WHO, WHAT, AND WHERE: COTTON PRODUCTION IN THE UNITED STATES 1997-2012

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Abstract

The "who, what and where" of cotton (*Gossypium hirsutum* L.) production in the United States has changed since 1997. Using Census of Agriculture data from 1997, 2002, 2007, and 2012, three general questions are considered: 1) Who are cotton producers; 2) What types of operations are producing cotton; and 3) Where are cotton operations located? More specifically, the number of farms classified as cotton farms declined, but how was that change distributed across the Cotton Belt? Furthermore, how have principal operator characteristics changed during this time period? In order to make informed research and policy decisions, it is important to understand how cotton production has changed across the Cotton Belt since 1997.

Introduction

In 2013, cotton (*Gossypium hirsutum* L.) producers across the United States (U.S.) produced approximately 5.2 billion US$ of cotton (USDA-NASS 2014). Cotton provides the highest cash receipts of any crop for many states that produce cotton, such as Texas and Georgia. The Census of Agriculture provides an important glimpse into the "who, what and where" of cotton production in the U.S., and the ability to investigate the change in cotton production from 1997 to 2012. The objective of this analysis is to use Census of Agriculture data from 1997, 2002, 2007, and 2012, to investigate three general questions: 1) Who are cotton producers; 2) What types of operations are producing cotton; and 3) Where are cotton operations located? More specifically, the number of farms classified as cotton farms declined, but how was that change distributed across the Cotton Belt? Furthermore, how have principal operator characteristics changed during this time period? In order to make informed research and policy decisions, it is important to understand how cotton production has changed across the Cotton Belt since 1997.

Materials and Methods

Using publically available data from the Census of Agriculture conducted in 1997, 2002, 2007, and 2012 (USDA-NASS 2014) and a special compilation of Census of Agriculture data for 1997, 2002, and 2007 for Cotton Incorporated (USDA-NASS 1997, 2002, 2007), general comparisons were made between 1997 and 2012. Based on the Census of Agriculture data, there are several ways to define a cotton producer. In the Census of Agriculture, operations are grouped using the North American Industry Classification System (NAICS). The NAICS is based on the primary business activity of the operation and is used to classify economic activities in North America. Cotton operations are classified at the four digit level as *Other Crop Farming (1119)* and at the five-digit level as *Cotton Farming (11192)*. This definition of cotton operations will be identified as "NAICS cotton farms". Cotton operations can also be defined as an operation that harvests at least one acre of cotton, similar to the definition used in the United States Department of Agriculture – Economic Research Service (USDA-ERS) Publication, "Characteristics and Production Costs of U.S. Cotton Farms, 2007" (Foreman 2012). This definition of cotton operations will be identified as "Harvested cotton farms". Data using both definitions will be discussed in the following section.

Results and Discussion

Across the U.S., the number of agricultural operations with cropland declined from 1997 to 2012 by 16.54% and cropland acres associated with those operations declined by 12.49%, as shown in Table 1.

Table 1. Number of Operations with cropland, acres of cropland, and average farm size for 1997, 2002, 2007, and 2012 (USDA-NASS 2014).

Year	Operations	Cropland	Average Size
	(number)	(acres)	(acres)
1997	1,857,239	445,324,765	240
2002	1,751,450	434,164,946	248
2007	1,685,339	406,424,909	241
2012	1,551,654	389,690,414	251
% Change from 1997 - 2012	-16.45%	-12.49%	4.74%

The average farm size increased by 11 acres (4.74%) over this time period. When considering only the NAICS cotton farms, the number of operations with cropland decreased by 53.06% and the acres associated with those operations decreased by 46.78%, as shown in Table 2. The average farm size of NAICS cotton farms increased by 121 acres (13.38%). As compared to the general agricultural population, NAICS cotton farms increased in size and decreased in number at a greater rate. A reduction in NAICS cotton farms does not mean that those operations no longer exist, it just means that they are no longer classified as cotton farms by NAICS. For harvested cotton farms, the number of operations decreased by 42.4% from 1997 to 2012 (Table 3). The data on acres of cropland on those operations is not currently available.

