THE REGIONAL ECONOMIC BENEFITS OF CROP INSURANCE DURING DROUGHT: COTTON ON THE TEXAS HIGH PLAINS

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Introduction

Widespread drought on the Texas High Plains (see Figure 1) during the Fall of 2021 and

Spring/Summer of 2022 has led to widespread abandonment of failed cotton in the region.

Texas

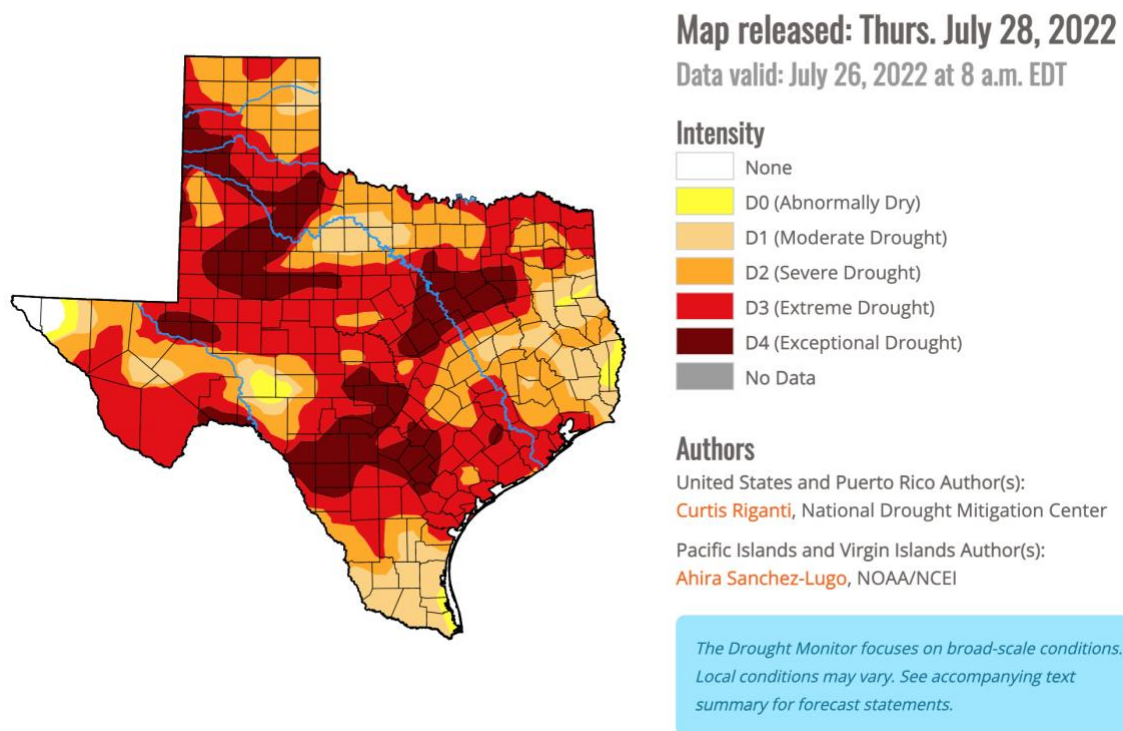**Map released: Thurs. July 28, 2022**
Data valid: July 26, 2022 at 8 a.m. EDT

Intensity

	None
	D0 (Abnormally Dry)
	D1 (Moderate Drought)
	D2 (Severe Drought)
	D3 (Extreme Drought)
	D4 (Exceptional Drought)
	No Data

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Pacific Islands and Virgin Islands Author(s):
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The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

Figure 1. Texas Drought Monitor Map, July 28, 2022.
Source: https://droughtmonitor.unl.edu/CurrentMap/StateDroughtMonitor.aspx?TX, collected August 3, 2022.

Though it is difficult to estimate accurately at this point, most analysts believe that the entire

production of dryland cotton has been lost as well as significant portions of the irrigated crop.

The result is anticipated total losses being between 50% and 80% of total production, with 65%

being the most likely loss scenario at the time of this analysis.

