

What is One Inch of Rain/Water Worth in  
Crop Production on the High Plains of Texas?

by

A. Wayne Wyatt/Ken Carver

February 12, 1997

**Conclusions**

The estimated increase in agricultural production resulting from one inch of precipitation on a timely basis on the four major crops grown in the High Plains Underground Water Conservation District 15 central High Plains of Texas counties has a market value of approximately \$81,055,865 with a regional economic impact of approximately \$283,695,528.

Using a conservative estimate in calculating the value of increased production on a per acre basis for the four major crops grown in the region, the increase in cotton lint production would bring \$34.00 per acre, corn \$18.90, grain sorghum \$10.45, and wheat \$20.50.

**Basis for Conclusions**

An inch of rainfall equals 27,154 gallons or a layer of water one inch deep over one acre of land or one acre-inch of water.

Research results from the Texas Agricultural Experiment Stations at Lubbock and Amarillo as reported by Irrigation Engineer Leon New indicate that average crop production per acre-inch of irrigation water on a 3 to 5 year running average is as follows:

<u>Crop</u>	<u>Per Acre-Inch</u>
Corn	700 pounds
Peanuts	600 pounds
Grain sorghum	500 pounds
Cotton	100 pounds
Wheat	10 bushels

This data is based on irrigation being used to supplement precipitation received prior to and during the growing season to a level that the water needs of the crop growing is met on a timely basis.

Generally, during the latter part of the growing season, especially during late July and August, the capacity of the irrigation wells on the High Plains of Texas is inadequate to fully satisfy the total water needs of the growing crops on a timely basis,

especially during drought years. A drought is generally considered to be occurring if only 60 to 65 percent of the average amount of precipitation is received during this period. Certainly, in such instances, one inch of precipitation could result in crop yield increases of the amounts listed above.

Mr. New's crop yield increase estimates on a per inch of water applied are generally a result of correct timing of irrigation water applications to meet crop water needs during critical growth and development periods of the crops being grown.

The opportunities to increase the water supply to growing crops to meet critical plant growth and development periods through precipitation enhancement is considerably less than through controlled irrigation due to the unpredictability of weather events which occur in the area. Therefore, for the purposes of this paper, we will reduce Mr. New's crop yield estimates by 50 percent.

<u>Crop</u>	<u>New's Per Acre-Inch Increase</u>	<u>Reduced to:</u>
Cotton	100 pounds of lint per acre	50 pounds of lint per acre
Grain sorghum	500 pounds per acre	250 pounds per acre
Wheat	10 bushels per acre	5 bushels per acre
Corn	700 pounds per acre	350 pounds per acre

The following tables reflect only the harvested acres of four major crops grown in those counties served by High Plains Underground Water Conservation District (see attached map) in 1995.

The price per pound/bushel used in the calculations were taken from the commodities section of the *Lubbock Avalanche-Journal* in February 1997 for area cash markets.

No effort has been made to estimate the value of one additional inch of water on the thousands of acres of other crops grown in the area or on forage production for livestock grazing.

High Plains Water District  
Value of One Inch of Rain On  
Total Harvested Acres of  
Corn - 1995

County	* Acres	Yield Increase Per Acre (Pounds)	Total Yield Increase (Pounds)	Value (Dollars)
Armstrong	1,000	350	350,000	18,900
Bailey	12,900	350	4,515,000	243,810
Castro	99,500	350	34,825,000	1,880,550
Cochran	-	-	-	-
Crosby	-	-	-	-
Deaf Smith	43,500	350	15,225,000	822,150
Floyd	14,400	350	5,040,000	272,160
Hale	58,700	350	20,545,000	1,109,430
Hockley	-	-	-	-
Lamb	44,600	350	15,610,000	842,940
Lubbock	1,100	350	385,000	20,790
Lynn	-	-	-	-
Parmer	81,700	350	28,595,000	1,544,130
Potter	-	-	-	-
Randall	<u>5,100</u>	350	<u>1,785,000</u>	<u>96,390</u>
Total	<u>362,500</u>		<u>126,875,000</u>	<u>\$6,851,250</u>

Price per cwt = \$5.40

\* Represents the harvested acres within all of the county.

