

A DECADE OF AGRICULTURAL CHANGE IN DELICIAS, CHIHUAHUA

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The author visited Delicias in 1962 and prepared a paper entitled "The Delicias Cotton Region of Mexico" (McDowell, 1962). In June of 1973 a return trip was made to analyze significant trends in the agricultural land use of the region. This paper presents the new findings.

The Delicias region is in southeastern Chihuahua (28°N. 105°W.), approximately 265 miles south of El Paso, Texas (Fig. 1). The region utilizes water from the Conchos river basin, an area of 64,000 square kilometers. The Conchos has its origin in the mountains of western Chihuahua and flows eastward to Camargo where it is joined by the Florido. About 100 kilometers farther downstream the Conchos turns east and eventually enters the Rio Grande 465 kilometers southeast of El Paso.

The study area ranges in altitude from 3,600 to 4,500 feet above sea level. The irrigated land is situated along the left bank of the Conchos beginning about 30

kilometers upstream from Camargo and extending downstream for a distance of 120 kilometers. The width of the irrigated zone varies from 3 to 30 kilometers. On the west the region is limited by the main canal and on the north by the Arroyo de Bachimba. Boquillas Dam and the Conchos River form the south and the east limits of the region. Within these boundaries are 135,000 hectares; but only 80,000 hectares are suitable for crops, and not all of these are under irrigation.

The climate of the region is arid or BWh in the Koppen classification. The average annual temperature for the region is 68°F.; January is the coldest, and June is the hottest month. The annual precipitation average for a ten-year period was 12.3 inches (Table 1).

The soils of the Delicias region have not been studied in enough detail for scientific classification. However, most soils of the region are derived from alluvial or lacustrine deposits of Recent or Pleistocene age. A simple classification of the soils based on their agricultural value divides them into four groups. The first two groups are suitable for cultivation. The third group is of doubtful value for cultivation; the fourth group consists of those soils not suitable for agricultural use.

Group one contains the best soils of the region. These are deep, friable, well-drained, free of alkalies and located on topography conducive to irrigation. These soils are highly productive under irrigation and remain so with normal management. This group accounts for 46,000 hectares in Delicias.

Group two soils have less favorable topography; they do not drain as well as group one because of a clay layer in the subsoil. However, the drainage problem of these soils can be overcome at modest cost. Some 34,000 hectares are in this group.

The soils of group three are on rugged topography, unsuited for irrigation. They are thin and rocky and are usually not cultivated but used for pasture.

Group four consists mostly of bare rock and gravels, or pockets so poorly drained that they are alkaline. They are not suited for agriculture, but may provide food and cover for wildlife or have other functions.

The five leading agricultural products of Delicias in terms of area for the five-year period 1956-1960 were cotton, wheat, corn, alfalfa and peanuts (Table 2).

TABLE 1: Annual rainfall at selected stations in Delicias

Year	Madero Dam (inches)	Boquilla Dam (inches)
1962	10.11	11.51
1963	10.48	8.99
1964	14.36	9.87
1965	6.84	11.22
1966	12.00	18.31
1967	10.41	14.61
1968	24.86	18.19
1969	8.45	7.16
1970	12.05	11.56
1971	12.01	12.51
Average	12.16	12.39

Source: Sectaría De Recursos Hidraulicos, Direccion General De Distritos De Riego, Distrito De Riego #5 Ciudad Delicias, Chihuahua.

