The Contribution of Cotton to Arizona's Economy

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About the Study

This study quantifies the contribution of cotton farming and ginning to Arizona's economy in 2022 (the year of the most recent USDA Census of Agriculture). We estimate the direct contribution, as well as additional economic activity supported through multiplier effects in industries outside of cotton production. Indirect multiplier effects capture economic activity in non-agricultural industries that provide goods and services as inputs to Arizona cotton production. Induced multiplier effects capture economic activity in industries that provide consumer goods and services to households earning income from the cotton industry. Direct, indirect, and induced effects combined measure the total economic contribution to the state's economy. In addition, we offer an overview of trends in pesticide use and water efficiency related to cotton production.

Main Findings

Cotton farming and ginning are strategic sectors for agricultural production in Arizona

- In 2022, cotton and cottonseed[1] sales were $176 million, accounting for 6% of Arizona crop cash receipts of $5.2 billion.
- Cotton ginning generated sales of around $9.6 million.

Arizona is among the top cotton producers in the US

- Arizona ranks among the top three producers of Pima cotton in the United States in terms of production (bales).
- Pinal County is in the top 1% of all U.S. counties, while Graham County is in the top 10% in terms of cotton and cottonseed sales. Yuma and Maricopa counties are in the top quarter in sales, while Pima County is in the top third, nationally.

The total contribution of cotton farming and ginning to Arizona's economy in 2022 was more than $322 million in sales (output)

- Cotton production directly contributed $185 million in sales to the state economy.
- Arizona's cotton production supported $59 million in labor income, including multiplier effects.
- Arizona's cotton production directly and indirectly supported 1,446 jobs, of which 862 jobs were directly in cotton farming, 188 were in cotton ginning, and 396 were in other industries in Arizona.
- Including multiplier effects, the value-added (Gross State Product)[2] generated by cotton was nearly $132 million in 2022.

[1] Cotton and cottonseed sales correspond to the NAICS Code 111920 - Cotton Farming and includes cotton farming, field, and seed production.
[2] Gross State Product (GSP) represents the total economic output of a state and serves as the state-level equivalent of a nation's Gross Domestic Product (GDP).

Arizona cotton producers have significantly reduced pesticide use

- From 1990 to 1995, Arizona cotton growers averaged 9 insecticide applications per year at a cost of $244 (in constant 2023 dollars) per acre (Ellsworth *et al.*, 2010).
- By 2023, insecticide use dropped to just 0.58 applications per acre, reducing costs to just $17.51 per acre (Cook, 2023).
- Arizona's 0.58 insecticide applications per acre were the lowest among cotton producing states and less than one-fifth the U.S. national average of 3.2 applications.

Arizona's cotton production per acre-foot of water applied has increased by 32% in the last 40 years

- In 1984, Arizona cotton growers applied 4.9 acre-feet (AF)[3] of irrigation water per acre with a yield of 242 pounds of cotton lint per AF applied.
- By 2023, growers averaged 4.2 AF of water applied per acre and a yield of 299 pounds of cotton lint per AF applied.
- This represents a 32% increase in the amount of cotton produced per AF of water applied.