Table2. Number of Operations with cropland, acres of cropland, and average farm size for 1997, 2002, 2007, and 2012 for operations classified as NAICS cotton farms (NAICS 11192) (USDA-NASS 2014).

Year	Operations	Cropland	Average Size
	(number)	(acres)	(acres)
1997	18,994	17,083,425	899
2002	14,476	14,589,663	1,008
2007	9,968	10,976,689	1,101
2012	8,915	9,091,136	1,020
% Change from 1997 - 2012	-53.06%	-46.78%	13.38%

Table 3. Number of Operations with cropland for operations classified as NAICS cotton farms (NAICS 11192), harvested cotton farms (operations with at least 1 acres of harvested cotton), and operations that sold cotton for 1997, 2002, 2007, and 2012 (USDA-NASS 1997, 2002, 2007, 2014).

Year	NAICS 11192	Harvested Cotton	Sold Cotton
	(number of operations)		
1997	18,994	31,492	31,455
2002	14,476	24,805	24,721
2007	9,968	18,605	18,591
2012	8,915	18,155	18,143
% Change from 1997 – 2012	-53.06%	-42.4%	-42.3%

Cotton producers in the U.S. increased their productivity per acre between 1997 and 2012 due in large part to changes in seed technology (Table 4). In 1997 on NAICS cotton farms, there were approximately 9.9 million acres of harvested cotton (2.23% of total cropland), and in 2012, that number fell to approximately 5.5 million acres (1.40% of total cropland). Total production also fell during this time; however, per acre production increased from 1.34 bales per acre to 1.67 bales per acre. Similarly, on harvested cotton farms, cotton acres decrease from 13.2 million acres (2.97% of total cropland) in 1997 to 9.4 million acres (2.41% of total cropland) in 2012. Following the same pattern as NAICS cotton farms, per acre production increased from 1.35 bales per acre to 1.76 bales per acre.

Table 4. Acres of harvested cotton and total cotton production for operations classified as NAICS cotton farms (NAICS 11192) and harvested cotton farms (operations with at least one acre of harvested cotton) for 1997 and 2012 (USDA-NASS 1997, 2014).

Year	Harvested Cotton (acres)	% of Total Cropland (%)	Production (bales)	Production (Bales/acre)
		NAICS Cotton Farms		
1997	9,941,101	2.23	13,305,198	1.34
2012	5,458,151	1.40	9,087,508	1.67
		Harvested Cotton Farms		
1997	13,235,201	2.97	17,878,721	1.35
2012	9,384,080	2.41	16,534,302	1.76

The number of NAICS cotton farms declined in every cotton production state from 1997 to 2012 except for Kansas, which increased 157% (Figure 1). Louisiana, California, and Arkansas experienced the largest decline in NAICS cotton farms (88%, 78%, and 75%, respectively). Virginia, South Carolina, and North Carolina experienced the smallest decline (13%, 22%, and 32%, respectively). Cropland acres on NAICS cotton farms declined from 1997 to 2012, as shown in Figure 2. Data on cropland acres on NAICS cotton farms for Missouri, Kansas, Florida, and South Carolina were not available for 2012. Louisiana, Mississippi, and California experienced the greatest decline in cropland acres on NAICS cotton farms (89%, 82%, and 71%, respectively). Virginia, Georgia, and North Carolina experienced the smallest decline in cropland acres on NAICS cotton farms (8%, 25%, and 26%, respectively).

While there are a number of demographic characteristics of operations available in the Census of Agriculture, age of principal operator, years on the present farm, gender, and primary occupation were considered in this paper. There was a shift in the age distribution of principal operators of NAICS cotton farms between 1997 and 2012. In 1997, approximately 23% of principal operators of NAICS cotton farms were between 35 and 44 years old with approximately 13% between the ages of 45 and 49. Operations with principal operators 70 years old and older comprised 12% of total NAICS cotton farms. In 2012 (15 years later), the distribution shifted to the older age brackets. The percent of operations with principal operators 55 years old or older increased from 42% in 1997 to 56.5% in 2012.