Cotton production represents a significant portion of the economic activity on the Texas High Plains representing about 15% of total economic activity in the region (Guerrero et al.). Thus, when the cotton industry faces drastic changes in production levels that has substantial economic impacts for the region. However, the widespread use of federally subsidized crop insurance offers producers a means to protect against some of those losses. And while crop insurance does not protect downstream processors (gins, warehouses, etc.), it does allow producers to pay production expenses and maintain a minimum level of economic activity in the region.

The purpose of this analysis is to produce preliminary estimates of the economic losses to the region resulting from drought-induced losses in the cotton sector and to provide an estimate of the economic impacts of crop insurance on the region during a year of severe cotton production shortfalls. The results presented here are only for the cotton-related impacts and do not include estimates of the impacts of losses occurring in other agricultural commodities nor do these estimates examine the impacts of losses beyond the farm-gate (shipping, warehousing, etc.).

Methods

Data for the baseline was gathered from the NASS database (Quickstats.nass.usda.gov) for the Texas High Plains region (Figure 2). Upland cotton production, measured in 480lb bales, was averaged from 2012 to 2021 resulting in an average production value for the region of 3,644,894 bales. This average number of pounds produced was then used multiplied by the insurance price for cotton lint in the region of $1.03 per pound for 2022, resulting in a baseline cotton lint production value of $1,802,035,594 if the average level of production had been

achieved. Then, the production average was multiplied by the estimated amount of cottonseed produced per lint pound of 1.276 and the 2022 insurance price of cottonseed of $0.11/lb resulting in a production value for cottonseed as $234,404,591 if the average level of production had been achieved. Adding both baseline cotton lint and cottonseed values resulted in a total average estimate of $2,036,440,185 for the High Plains region.
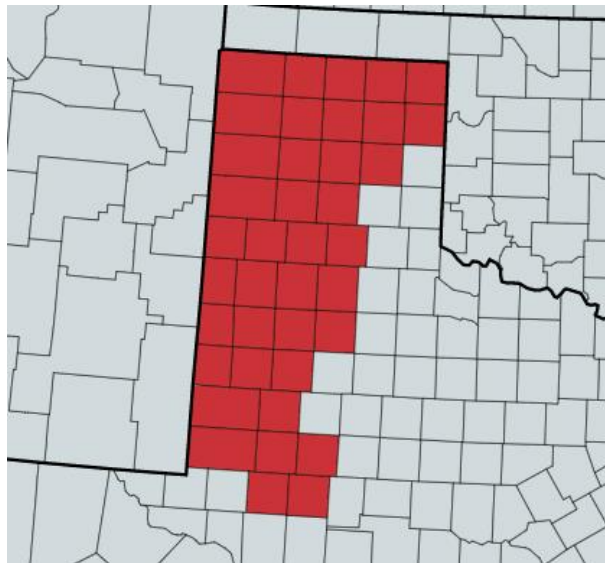

Figure 2. Study Area (Shaded Counties) of the Texas High Plains Corresponding to the Northern and Southern High Plains USDA-NASS Reporting Districts.

Next, we assumed the most likely level crop losses of 65%. Without insurance, this would imply a total production value of $712,754,065, or a total loss of value at the farm level of $1,323,686,120. For the purposes of this analysis, we assume that all producers in the region, on average, were insured at the 65% coverage level meaning that at any production value less than 65% the producer received a payment equal to the production loss times the insurance price ($1.03 per pound). Because the insurance begins paying indemnities at 35% loss, the resulting total value at the farm level is $1,323,686,120 which indicates that the insurance "saved" the

region loss value of $610,932,055. That is, with a 65% loss of cotton production in the region, the total value of production would be $712 million; but with insurance in place, the producer losses are mitigated holding total value to the producer at $1.3 billion. Thus, the insurance protected the producer from an additional loss of $611 million.

