

The Spread and Extent of Irrigation in South Carolina by Crop Group from 1997 to 2012

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Background

Irrigated farm land in South Carolina (SC) increased 538 percent from 1959 to 2012 (Census Bureau 1962, p. 2; NASS 2014, p. 338). Harvested cropland accounted for 93 to 98 percent of irrigated areas in South Carolina during 1997 to 2012, while pasture accounted for the remainder (NASS 2004, p. 324; NASS 2014, p. 338). Harvested cropland consists of land from which crops were harvested and hay was cut, land used to grow short-rotation woody crops or Christmas trees, and land in orchards, groves, vineyards, berries, nurseries, and greenhouses (NASS 2014 p. B-11).

Farmers in South Carolina and elsewhere irrigate to increase their yields. Yields of corn for grain, cotton, peanuts, soybeans, and wheat were 24.5 percent higher on irrigated than non-irrigated harvested land in 2012 and 53.6 percent higher in 2007. Irrigation was not the only reason, however, for the exceedances.

Farmers also irrigate to reduce their risks, some of which depend on climatic variability. Timely irrigation can prevent crop failure or at the least reduce variation in yield and quality. Farmers can even use irrigation to adapt to long-term changes in climate.

Have the number of irrigators increased and has irrigation also spread in South Carolina during 1997-2012? What has been the spread and extent of irrigation by groups of crops during the same period? Answers to these questions are based on data from the four, most recent Censuses of Agriculture.

Farms that Irrigate

The number and proportion of farms that irrigated in South Carolina increased from 1997 to 2002 and then remained approximately constant from 2002 to 2012 (Table 1).

Table 1: Number of Farms with Irrigated Land and All Farms in SC

Year	All Farms	Irrigating Farms	Share of Irrigating Farms (%)
1997	25,807	1,435	5.56
2002	24,541	1,918	7.82
2007	25,867	2,030	7.85
2012	25,266	1,973	7.81

Sources: Tables 8 and 10 (pp. 297 and 324), NASS 2004 and Tables 8 and 10 (pp. 314 and 338), NASS 2014

Land in Farms

The irrigated area and share of farmland steadily increased in each census after 1997 (Table 2). The irrigated area and share of land in farms increased 79 percent from 1997 to 2012 in South Carolina. In spite of the spread of irrigation in the state, farmland was unlikely to be irrigated in this fifteen-year period. For example, the probability that an acre of farmland was irrigated in 2012 was 3.2 percent.

Table 2: Total Land in Farms*, Irrigated Land in Farms, and Irrigated Share of Farmland in SC

Year	Total Area (Acres)	Irrigated Area (Acres)	Irrigated Share (%)
1997	4,974,138	88,898	1.79
2002	4,845,923	95,642	1.97
2007	4,889,339	132,439	2.71
2012	4,971,244	159,239	3.20

Sources: Tables 8 and 10 (pp. 297 and 324), NASS 2004 and Tables 8 and 10 (pp. 314 and 338), NASS 2014

* Land in farms consists primarily of agricultural land used for crops, pasture, or grazing but also includes woodland and wasteland not actually under cultivation or used for pasture or grazing, provided they are part of the farmer's total operation (NASS 2014, p. B-13).

Top Five Field Crops

The total harvested areas of corn for grain, cotton, peanuts, soybeans, and wheat have been the largest five harvested areas of any crop in South Carolina. Although the irrigated harvested area of these five crops slightly decreased from 1997 to 2002, it increased in

the remaining two census years and 130 percent from 1997 to 2012 (Table 3). The irrigated share of the total harvested area of these crops grew steadily and increased 175 percent during the fifteen-year period (Table 3). Although irrigated and harvested area of these field crops accounted for 43.4 to 64.4 percent of all irrigated land in farms during the 15-year period (Figures 2 – 5), these field crops were among the least likely crops to be irrigated (Figure 1).

Table 3: Total Area Harvested, Irrigated Area Harvested, and Irrigated Share of Harvested Area for Top Five Field Crops in SC

Year	Total Area (Acres)	Irrigated Area (Acres)	Irrigated Share (%)
1997	1,462,665	44,546	3.05
2002	964,897	41,475*	4.30
2007	1,166,413	66,780	5.72
2012	1,222,820	102,580	8.39

Sources: Tables 24 and 25 (pp. 418-419 and 428-433), NASS 2004 and Table 25 (pp. 430-442), NASS 2014.