In 1997, the average years on the present farm by principal operators was 21 years. In 2012 the average years on the present farm increased to 25.9 years. Across all operations in the U.S., the percent of operations with female principal operators increased from 9% to 14%. For NAICS cotton farms, the increase was much smaller. The percent of NAICS cotton operations with female principal operators increased from 4% in 1997 to 5% in 2012. The percent of operations with principal operators whose primary occupation was farming decreased from 82% in 1997 to 81% in 2012; however, this is higher than the percent of operations whose principal operators' primary occupation was farming across all farms, which was 48% in 2012 (up from 47% in 1997). This indicates NAICS cotton farmers are more likely to claim farming as their primary occupation than the average farmer in the U.S.

In 1997, 71.53% of cotton acres were part of NAICS cotton farms; however, in 2012, that number fell to 58.16%. While this could have been caused by producers becoming more diversified, this shift needs additional attention in future research. Cropland on NAICS cotton farms is allocated primarily to cotton, corn, sorghum, hay, soybeans, peanuts, and all other crops (includes all other crops aside from the ones previously listed), as shown in Figure 3. From 1997 to 2012, NAICS cotton farms allocated more acres to cotton, peanuts, and all other crops. The percent of cropland allocated to corn, sorghum, and soybeans decreased over this time period, and hay remained stable.