High Plains Water District  
Value of One Inch of Rain On  
Total Harvested Acres of  
Grain Sorghum - 1995

County	* Acres	Yield Increase Per Acre (Pounds)	Total Yield Increase (Pounds)	Value (Dollars)
Armstrong	30,100	250	7,525,000	314,545
Bailey	42,800	250	10,700,000	447,260
Castro	28,200	250	7,050,000	294,690
Cochran	47,900	250	11,975,000	500,555
Crosby	10,400	250	2,600,000	108,680
Deaf Smith	76,800	250	19,200,000	802,560
Floyd	35,900	250	8,975,000	375,155
Hale	32,300	250	8,075,000	337,535
Hockley	37,000	250	9,250,000	386,650
Lamb	23,300	250	5,825,000	243,485
Lubbock	15,200	250	3,800,000	158,840
Lynn	7,900	250	1,975,000	82,555
Parmer	44,400	250	11,100,000	463,980
Potter	6,900	250	1,725,000	72,105
Randall	<u>29,600</u>	250	<u>7,400,000</u>	<u>309,320</u>
Total	<u>468,700</u>		<u>117,175,000</u>	<u>\$4,897,915</u>

Price per cwt = \$4.18

\* Represents the harvested acres within all of the county.

High Plains Water District  
Value of One Inch of Rain On  
Total Harvested Acres of  
Cotton - 1995

County	* Acres	Yield Increase Per Acre (Pounds)	Total Yield Increase (Pounds)	Value (Dollars)
Armstrong	1,600	50	80,000	54,400
Bailey	78,000	50	3,900,000	2,652,000
Castro	65,100	50	3,255,000	2,213,400
Cochran	87,500	50	4,375,000	2,975,000
Crosby	204,200	50	10,210,000	6,942,800
Deaf Smith	10,200	50	510,000	346,800
Floyd	173,100	50	8,655,000	5,885,400
Hale	228,700	50	11,435,000	7,775,800
Hockley	228,200	50	11,410,000	7,758,800
Lamb	179,500	50	8,975,000	6,103,000
Lubbock	273,400	50	13,670,000	9,295,600
Lynn	255,400	50	12,770,000	8,683,600
Parmer	70,600	50	3,530,000	2,400,400
Potter	-	-	-	-
Randall	-	-	-	-
<b>Total</b>	<b><u>1,855,500</u></b>		<b><u>92,775,000</u></b>	<b><u>\$63,087,000</u></b>

Price per pound = \$0.68

\* Represents the harvested acres within all of the county.

High Plains Water District  
Value of One Inch of Rain On  
Total Harvested Acres of  
Wheat - 1995

County	* Acres	Yield Increase Per Acre (Bushels)	Total Yield Increase (Bushels)	Value (Dollars)
Armstrong	16,500	5	82,500	338,250
Bailey	3,400	5	17,000	69,700
Castro	46,800	5	234,000	959,400
Cochran	2,000	5	10,000	41,000
Crosby	3,600	5	18,000	73,800
Deaf Smith	84,200	5	421,000	1,726,100
Floyd	26,500	5	132,500	543,250
Hale	23,200	5	116,000	475,600
Hockley	3,500	5	17,500	71,750
Lamb	10,100	5	50,500	207,050
Lubbock	2,200	5	11,000	45,100
Lynn	1,100	5	5,500	22,550
Parmer	37,500	5	187,500	768,750
Potter	13,000	5	65,000	266,500
Randall	<u>29,800</u>	5	<u>149,000</u>	<u>610,900</u>
<b>Total</b>	<b><u>303,400</u></b>		<b><u>1,517,000</u></b>	<b><u>\$6,219,700</u></b>

Price per bushel = \$4.10

\* Represents the harvested acres within all of the county.

Value of One Inch of Rain  
To the High Plains Underground Water District Counties As A  
Result of Increased Crop Production

Crop	Dollar Value	Area Multiplier	Total Value
Cotton	\$63,087,000	3.5	220,804,500
Corn	6,851,250	3.5	23,979,375
Grain Sorghum	4,897,915	3.5	17,142,703
Wheat	<u>6,219,700</u>	3.5	<u>21,768,950</u>
Total	<u>\$81,055,865</u>		<u>\$283,695,528</u>

