*

# Export Use of IP Non-GMO Food-grade Soybeans (Unweighted)




Most IP non-GMO food-grade soybeans exported will be used as food-grade soybeans. Less than 10% of exported IP non-GMO food-grade soybeans are used for either soybean oil, meal or feed.



Bases: 2020=18, 2021=18, 2021=18.

Source (2021 study): Of the IP food-grade non-GMO soybeans purchased by your company that will be exported, what percent (%) will be the following?

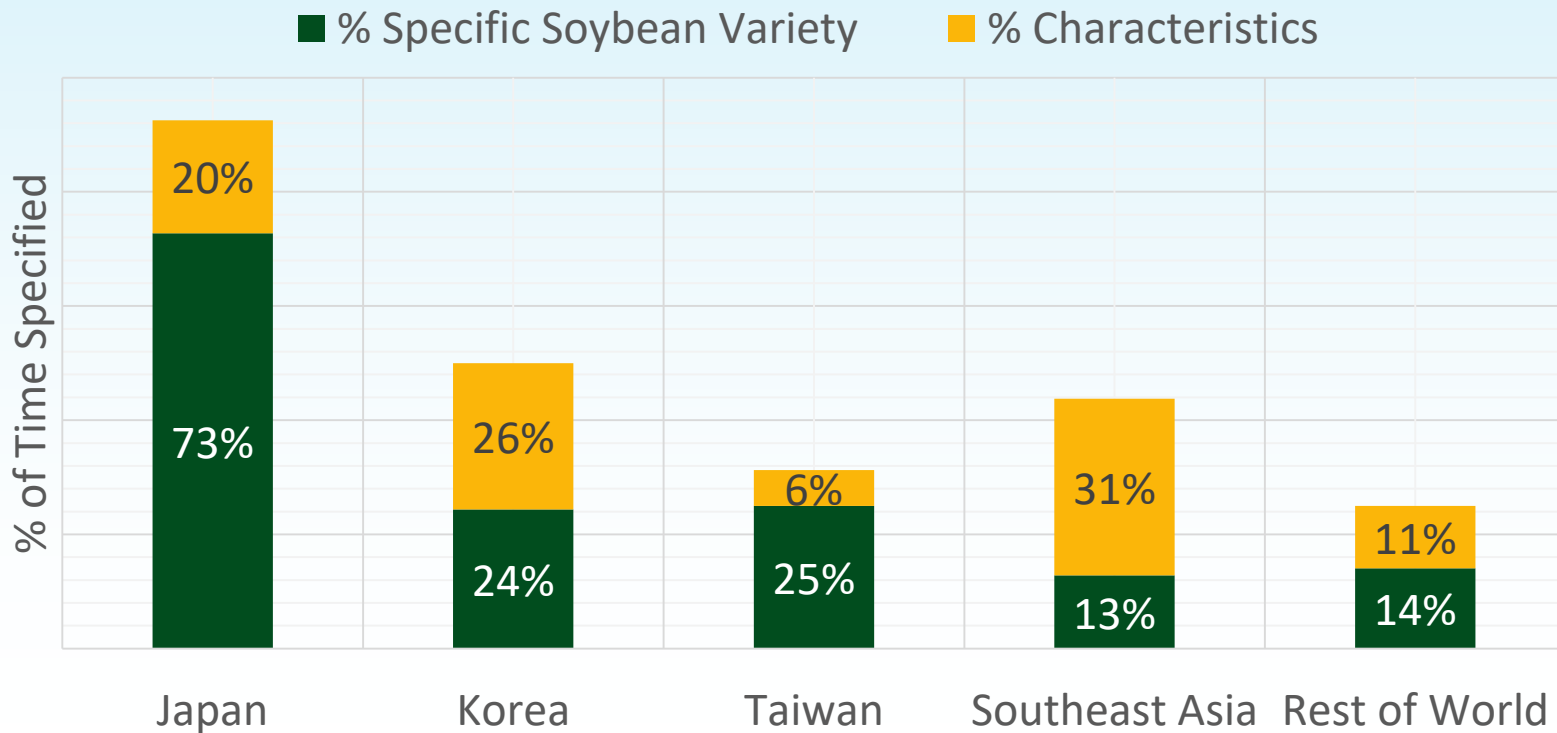
# Exporter Feedback on Their Destinations for U.S. Non-GMO Food-grade Soybeans (Unweighted)