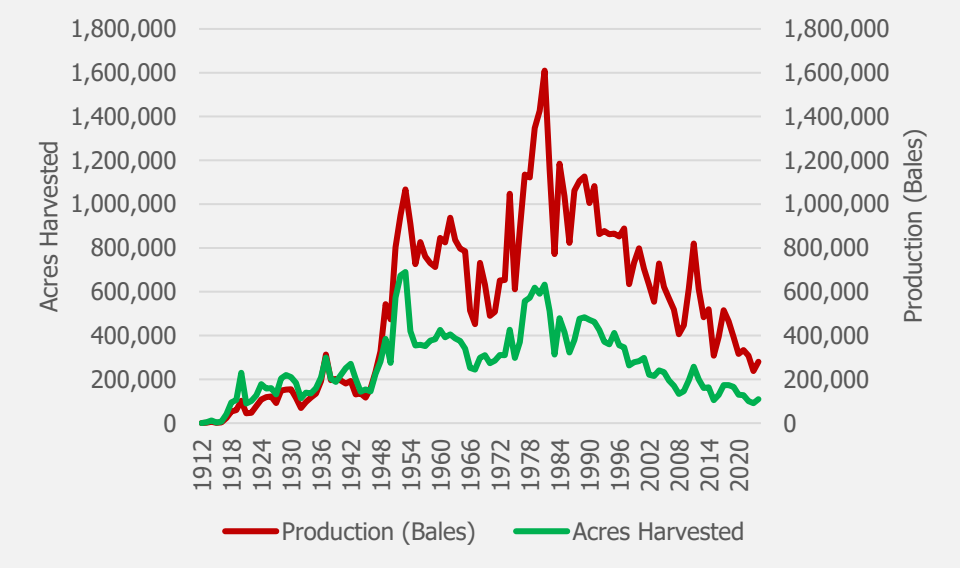
[3] One AF equals 325,851.43 gallons

Cotton Farming in Arizona

Cotton is one of the original "5 C's" of Arizona's economy – copper, cattle, citrus, climate, and cotton. In 2022, agricultural cash receipts in Arizona were $5.2 billion. In that same year, cash receipts from cotton farming were approximately $176 million. accounting for 6% of state crop cash receipts. Of the total production, 88% was destined for foreign markets (Montanía *et al.*, 2025). In 2022, Arizona accounted for 2% of total U.S. cotton production.

Figure 1 shows the evolution of cotton production in Arizona. Both harvested acres and production levels took off during World War II, contributing to the war effort. Production levels were declining beginning in the 1990s, and since the early 2000s, Arizona's cotton production has fallen more sharply than the national total.

Figure 1. Cotton Production Trends in Arizona, 1912-2022



Source: USDA NASS (2025)

Arizona harvested approximately 871,900 acres of cropland[4] in 2022, with over 108,000 acres, about 12% of the total, dedicated to cotton farming. Arizona produces two primary species of cotton: upland cotton *(Gossypium hirsutum*) and Pima cotton *(Gossypium barbadense*), each with distinct fiber characteristics and market uses. Upland cotton, with shorter fibers, accounts for most of the cotton grown in the U.S. and it is used widely in products such as denim and casual wear due to its durability and yield (Raper *et al.*, 2019). Pima cotton, in

[4] This category includes land from which crops were harvested and hay was cut, land used to grow short rotation woody crops, Christmas trees, and land in orchards, groves, vineyards, berries, nurseries, and greenhouses. Land from which two or more crops were harvested was counted only once. Land in tapped maple trees was included in woodland not pastured (USDA, 2024)

contrast, is an extra-long staple variety, prized for its superior softness, strength, and quality, making it suitable for luxury textiles (Holladay *et al.*, 2021). In 2022, Arizona's cotton production reached a total of 238,000 bales – 208,000 bales of upland cotton and 30,000 bales of Pima cotton. The state's total cottonseed production was 85,000 tons. Nationally, average cotton yield in 2022 was approximately 947 pounds per acre. Arizona's upland cotton yield of 1,331 pounds per acre was significantly higher than the national average, while the Pima cotton yield of 900 pounds per acre was slightly below the national average (USDA NASS, 2024).

These figures highlight Arizona's efficiency in upland cotton production despite challenging conditions and its continued role as a key producer of high-quality Pima cotton. These conditions include, among others, water scarcity, extreme summer heat, which can reduce yields and lower fiber quality (Thorp et al., 2020). Additionally, pest infestations, particularly by silverleaf whiteflies and aphids, threaten crop quality and marketability (Naranjo & Ellsworth, 2024). This demands advanced irrigation strategies, heat-tolerant crop varieties, and integrated pest management to sustain productivity and quality, especially for high-value Pima cotton.

Arizona has historically played a leading role in Pima cotton production, once ranking as the top-producing state. This position has shifted over time. As of 2022, Arizona ranked second in Pima production nationally, and continues to hold a strong position in national cotton production rankings:

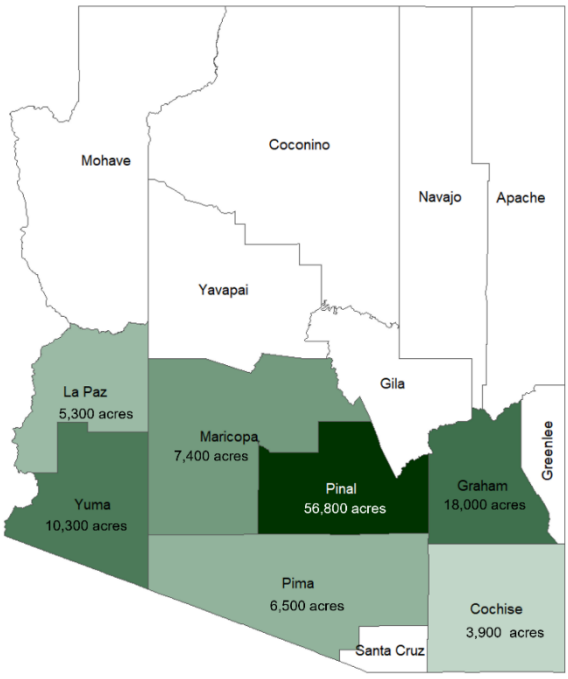
Figure 2. Arizona's National Ranking in Cotton Production

Source: USDA NASS (2022)

Upland & Pima Cotton Production by County

Cotton production in Arizona is highly concentrated in a few key counties in the southern half of the state (Figure 2). Pinal County is the top cotton-producing county in the state (Bickel *et al.,* 2018) with 56,800 harvested acres and 176,500 bales produced, far surpassing all other counties. Graham County and Yuma County followed in terms of acreage and cash receipts.

Figure 3. Acres Harvested, Upland & Pima Cotton, 2022



Source: Authors' estimates using data from USDA NASS (2022)

Table 1 reports cotton yields for selected Arizona counties (where data are available) along with their ranking among all cotton-producing counties in the U.S. Data come from the 2022 Census of Agriculture. Yields were calculated by dividing total cotton production by cotton acres harvested, since the Census does not report yields directly. Table 1 also reports counties relative to other cotton-growing counties in the country. Yields in La Paz, Maricopa, and Pinal Counties are all in the top 1% among all cotton-growing counties in the United States. Yields in Pima County were in the top 2%, while yields in Graham County were in the top third in the nation in 2022.

Table 1. Cotton Yields and National Rankings for Arizona Counties, 2022

County	Cotton yield (lbs. / acre)	National ranking among US counties (top %)
La Paz	1,652	1%
Maricopa	1,570	1%
Pinal	1,511	1%
Pima	1,450	2%
Graham	1,004	33%

Note: Sufficient data not reported for other Arizona counties
Source: Authors' estimates using data from USDA Census of Agriculture 2022

Table 2 shows rankings of Arizona counties among U.S. cotton-producing counties in terms of cotton and cottonseed sales. Pinal County is in the top 1% of all U.S. counties, while Graham County is in the top 10%. Yuma and Maricopa counties are in the top quarter, while Pima is in the top third, nationally.

Table 2. Cotton and Cottonseed Sales Rankings for Arizona Counties, 2022

County	National ranking among US counties (top %)
Pinal	1%
Graham	10%
Yuma	22%
Maricopa	22%
Pima	32%

Source: USDA Census of Agriculture: 2022 State and County Profiles Arizona

Cotton Ginning

According to the Mountain Regional Field Office of the National Agricultural Statistics Service – USDA, Arizona gins produced 284,550 "running bales" (293,300 480-pound bales) in 2022. Of the 284,550 running bales ginned, 257,400 running bales were upland cotton, and 27,150 running bales were Pima cotton. The Department of Labor's Quarterly Census of Employment and Wages (QCEW) reported 11 cotton gins operating in Arizona in 2022. These establishments paid $6 million in annual wages.

Though not disclosed in government statistics, cotton ginning in Arizona is estimated[5] to have generated direct sales of approximately $9.6 million in 2022. This represents $33.72 per bale, consistent with the average ginning cost of $34.97 per bale in the Southwest, estimated by the National Cotton Council Survey (Holt *et al.*, 2024).

Table 3. Arizona Cotton Ginning Costs and Sales: Summary of Statistics

Indicator	Value	Source
Number of running bales ginned (2022)	284,550	USDA NASS
Number of establishments (2022)	11	QCEW
Annual Wages (2022)	$6,122,168	QCEW
Sales (Output) (2022)	$9,596,000	Estimated
Sales (Output)/bale (2022)	$33.72	Estimated
Southwest average ginning cost (2021)	$34.97	National Cotton Council Survey

Source: QCEW, USDA NASS, IMPLAN LLC (2022)

[5] The output value for cotton ginning is not directly reported by the USDA statistics. We estimate cotton ginning sales in Arizona using an industry employee compensation event in IMPLAN. We converted annual wages to employee compensation values using the IMPLAN conversion factor for Support Activities for Agriculture and Forestry, where cotton ginning is included.