* The irrigated area of peanuts harvested in 2002 was imputed.

Vegetables and Melons

Although the irrigated area and irrigated share of land used for vegetables and melons decreased from 1997 to 2002, they increased from 2002 to 2012 (Table 4). Overall, the irrigated area and irrigated share of land used for these crops increased 27 percent and 48 percent from 1997 to 2012 (Table 4). The likelihood of vegetables and melons being irrigated rose during the same period (Figure 1). Indeed, vegetables and melons were the most likely group of crops to be irrigated in 2007 and 2012 (Figure 1). Nonetheless, the area of irrigated land used for vegetables and melons accounted for only 10.2 to 15.3 percent of all irrigated land (Figures 2 – 5).

Table 4: Total Area, Irrigated Area, and Irrigated Share of Land Used for Vegetables* in SC

Year	Total Area (Acres)	Irrigated Area (Acres)	Irrigated Share (%)
1997	29,583	13,585	45.9
2002	29,025	11,460	39.5
2007	25,809	13,456	52.1
2012	25,373	17,242	68.0

Sources: Table 28 (p. 453), NASS 2004 and Table 28 (p. 463), NASS 2014

* 'Vegetables' includes melons, potatoes, sweet corn, and sweet potatoes (NASS 2014, p. B-33). Land used for vegetables is the land from which vegetables were harvested at least once (NASS 2014, p. B-13). If vegetables were harvested more than once, however, the relevant area was counted only once.

Tree Fruits, Grapes, Citrus, and Nuts

The irrigated area of land in orchards increased 10.7 percent from 1997 to 2012 (Table 5). The irrigated share of land in orchards increased 25.8 percent from 1997 to 2002 and was almost the same ten years later in 2012 (Table 5). Tree fruit, grapes, citrus, and nuts were the second most likely group of crops to be irrigated in 2002 and 2007 and tied for the second in 2012 (Figure 1). Orchard land's share of all irrigated land in South Carolina fell from 11.3 percent in 1997 to 7.0 percent in 2012 (Figures 2 – 5).

Table 5: Total Area, Irrigated Area, and Irrigated Share of Land in Orchards* in SC

Year	Total Area (Acres)	Irrigated Area (Acres)	Irrigated Share (%)
1997	25,953	10,004	38.6
2002	24,389	11,825	48.5
2007	22,185	10,240	46.2
2012	23,059	11,070	48.0

Sources: Table 30 (p. 481), NASS 2004 and Table 30 (p. 497), NASS 2014

* Land in orchards comprises land in bearing- or nonbearing-age fruit trees, citrus or other groves, vineyards, and nut trees and includes land on which these crops failed (NASS 2014, p. B-13).

Berries

The irrigated area of land in berries increased 24.1 percent during 1997-2012 (Table 6). However, the irrigated share of land in berries decreased 24.4 percent during the same period because non-irrigated land in berries increased proportionally more. Berries were the most likely crops to be irrigated in 1997 and 2002 and the second most likely crops to be irrigated in 2012 (Figure 1). Nonetheless, irrigated berry land accounted for only 0.6 to 0.3 percent of all irrigated land during 1997-2012 (Figures 2 – 5).

Table 6: Total Area, Irrigated Area, and Irrigated Share of Land in Berries* in SC

Year	Total Area (Acres)	Irrigated Area (Acres)	Irrigated Share (%)
1997	883	565	64.0
2002	701	490	69.9
2007	993	398	40.1
2012	1,450	701	48.3

Sources: Table 32 (p. 495), NASS 2004 and Table 32 (p. 515), NASS 2012

* Land in berries is where harvested or unharvested berries are grown (NASS 2014, p. B-35). 'Berries' includes blackberries, dewberries, blueberries, raspberries, and strawberries (NASS 2014, pp. 516-520).

Forage

Forage is plant material that grazing livestock eat in pastures or that is cut for fodder and carried to the animals. Forage crops, which include hay, are cut or harvested (NASS 2014, pp. B-10 and B-31). Land for forage crops, but not pasture, is part of cropland (NASS 2014, pp. B-11, B-18, and B-28). The irrigated area of land for forage, that is, pasture plus land for forage crops, increased 9.6 percent from 2002 to 2012 (Table 7). The irrigated share of land for forage increased 41.7 percent from 2002 to 2012. Forage was the least likely group of agricultural plants to be irrigated (Figure 1). Irrigated land for forage accounted for 6.3 to 11.9 percent of all irrigated land during 2002-2012 (Figures 2 – 5).