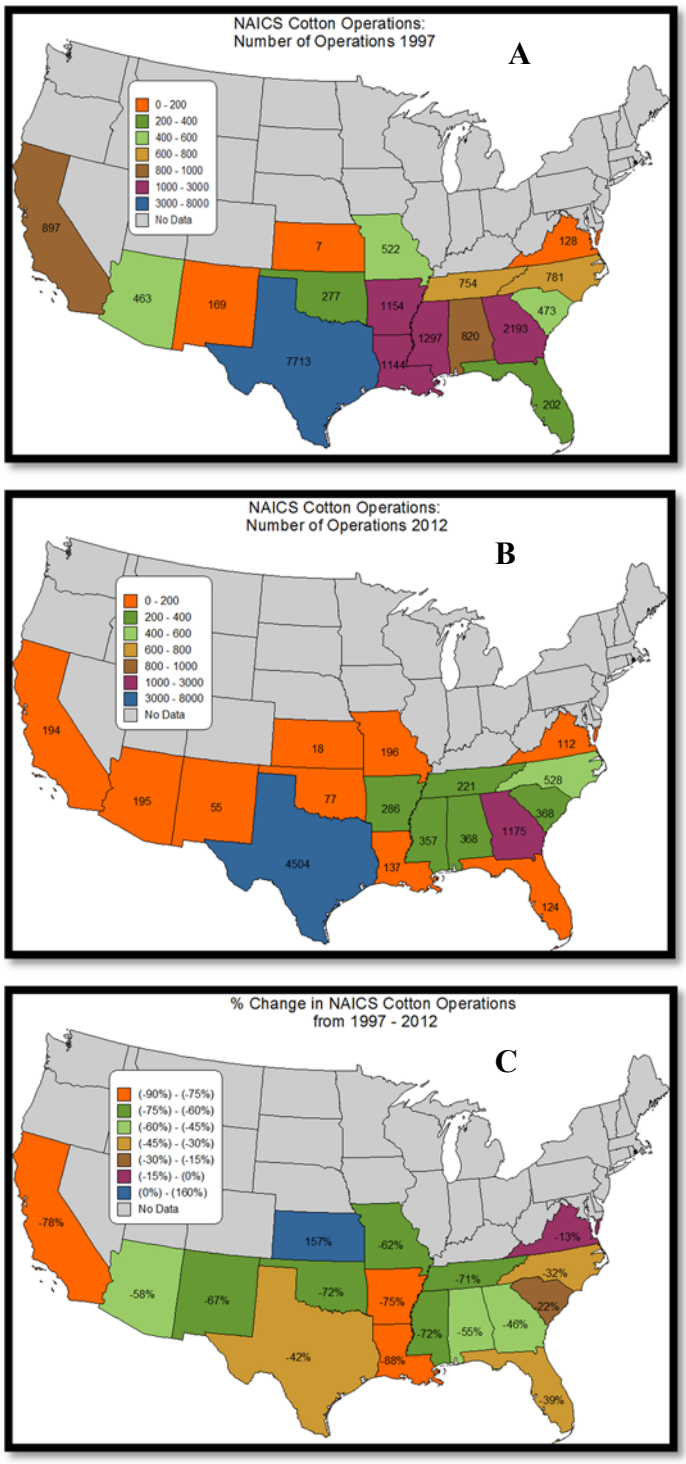

Figure 1. Number of NAICS cotton farms in 1997 (A) and 2012 (B) and the percent change in NAICS cotton farms between 1997 and 2012 (C) (USDA-NASS 1997, 2014).