	2020	2021	2022
Japan 	63%	62%	61%
South Korea 	13%	14%	15%
Taiwan 	10%	9%	8%
Thailand	2%	3%	3%
China	2%	2%	1%
Vietnam	2%	2%	2%
Malaysia/Singapore	1%	1%	1%
Indonesia	0%	1%	1%
The Philippines	0%	1%	1%
Bangladesh	0%	0%	0%
Other country	6%	6%	6%

Source (2021 study): And what percent of the IP food-grade non-GMO soybeans purchased by your company were/will be exported to the following countries in the following years?

# Specifications for Exported Non-GMO Food-grade Soybeans

Question to exporters: Do international buyers request specific varieties, or quality characteristics?



Source (2021 study): When working with international buyers, how often do they specify a specific variety of soybean vs. contracting on characteristics (protein, sugars, etc.)?

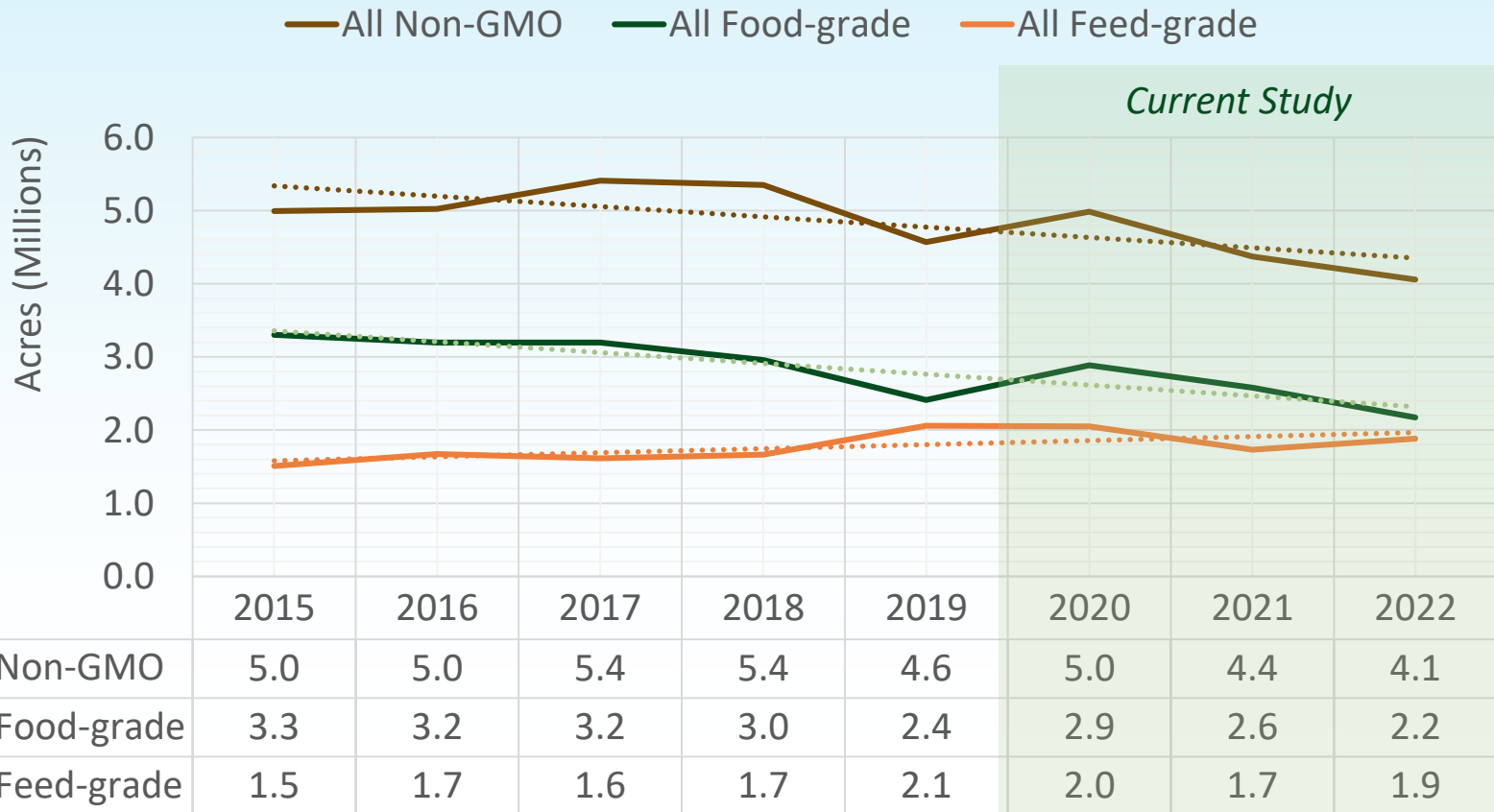




# Estimation of U.S. Non-GMO Food-grade Soybean Production

# Trends in Non-GMO Soybean Production in the U.S.

Historically, non-GMO food-grade soybean production in the U.S. tracks parallel to non-GMO soybean production in general, but non-GMO feed-grade acres are not affected by the reduction in non-GMO soybeans.





# Conclusions & Implications

**Non-GMO Food-grade Soybeans  
Quantification Study  
September 2021**

**87.2 million soybean acres** planted in the U.S. in 2021.

- **4.4 million non-GMO acres**
- **Estimated 2.6 million food-grade acres**
  - **2.1 million contracted non-GMO food-grade soybean acres** in 2021 in the U.S.
- **1.7 million feed-grade non-GMO acres.**

Biggest states producing non-GMO acres and thus likely most food-grade soybeans are: **Illinois, Indiana, N. Dakota, Missouri, S. Dakota and Minnesota.**

Most U.S. produced non-GMO food-grade soybeans are destined for the **tofu market (52%)**. Another 28% will be used for soymilk. All other uses such as miso, natto, and sprouts account for less than 10% of U.S. produced non-GMO food-grade soybeans.

The U.S. is expected to export **57 million metric tons (MMT)** of soybeans in 2021 or about 48% of its total soybean production.