Table 7: Total Area, Irrigated Area, and Irrigated Share of Land for Forage in SC

Year	Total Area (Acres)	Irrigated Area (Acres)	Irrigated Share (%)
1997*	1,167,197	1,516	0.130
2002	1,562,122	9,194	0.589
2007	1,441,772	15,823	1.097
2012	1,207,891	10,077	0.834

Sources: Table 26 (p. 445), NASS 2004 and Table 26 (p. 450), NASS 2014 for forage-crop land; Quick Stats, NASS for pasture

* Figures for 1997 pertain only to pasture. Separate data on total and irrigated land for forage crops were not collected for 1997. The irrigated area that includes land in forage crops was probably less in 1997 than in 2002. Irrigated forage-crop land did not exceed 6,797 acres in the three Census years after 1997.

Conclusion

Although increases in the number and share of irrigators ceased (Table 1), the expansion of irrigation in South Carolina occurred for all types of crops and forage during 1997-2012. That is, the increase in the irrigated area of land in farms was reflected in increases in the irrigated areas of the top-five field crops, land for vegetables and melons, land in tree fruits, grapes, citrus, and nuts, land in berries, and forage (Tables 2 – 7).

The increases in the irrigated share of farmland were reflected in increases in irrigated shares of all types of crops, except berries, and forage (Figure 1). In other words, the probability of forage or specific types of crops being irrigated increased from 1997 to 2012 and the probability of berries being irrigated increased from 2007 to 2012.