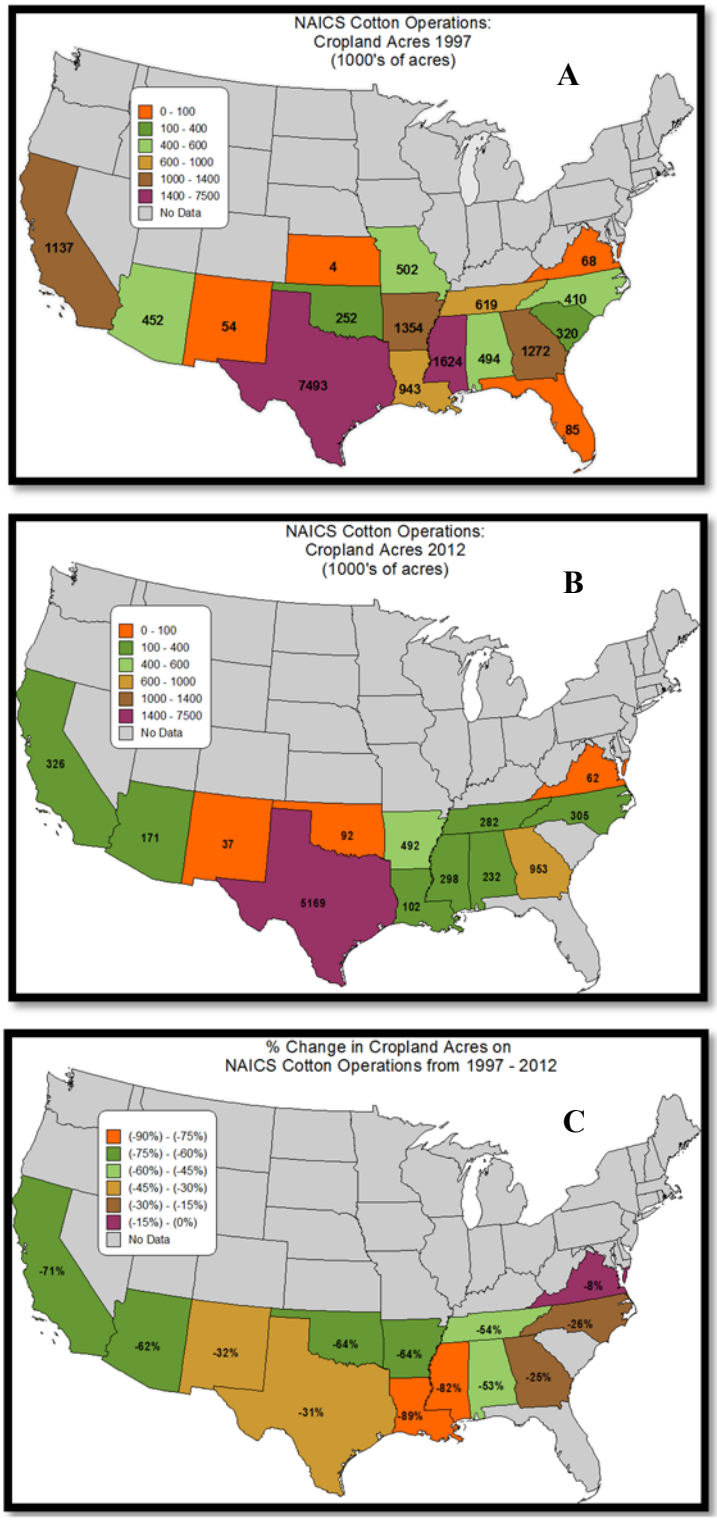

Figure 2. Acres of cropland on NAICS cotton farms in 1997 (A) and 2012 (B) and the percent change in cropland acres on NAICS cotton farms between 1997 and 2012 (C) (USDA-NASS 1997, 2014).