Economic Contribution

Cotton farming and ginning contribute to Arizona's economy through direct, indirect, and induced multiplier effects. Indirect effects measure economic activity generated by agriculture's demand for inputs or supplies, supporting local non-agricultural industries. Induced effects capture the economic activity created when households employed by Arizona farms and agricultural processing companies spend their earnings on local goods and services. This study uses the IMPLAN input-output model (IMPLAN Group, LLC, 2022) to estimate the economic contribution of cotton farming in Arizona.

The IMPLAN model was updated to reflect the most accurate values for crop, livestock, and poultry sales,[6] employment,[7] number of proprietors,[8] and subsequently, their compensation. The share of intermediate expenditures and value added in the total output for cotton farming, as well as the production functions, were updated using farm expense data from the 2022 Census of Agriculture. All these modifications were made following the most recent analysis of the economic contribution of agribusiness in Arizona.[9] Finally, a standard economic contribution analysis was completed, using IMPLAN's multi-industry contribution analysis method. The multi-contribution analysis method ensures that there is no double-counting. The analysis was made for the cotton farming sector and for support for agricultural activities (where cotton ginning is included).

Table 4. Summary of Estimated Values Used for Updating the Input-Output Model, 2022.

Category	Total Agriculture	Total Crops	Cotton Farming
Output (Sales)	$5,213,206,000	$3,051,031,000	$176,397,000
Number of Jobs	38,682	18,373	811
Share of Intermediate Inputs/Output	63%	57%	73%
Value Added/Output	37%	43%	27%

Source: Authors' estimates

The total contribution of cotton farming and ginning to Arizona's economy in 2022 was more than $322 million in sales (output). Cotton production directly contributed $185 million in sales. Of the total, $176 million comes from cotton farming and $9.6 million from cotton ginning.

Arizona's cotton production supported $59 million in labor income, including multiplier effects. Arizona's cotton production directly and indirectly supported 1,446 jobs, of which 862 jobs were directly in cotton farming, 188 were in cotton ginning, and 396 were in other Arizona industries. Including multiplier effects, the value added (Gross State Product) generated by cotton was nearly $132 million in 2022.

[6] Census of Agriculture 2022. Cash Receipts.
[7] Data from the Quarterly Census of Employment and Wages (QCEW), 2022. Annual average of monthly employment levels for a given year.
[8] Census of Agriculture 2022. Number of farms (proxy for number of proprietors).
[9] Available here.

Table 5. Economic Contribution of Cotton Farming and Ginning to Arizona's Economy, 2022 (in 2022 US Dollars)

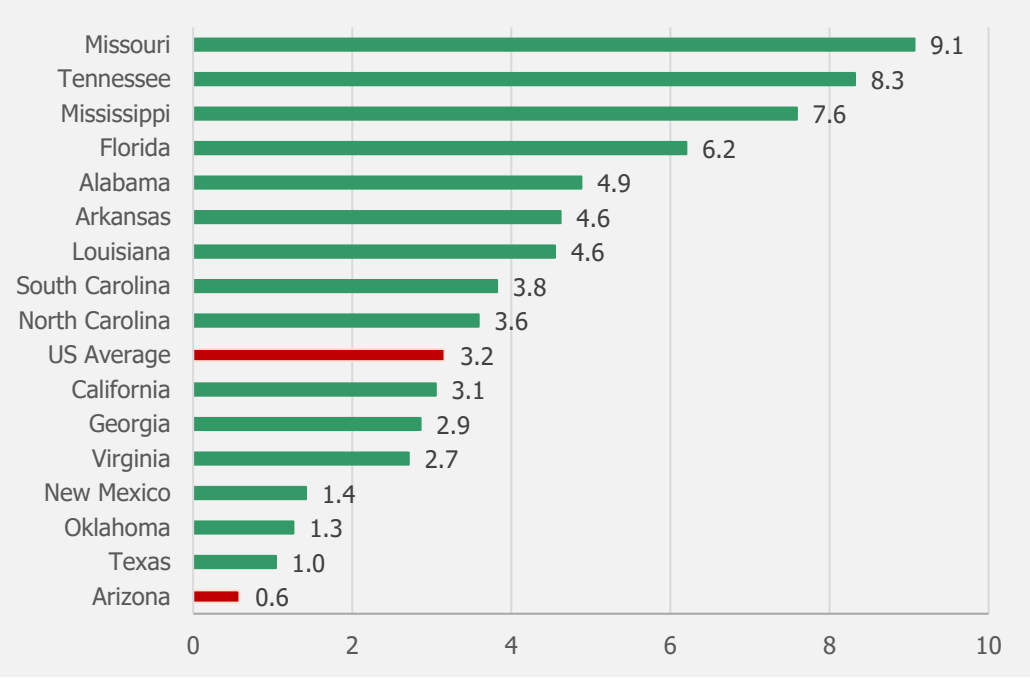
Impact	Employment	Labor Income	Value Added	Output
Direct Effects	1,050	$21,508,000	$56,629,000	$185,993,000
Cotton Farming	862	$13,394,000	$47,947,000	$176,397,000
Cotton Ginning	188	$8,114,000	$8,682,000	$9,596,000
Indirect Effects	395	$24,890,000	$49,441,000	$92,907,000
Induced Effects	230	$13,388,000	$25,585,000	$43,267,000
Total Effects	**1,675**	**$59,786,000**	**$131,655,000**	**$322,167,000**