This study utilized IMPLAN, an input/output computer program that simulates the economic linkages across an economy (IMPLAN.com).[1] IMPLAN uses economic linkages to simulate the impact that a change in one sector or industry has on a defined regional economy by tracing the impacts of changes in the impacted sector through all the allied and related industries in the region. So, for the cotton example, is examines the direct impacts that changes in cotton production have on the farm sector including labor income and the added value to the inputs that are provided to the farm; the indirect effects that production changes have on related industries such as input and service providers (including cotton ginning); and the induced effects that changes in local income have on local industries such as restaurants, retailers, car dealerships, etc. In this manner, IMPLAN captures an estimate of the total changes on local economic activity resulting from the change in cotton production.

The designated region assigned in IMPLAN was the Northern and Southern High Plains region of Texas including Andrews, Armstrong, Bailey, Briscoe, Carson, Castro, Cochran, Crosby, Dallam, Dawson, Deaf Smith, Floyd, Gaines, Glasscock, Gray, Hale, Hansford, Hartley, Hemphill, Hockley, Howard, Hutchinson, Lamb, Lipscomb, Lubbock, Lynn, Martin, Midland, Moore, Ochiltree, Oldham, Parmer, Potter, Randall, Roberts, Sherman, Swisher, Terry, and Yoakum counties shown in Figure 2.

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[1] The current IMPLAN model uses estimates of total economic activity based on data from 2019 (pre-pandemic) and utilizes 2022 value of the USD.

Results

The baseline total effect of the cotton lint and cottonseed production provide an approximate

total of 26,353 jobs, a labor income of $1,170,976,136, a value added of $1,922,196,588, and an

output of $3,296,576,7 into the region's economy (Table 1). This baseline is then used as a basis

for comparison with the assumed loss scenarios below.

Table 1. Baseline Economic Impact of Cotton on the Texas High Plains Assuming Average
Production from 2012-2021 and the $1.05/lb Insurance Guaranteed Price for 2022.

Baseline Impact	Employment	Labor Income	Value Added	Output
Direct	16,130	$705,636,231	$1,215,233,722	$2,036,440,185
Indirect	6,806	$309,187,158	$424,720,115	$749,304,462
Induced	3,416	$156,152,747	$282,242,751	$510,832,109
Totals	26,353	$1,170,976,136	$1,922,196,588	$3,296,576,755

Note: Columns may not sum to the same as the total due to rounding.

The results of each scenario are presented in Table 2. Focusing only on the total impacts,

without insurance a regional production loss of 65% would result in a loss in total economic

activity of $2.1 billion and a loss of 17,130 jobs. Even with crop insurance there is a loss of

economic activity of $1.2 billion, but the existence of crop insurance saved the local economy

nearly $1 billion in additional losses and saved 7,906 jobs.

Table 2. Resulting Total Output Effects on the Texas High Plains Economy Under Alternative
Drought Loss Scenarios for the 2022 Crop Year.

Output	Baseline	65% Loss	With Insurance	Difference
Direct	$2,036,440,185	$712,754,065	$1,323,686,120	$610,932,055
Indirect	$749,304,462	$262,256,562	$487,047,900	$224,791,338
Induced	$510,832,109	$178,791,238	$332,040,871	$153,249,633
Totals	$3,296,576,756	$1,153,801,864	$2,142,427,783	$988,625,919
Total Employment	26,353	9,224	17,130	7,906

Note: Columns may not sum to totals due to rounding.

Readers are cautioned to interpret the "Difference" column as an upper-bound estimate of

the savings from crop insurance, though the actual effects are likely on the upper end of any

range of effects. IMPLAN includes cotton ginning as part of the farm cost of production but we

know that when there is a crop failure ginning does not occur. Therefore, the 65% loss scenario

would include losses to cotton ginning but those losses would not be remedied by crop insurance. That is, the farmer would see a return of revenue with insurance but the cotton gin would not. Also, depending on when the cotton was abandoned, the return of revenue would not necessarily benefit input suppliers. For example, if all cotton was abandoned at the end of the year, most inputs (besides ginning) would have already been paid and therefore the economic benefits of the insurance payment would be distributed throughout the economy. However, if cotton is abandoned at the beginning of the year most of the inputs are not purchased so the insurance payment only serves as a fixed payment to the producer which has been shown to have limited economic impact on the regional economy (Jones et al. 2013). By adding the insurance payment back to the producer in IMPLAN the program treats that as added economic activity to both input suppliers and ginners. The input supplier effects depend on the timing of the abandonment while the ginning effects would not arise because ginning would not occur. Therefore, the $1 billion should be viewed as the upper bound on the benefits of the insurance program but the fact remains that the insurance program provided significant economic buffer to the region.