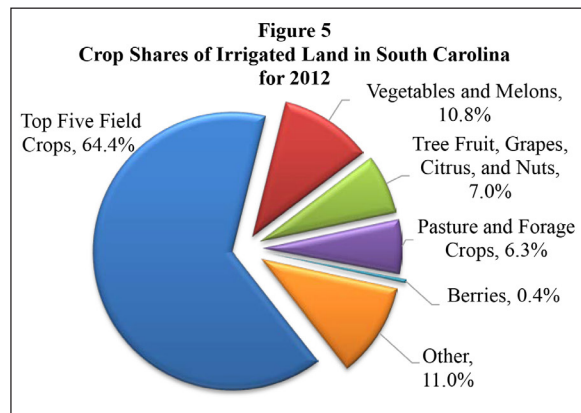
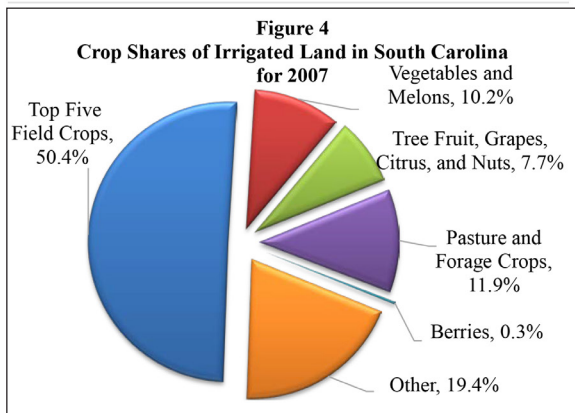
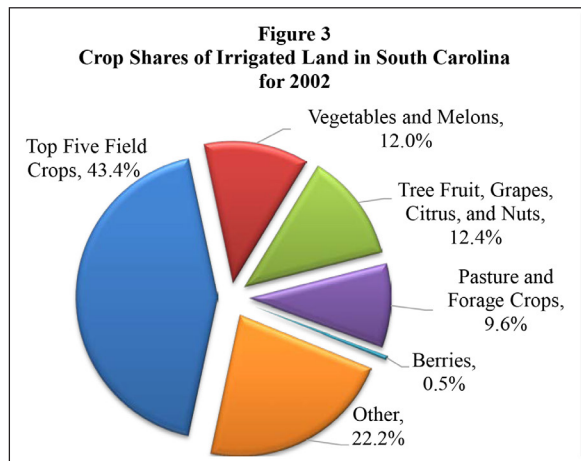
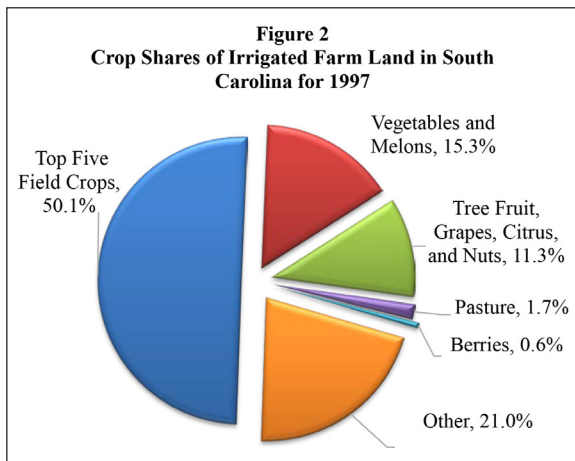
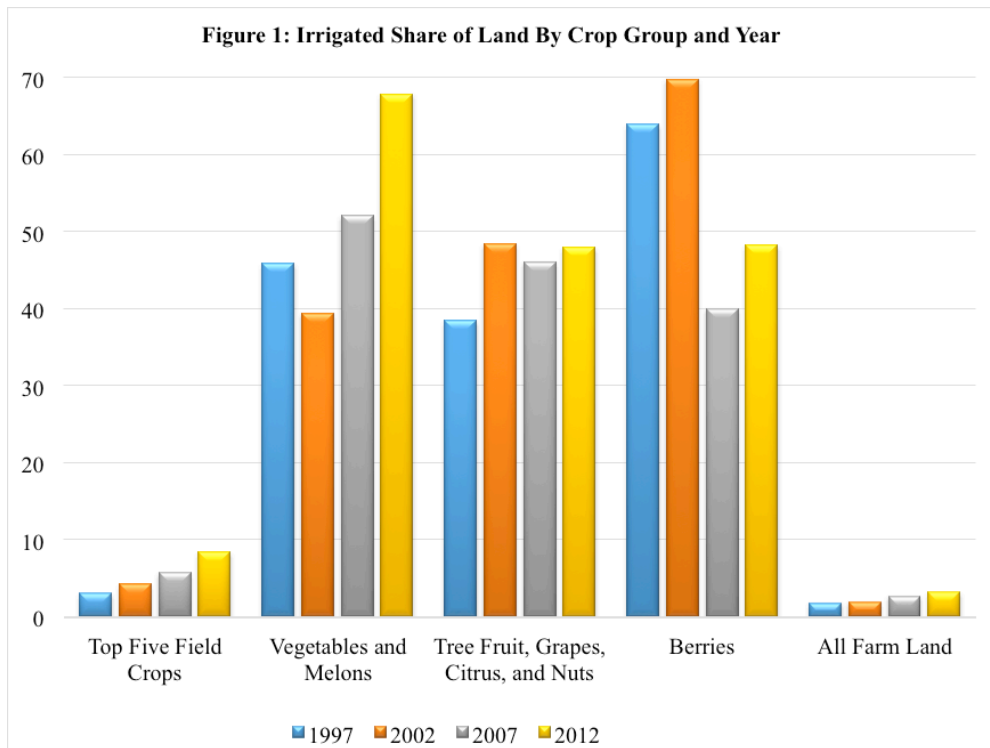
The largest expansion of irrigated area occurred for the top five field crops. Although probabilities of these crops being irrigated were relatively low during 1997-2012, the crops’s irrigated shares of all irrigated farm land were the largest during the 15-year period because the crops were so widely planted.

The probabilities of berries, other fruits, nuts, and vegetables being irrigated in South Carolina during 1997-2012 were relatively high (Figure 1). These crops are considered ‘high-value’; the returns per acre tend to be high. However, the irrigated areas of berries, other fruits, nuts, and vegetables accounted for only 18.2 to 27.2 percent of all irrigated farm land during the 15-year period (Figures 2 – 5) because they were not widely planted.

What have been the key drivers of adoption and expansion of irrigation and increases in the probabilities of crops being irrigated? Extension, farmer learning from irrigating neighbors, access to credit, federal cost-sharing for irrigation equipment, reductions in market costs of irrigation, and increases in demand for the state’s agricultural products are the most likely drivers and merit the attention in future research.

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