Sustainability vs. Profitability: Which Will be the Downfall of King Cotton?

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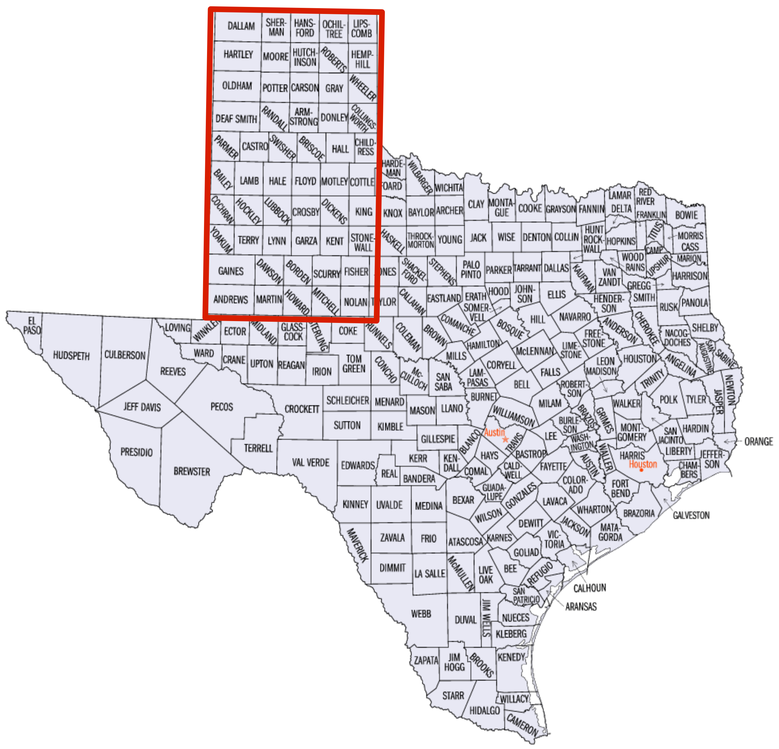
Introduction

Cotton (*Gossypium hirsutum* L.) has long been the most profitable crop on the Texas High Plains (Figure 1). However, with continuing depletion of the Ogallala Aquifer levels, water-efficient, alternative crops have never been more important for sustainable crop production in this region. In this decade, years of a devastating drought even with supplemental irrigation has not provided sufficient water to make a sustainable and profitable cotton crop. Producers need profitable, alternative crops such as guar, sorghum, safflower, and sesame for inclusion in their crop rotations. These five selected crops are able to produce reasonable yields without irrigation during years with average or above precipitation. Our hypothesis is that growing water-saving crops on a portion of the crop land will allow concentration of supplemental irrigation on high value cotton crops and ultimately improve the sustainability of alternative crops in the Texas High Plains agricultural industry.

Objective

Calculate the break-even price for selected alternative crops that would be able compete with an average two-bale cotton crop on the Texas High Plains.

Figure 1. The Texas High Plains covers 54 counties enclosed by the box below.



Materials and Methods

All data for this study was derived from Texas A&M Agrilife Research Extension budgets gathered and updated each year for projecting the return on each crop for the upcoming season. The following formula was used to calculate break-even price for each of the alternative crops discussed in this paper:

$$\pi = P_{CT}Y_{CT} + P_{G}Y_{G} + P_{SG}Y_{SG} + P_{SM}Y_{SM} - C_{CT} - C_{G} - C_{SG} - C_{SM}$$

CT, G, SG, SM stand for cotton, guar, sorghum, and sesame, respectively; while P, Y, C stand for price, yield, and cost, respectively. The formula minimizes profit to derive the break-even price for each crop compared with a two-bale cotton crop. Three yield levels used for all crops was based on a +/- 20% difference off of an average yield found on the Agrilife budgets. The average, estimated yield levels used for cotton lint, guar, sorghum, and sesame are 1250, 1000, 5500, and 1500 lbs/acre, respectively. The variable costs for producing each crop was also be attained from the Agrilife budgets.

Table 1. The current prices, estimated gross income per acre, variable costs, and net income of four crops adapted to the Texas High Plains.

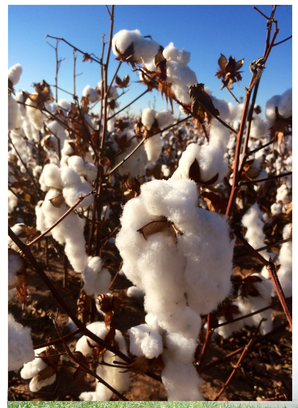
	Cotton	Guar	Sorghum	Sesame
	$ lb^{-1}			
Current Price	0.760	0.350	0.084	0.550
	$ acre^{-1}			
Income	1154	350	462	825
Variable Costs	762	247	350	328
Total Return	392	103	112	497

Table 2. The calculated break-even prices found for each of the selected crops based on an estimated average yield and +/- 20% yield change.

Yield	Cotton	Guar	Sorghum	Sesame
	$ lb^{-1}			
-20%	0.95	0.80	0.17	0.60
Average	0.76	0.64	0.14	0.48
20%	0.63	0.53	0.11	0.40

Results

The returns for the crops were used in calculating the break-even price (Table 1). All three show a change in the price levels to break-even with cotton, but one particularly stands out. Sesame shows a higher profit level than average cotton profit for a producer, resulting in a decrease of the actual market price for the break-even price (Table 1). After calculating the differing break-even prices for each yield level, the final price of each crop was calculated (Table 2). The market prices of both guar and sorghum need to rise significantly to overcome the profit loss compared to cotton. Even though guar and sorghum did not match the profitability of cotton, these crops require less supplemental irrigation and therefore can be beneficial to slowing aquifer discharge rates.



Conclusion

As the agricultural industry of the Texas High Plains continues to evolve, many producers will look into new, alternative crops that will maximize their profits while minimizing irrigation use. Producers will need to look at not only their net income per acre, but also the sustainability of agriculture in this region with the continuing drought and aquifer depletion. These alternative crops may be the key to maintain a valuable agricultural industry. Sorghum is a viable alternative, but does not show as high of promise as sesame. However, international market issues with guar may limit its production in the near future. Nevertheless, producers should continue to try to integrate these alternative crops into their current crop rotation to provide higher yields and less disease of cotton grown under an appropriate rotation.