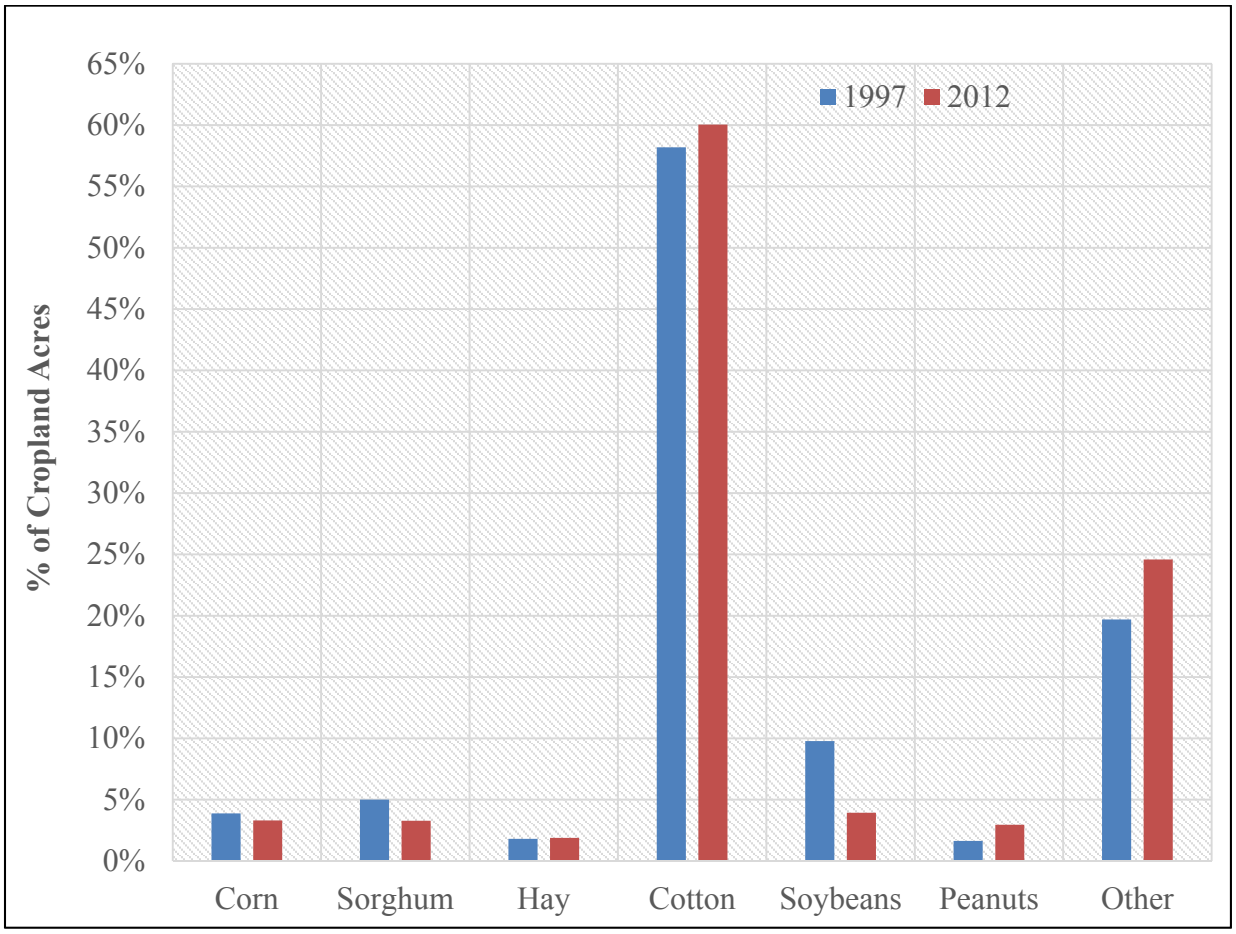

Figure 3. Percent of cropland acres by crops grown on NAICS cotton farms.

When considering harvested cotton farms, the types of operations by NAICS that harvested cotton were dominated by cotton farms (NAICS 11192) as expected in 1997 and 2012; however, NAICS cotton farms comprised a smaller percentage of harvested cotton farms in 2012, as shown in Figure 4. In 1997, operations classified as all other crops (NAICS 11193, 11194, and 1995) comprised approximately 16.8% of harvested cotton farms, and the share increased to 19.32% in 2012. The third largest classification (in terms of number of operations) in 1997 was oilseed/grain farms (NAICS 1111). From 1997 to 2012 the share of oilseed/grain farms increased from 13.4% to 24.9%, as was the second largest classification. Oilseed and grain farms comprised approximately one-quarter of harvested cotton farms in 2012. In 1997, the top three NAICS groups (cotton farms, all other crops, and oilseed and grain farms) accounted for 90.5% of harvested cotton farms. This share grew to 93.3% in 2012; however, the distribution within the three groups changed – with NAICS cotton farms losing shares and the other two groups gaining shares. This would lead one to conclude that harvested cotton farms diversified between 1997 and 2012.