Source: Authors' estimates

Reducing Pesticide Use

From 1990 to 1995, Arizona cotton growers averaged 9 insecticide applications per year at a cost of $244 per acre (in 2023 constant dollars) (Ellsworth *et al.*, 2010). These were primarily broad-spectrum pesticides that negatively impacted beneficial insects and cotton pest predators. Then, in the mid-1990s, a number of pest control innovations dramatically altered pesticide use in Arizona cotton. First, more selective insect growth regulators were introduced to control whiteflies (Oliveira *et al.,* 2001). Then, in 1996, transgenic cotton producing the insecticidal proteins of *Bacillus thuringiensis* Berliner (Bt) was introduced. Arizona growers rapidly adopted Bt cotton varieties, which effectively controlled pink bollworm (a major pest of Arizona cotton). From 1990 to 1995, Arizona cotton growers made an average of 2-3 insecticide applications per year for pink bollworm alone (Naranjo, 2010). By 1999, this dropped to zero on Bt cotton acres and has since dropped to zero on all cotton acres as pink bollworm has been effectively eradicated in the state (Tabashnik *et al.*, 2021). Pink bollworm eradication combined Bt cotton adoption with sterile insect releases and involved statewide cooperation among Arizona cotton growers. Later, more selective compounds were introduced to control the lygus and brown stink bug (Ellsworth and Fournier, 2025). These new compounds, combined with integrated pest management techniques relying less on insecticide applications and more on maintaining natural pest predator populations, proved highly effective. In 2022, more than a third of Arizona cotton acres received no foliar sprays for arthropod pests (University of Arizona, 2023). By 2023, this insecticide use dropped to just 0.58 applications per acre, reducing costs to just $17.51 per acre (Cook, 2023). Arizona's 0.58 insecticide applications per acre were the lowest among cotton producing states and less than one-fifth the U.S. national average of 3.2 applications (Figure 4).