The impacts of changes in cotton production are not simply isolated to the cotton sector and support industries. Those impacts are passed through the economy as well. In Table 2 above, for example, the "Induced" effects are impacts on the rest of the economy overall. To illustrate some of those impacts, Table 3 shows the total impacts on other key sectors of the regional economy as well (this is not an exhaustive list, just example sectors for illustrative purposes).[2]

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[2] Keep in mind that these are not total sector outputs. These are the outputs for each sector in the region that are attributable (direct, indirect, and induced) to regional cotton production. So, for example, under the baseline (average) scenario, we would expect regional cotton production to generate $36.8 million in restaurant total value of output.

Table 3. Total Economic Impacts on Various Sectors Under the Assumed Scenario Changes in Regional Cotton Production.

Sector	Baseline	65% Loss	With Insurance	Difference
	Millions of Dollars			
Wholesale Trade	49.0	17.1	31.8	14.7
Restaurants	36.8	12.9	23.9	11.0
Food Retail	8.9	3.1	5.8	2.7
Automotive Maintenance and Repair	7.7	2.7	5.0	2.3
Retail Sales	18.9	6.7	12.3	5.6

So, for example, the existence of crop insurance likely saves regional restaurants around $11 million in sales in a severe drought year like this year from cotton losses alone. According to Table 2, across all regional sectors, crop insurance saves about $153 million in additional losses as compared to the case of no crop insurance. Again, the caveat that these are upper-bound estimates applies to these estimates as well.

Finally, because crop insurance protects not only farm revenue but also regional revenue, the program has an impact on regional, state, and federal taxes collected. Table 4 shows a summary of those impacts.

Table 4. Tax Implications Under Assumed Scenario Changes in Regional Cotton Production.

Tax Level	Baseline	65% Loss	With Insurance	Difference
	Dollars			
Sub-County General	3,565,117	1,247,791	2,317,326	1,069,535
Special Districts	7,889,554	2,761,340	5,128,204	2,366,868
County	2,792,877	977,507	1,815,370	837,863
State	16,073,605	5,625,752	10,447,843	4,822,091
Federal	248,206,565	86,872,298	161,334,267	74,461,969
Total	278,527,708	97,484,698	181,043,010	83,558,312

Note: Columns may not sum to totals due to rounding.

Thus, overall, crop insurance is likely to save around $84 million (upper-bound) in tax revenue at all levels of taxation for the region. But, most importantly for the region, crop insurance likely saves around $4.3 million in county (and sub-county) levels which includes school districts and county taxes for hospitals and road maintenance.

Conclusions

This analysis demonstrates that the severe drought of 2022 is likely to have significant economic impacts on the region. But the existence of crop insurance reduces the magnitude of that potential economic loss by as much as 60% and reduces job losses and preserves regional tax revenue. A new farm bill will begin being formulated in the current year. This analysis demonstrates not only the value of crop insurance to the farm sector but to regional economies that are dependent on agricultural production as an economic driver. This analysis focuses on cotton on the Texas High Plains. We do not address economic losses associated with other crops and livestock here though shortfalls in products such as cotton seed and hulls that enter into livestock feed with definitely impact those sectors as well. Additionally, these estimates do not include the impacts on downstream processors (warehouses, shipping, etc.) that will occur as a result of reduced throughput of cotton through the system. The IMPLAN model is limited by an assumption of linear effects ignoring compound effects that might occur but provide a reasonable estimate of the magnitude of potential losses used for planning purposes. Overall, an anticipated loss of about $2 billion represents a reduction of nearly 10% of regional economic activity. Thus, regardless the final magnitude of losses, they are large negative impact to the Texas High Plains economy.

References

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