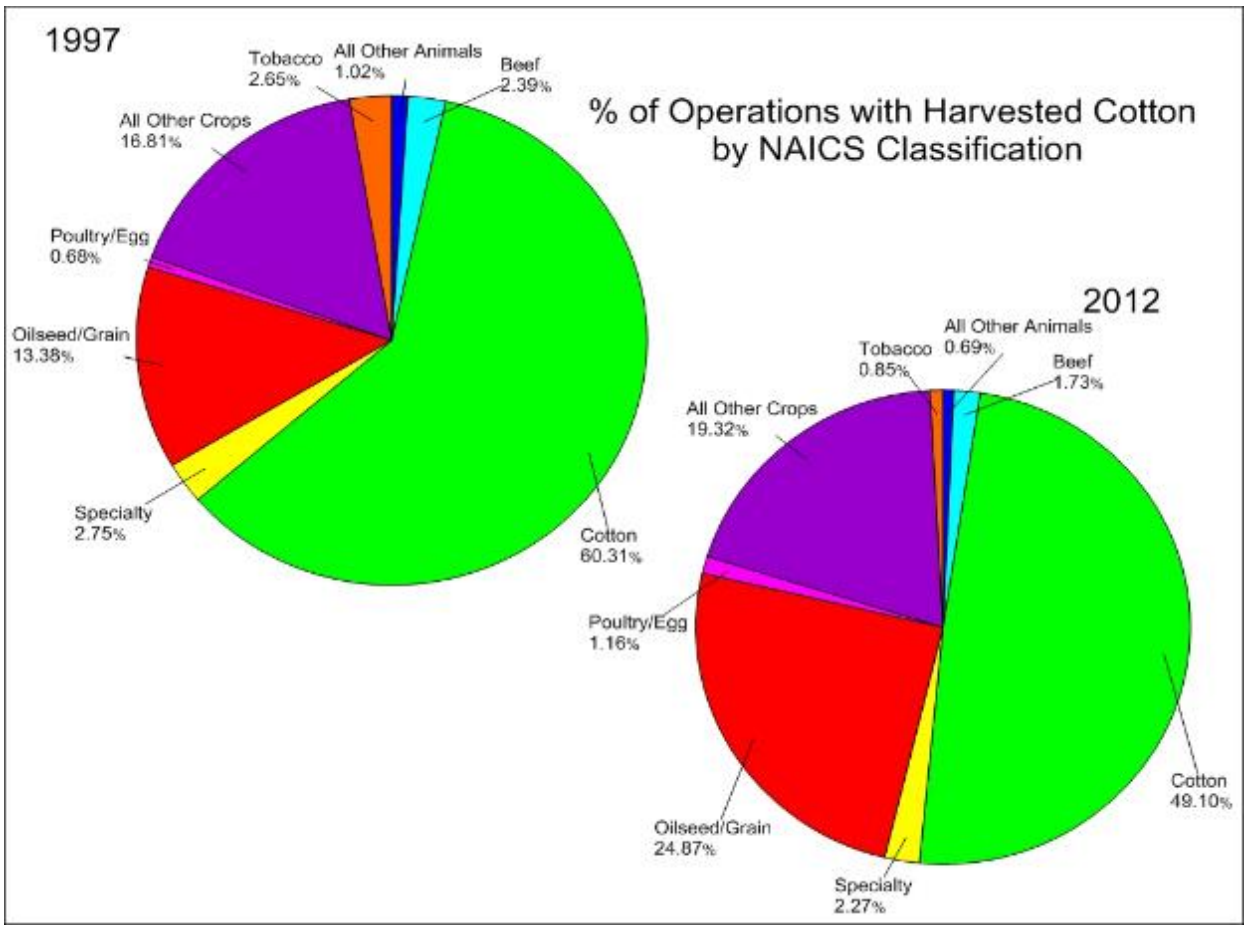

Figure 4. Percent of harvested cotton farms by NAICS.

Lastly, in the Census of Agriculture, operations are classified by economic class. Operations are placed in an economic class based on the sum of market value of agricultural products sold and federal farm programs. In 1997, operations classified as NAICS cotton farms (NAICS 11192) and harvested cotton farms had similar distributions across 11 economic classes, with a larger percentage of NAICS cotton farms than harvested cotton farms in the economic classes between 250,000 US$ to $499,999 US$ and $1,000,000 and more, as shown in Figure 5. Also, in 1997, only 17% of NAICS cotton farms were in economic class 500,000 US$ and above. The percent of harvested cotton farms was slightly higher at 21%. In 2012, there was a distinct shift in the distribution across the ten economic classes. Approximately 33% of NAICS cotton farms and 50% of harvested cotton farms were in an economic class 500,000 US$ and above.