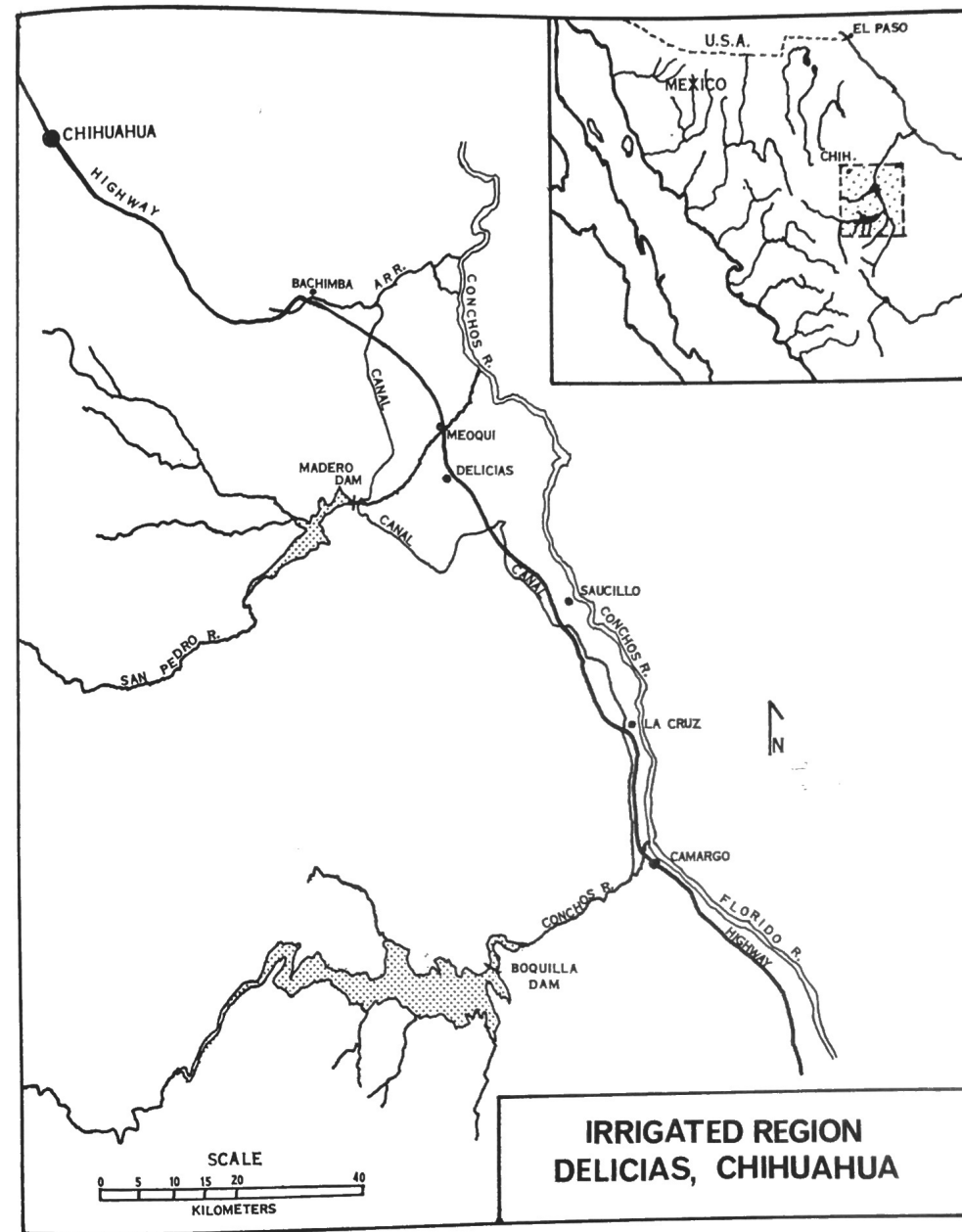


FIG. 1: Irrigated region, Delicias, Chihuahua

TABLE 2: Area of harvested crops

Year	Cotton * (has.)	Wheat (has.)	Corn (has.)	Alfalfa (has.)	Peanuts (has.)
1956-60	35,749	3,933	3,393	1,747	1,182
1961	42,201	3,658	4,645	4,719	2,941
1962	40,628	5,738	6,497	4,998	4,867
1963	30,135	11,895	9,619	4,134	3,981
1964	12,326	24,978	22,958	4,419	3,215
1965	14,970	20,898	15,579	4,594	5,486
1966	8,865	12,525	3,162	4,594	5,727
1967	13,967	26,426	12,575	5,811	3,032
1968	15,057	24,696	10,314	6,076	3,276
1969	4,816	38,678	8,692	5,784	4,711
1970	3,835	25,631	11,154	7,670	10,725
1971	7,257	30,004	8,615	7,557	5,465

Source: Sectaría De Recursos Hidráulicos, Dirección General De Distritos De Riego, Distrito De Riego #5 Ciudad Delicias, Chihuahua.

*Hectares: one hectare equals 2.47 acres

In the late 1950's and early 1960's, cotton dominated the agriculture of Delicias. More than 60 per cent of the harvested land produced cotton every year during the 1950's; in 1961 the 42,201 hectares harvested was the second largest cotton area cultivated by Delicias, 750 hectares less than the record of 1957. In 1964 because of water and credit shortages, the area of cotton harvested experienced a sharp decrease, plummeting to 12,326 hectares. During the remainder of the period under study, the area of cotton harvested remained far

below the five-year average of 1956 through '60 and reached a low of 3,835 hectares in 1970.

The decline in the area of cotton harvested was accompanied by a drop in cotton's percentage of value of all harvested crops (Table 3). In 1961 cotton accounted for 80.77 per cent of the value of harvested crops, but in 1970 only 5.72 per cent.

Why did cotton's dominance in the agriculture of Delicias decline? Simply because cotton was becoming less profitable. There are many reasons for the de-

TABLE 3: Per cent of total value for crops harvested

Year	Cotton	Wheat	Corn	Alfalfa	Peanuts
1961	80.77	4.07	1.46	6.77	3.17
1962	76.60	7.87	1.83	5.94	4.45
1963	44.28	23.60	8.48	8.20	5.23
1964	29.21	38.85	16.32	5.50	3.43
1965	38.63	30.77	12.70	5.19	6.64
1966	43.03	27.27	4.05	7.12	12.49
1967	36.04	33.20	8.13	10.50	3.34
1968	26.61	35.42	11.42	12.53	4.12
1969	7.59	44.83	5.39	10.01	8.39
1970	5.72	33.92	8.69	19.06	15.99
1971	16.63	37.30	6.19	17.32	5.84

Source: Sectaría De Recursos Hidráulicos, Dirección General de Distritos De Riego, Distrito De Riego #5 Ciudad Delicias, Chihuahua.

cline of cotton and this paper will not deal with them in detail. However, rising production costs, water shortages, reduced credit and insurance, coupled with the preference of farmers to use land for purposes other than cotton were important factors in cotton's decline. An example of the latter was the shift to wheat production.