Figure 4. Average Pesticide Application per Acre, 2023

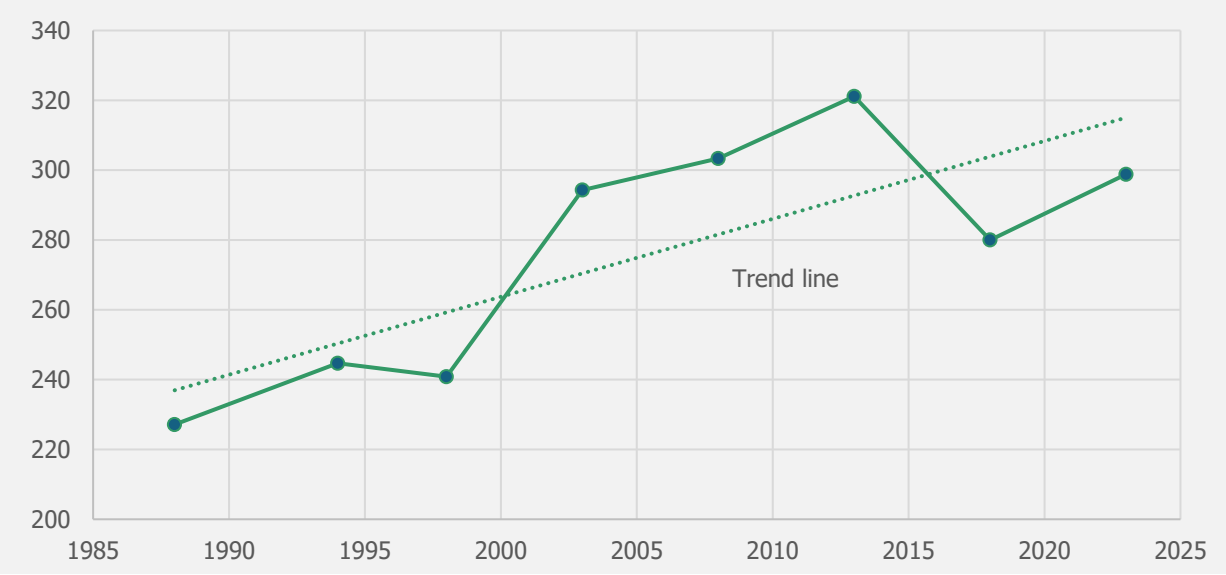


Source: Cook (2023)

Increasing Water Use Efficiency

Over the past 40 years, Arizona cotton growers have reduced water applications per acre while achieving higher yields. Water productivity can be measured in terms of "crop per drop" – the quantity of crop produced for a given amount of water applied. In 1984, Arizona cotton growers applied 4.9 acre-feet of irrigation water per acre, while obtaining 242 pounds of cotton lint per acre-foot applied. An acre-foot equals 325,850 gallons and is the volume of water needed to cover one acre of land to a depth of one foot. By 2023, growers reduced application rates to 4.2 acre-foot per acre, achieving production of 299 pounds of cotton lint per acre-foot applied (Figure 5). This represents a 32% increase in the amount of cotton produced per acre-foot of water applied.

Figure 5. Trends in Arizona Cotton Production per Acre-Foot of Irrigation Water Applied, 1984-2023



Source: Water applied per acre comes from the USDA Farm and Ranch Irrigation Survey (various years). Cotton yield per acre comes from the USDA NASS database. Cotton production per acre-foot of water equals yield (output per acre) divided by the acre-foot foot water applied per acre.

Water use can also be measured in terms of a "water footprint" – the amount of water used to generate a certain amount of crop output. In 1984, growers applied 1.98 acre-feet per bale of cotton produced. By 2023, growers applied 1.61 acre-feet per bale. This represents a 24% drop in the amount of water applied to grow one bale of cotton.

Appendix A: Cotton Farming Sales

All economic contribution estimates are based on 2022 data, as this is the most recent year for which detailed spending patterns are available through the Census of Agriculture. We use this information to modify the original model to measure the economic activity generated by cotton farming more accurately. Since cash receipt data for cotton farming in Arizona is often unavailable due to confidentiality restrictions, we compared cotton sales using multiple sources: the 2022 Census of Agriculture, USDA NASS, USDA Economic Research Service (ERS), and IMPLAN (IMPLAN LLC, 2022). To assess the robustness of our results, we also estimated cotton sales for 2023. Table A1 presents the results.

Table A1: Cotton and Cottonseed Sales Estimation

Output (Sales)	2022	2023
2022 Census of Agriculture*	$165,905,000	--
ERS	$176,397,000	$147,473,000
IMPLAN	$194,756,000	$165,382,000
USDA NASS*	$185,676,000	$142,427,760

**Estimated Values*
Source: 2022 Census of Agriculture, USDA NASS (2025), ERS (2025), and IMPLAN LLC (various years).

The estimated values for 2023 are consistently lower across all data sources. However, as shown in Table A2, this decline primarily reflects a reduction in production volume for upland cotton and lower market prices for Pima cotton, rather than any structural shifts within the cotton sector. Therefore, we assume that the underlying production processes and spending patterns observed in 2022 remain representative. As a result, the estimated economic contribution and multipliers for 2022 should be consistent with those of 2023.

Table A2: Production Levels and Prices of Upland and Pima Cotton

Category	AZ Production (1,000 bales)		National Price (per pound)	
	2022	2023	2022	2023
Upland cotton	280	208	$0.85	$0.91
Pima cotton	28	30	$1.77	$1.45

Estimated Values
Source: USDA NASS (2024), USDA AMS (2024)

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