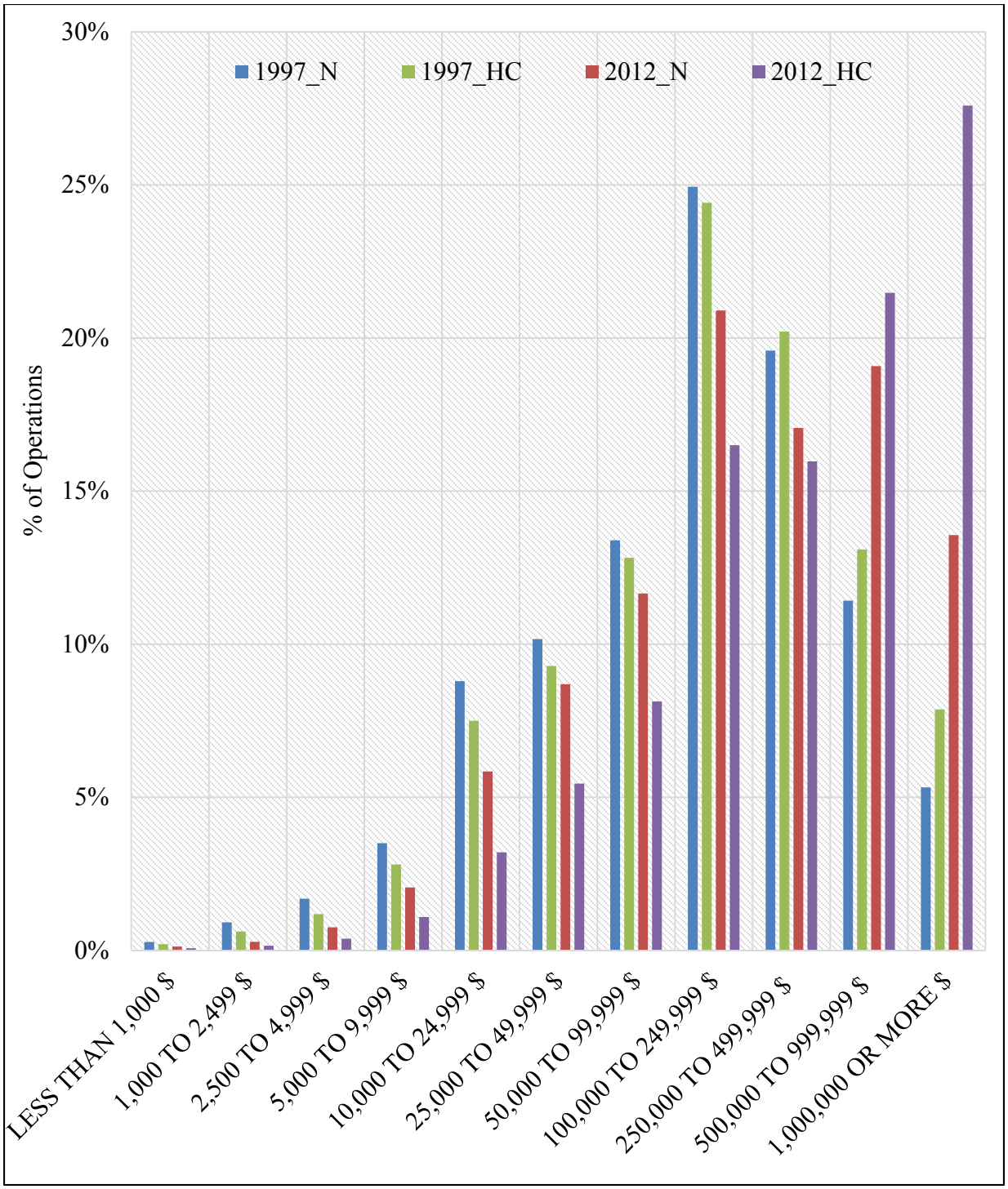

Figure 5. Percent of NAICS 11192 cotton farms (N) and operations with at least one acre of harvested cotton (HC) in 1997 and 2012 by economic class.

Summary

From 1997 to 2012, cotton farms decreased in number and total operated acreage for both NAICS cotton farms and harvested cotton farms. In 2012, less cotton was being produced on NAICS cotton farms than in 1997. The majority of principal operators of NAICS cotton farms in 2012 were 55 years old or older. Furthermore, only 5% of NAICS cotton farms had female principal operators of NAICS cotton farms in 2012 and approximately 80% of NAICS cotton

farms had principal operators whose primary occupation was farming. Overall, the average farm size of NAICS cotton farms and harvested cotton farms increased, and they became more diversified over this time period.

This analysis raises additional questions. First, does the age of cotton farmers impact the classification as NAICS cotton farms? Secondly, what factors have impacted the change in the distribution of operations across economic classes between 1997 and 2012? Third, did diversification or another combination of factors contribute to lower cotton acres from 1997 to 2012?

References

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