In 1961 the harvested area of wheat was 3,658 hectares. During the last three years of the period in this study, the area of wheat harvested averaged 31,438 hectares, or more than eight times that harvested in 1961. Most of the wheat is the new high-yielding dwarf varieties introduced in the early 1960's. Wheat requires less water than cotton, has lower production costs and credit terms have been favorable, thereby making it an attractive alternative crop to cotton. Since wheat is planted in December and harvested in late May or early June, farmers sometimes double crop wheat land. In Delicias peanuts have been the crop that followed wheat if water were available. Table II shows the area of peanuts harvested with 1970 being the peak year. However, a drop of 22 per cent in the average farm price of peanuts occurred; the 1971 area of peanuts harvested was about one half that of 1970.

Soybeans are beginning to be used as a second crop following wheat. In 1971 Delicias harvested 2,847 hectares of soybeans which contributed 5.16 per cent of the value of harvested crops. Mexico's continuing need for edible vegetable oils coupled with soybean's high net returns suggest soybean production will expand in the future.

Corn, a traditional crop in most of Mexico, is no exception in Delicias. The area of corn harvested during the decade 1962-1971 ranged from a low of 3,162 hectares in 1966 to a high of 22,958 hectares in 1964. Corn's contribution to the value of harvested crops for the decade ranged from a low of 3.34 per cent in 1967 to a high of 15.99 per cent in 1970. Because of its use as food for both humans and animals, plus tradition, corn will continue to hold a role in the agriculture of Delicias.

Alfalfa is a crop of increasing significance in Delicias. In the first three years of the 1962-71 decade, an average of 4,517 hectares were harvested providing an average 6.55 per cent of the value of harvested crops. During the last three years of the 1962-71 period, an average of 7004 hectares were harvested, an increase of 55 per cent over the 1962-64 average. The per cent of value contributed by alfalfa to harvested crops in 1969-71 also showed a marked increase and averaged 15.46 per cent, more than double the 1962-64 figure.

Two important reasons for the growing importance of alfalfa are the start of dairying in 1964, and the effort to increase the perennial crops of Delicias. In 1964 the Carnation Milk Company provided dairy cattle to some farmers in Delicias; in 1970 there were over 3500 registered dairy cattle in the Delicias region with herds ranging in size from two to more than 100 head. The

construction of a plant by Mead Johnson in Delicias during 1968 furnished additional impetus to dairying.

Alfalfa fits into the effort to increase the area of perennial crops for it is one that does not need to be planted every year. A new perennial crop in Delicias is the pecan. In 1969 pecans appeared for the first time among the data of harvested crops with an area of 750 hectares; in 1971 1,936 hectares of pecans were harvested. Presently, pecans give a higher return than any other crop in Delicias and plantings are being expanded.

CONCLUSIONS

During the 1962-71 decade Delicias changed from a cotton dominated region to one of greater diversification with wheat as the leading crop. The years immediately ahead will witness some increase in the cotton area because of the current high prices. However, the thriving dairy industry and investment in perennial crops will keep cotton from dominating the agriculture of Delicias as it did in the early 1960's.

LITERATURE CITED

- MCDOWELL, H. G. 1962. The Delicias cotton region of Mexico. Memorandum Folio. Vol. 14:93-103. (Southeastern Division Assoc. of Amer. Geographers, Johnson City, Tennessee).

Tribute to Dr. Glenn Gentry, 1895-1973

Dr. Glenn Gentry, esteemed member and supporter of the TAS for many years, died December 15, 1973.

Dr. Gentry received his degrees from Vanderbilt University, Peabody College, and Southern YMCA Graduate School. His education and subsequent membership in the American Fisheries Society and the Tennessee Conservation League served as the foundation of a life dedicated to the wise use of Tennessee's natural resources.

He served twenty-four years for the Tennessee Game and Fish Commission, fourteen years as the Chief of the Fisheries Division. During this time he was a major proponent for rockfish introduction into Tennessee reservoirs.

Dr. Gentry's interests brought him recognition as one of the leading southeastern herpetologists, for his services towards preserving Tennessee's natural beauty, and his election to the status of Fellow of the TAS in 1967.

The Academy and the State of Tennessee owe much to Dr. Gentry for his efforts and counsel throughout the years. On behalf of the entire membership of the Tennessee Academy of Science, we express our sincere sympathy to his family.