- **Non-GMO food-grade soybeans** account for about **1% of exported soybeans or 557 thousand MT**, which is up from 2020 (525 thousand MT). In 2022, it is projected that non-GMO food grade exports will be at about **563 thousand MT**.
- Most U.S. non-GMO food-grade soybeans are destined for **Japan**, which is expected to receive **346 thousand MT** of non-GMO food-grade soybeans in 2021 and **343 thousand MT** in 2022. South Korea, the second largest importer of U.S. non-GMO food-grade soybeans is increasing imports of U.S. produced non-GMO food-grade soybeans each year. In contrast, Taiwan is decreasing imports of U.S. produced non-GMO food-grade soybeans each year.

Much of the opportunity to expand non-GMO food-grade production in the U.S. will depend on changes in the market and farming practices. Currently, export demand and the demand for bio-fuels is up, helping to drive increases in soybean prices. One purchaser explains,

*“High futures/basis levels reward the farmer to keep things simple and plant what they know (GMO). The non-GMO premiums on export side are somewhat soft relative to selling to local processor and offer little drive for farmer to plant something new/different.”*

Thus, in the current market, expanding food-grade soybean production may be more difficult without a significant increase in premiums. Currently growers report receiving about \$1.71 for their non-GMO food-grade soybeans. They are seeking a minimum of a 10% increase in premiums to consider planting more non-GMO food-grade soybeans.

However, opportunities for future production increases are present as demand stabilizes, soybean prices rescind, and herbicide resistance becomes more of an issue among growers as one state association representative explains in reference to future demand for non-GMO food-grade soybeans,

*“Probably increase. It depends on the weed resistance discussion and demand for biodiesel.”*

A purchaser sums up this sentiment as follows,

*“Simply put, it is harder to get the farmer's attention with a \$1-\$3 non-GMO premium when commodity soybeans are already \$15+. However, when soybean prices are in the basement, many farmers need that non-GMO premium just to break even.”*