Cotton

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ESTIMATED LOSSES FROM BARK IN COTTON LINT, TEXAS HIGH PLAINS

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The problem caused by bark, i.e., pieces of dense, woody material from the stalk of the cotton plant, to the users of cotton lint--textile mills--is that it may cause difficulties in various processing stages unless it is removed and/or it may result in imperfections in the yarn or fabric. Thus, bark tends to increase costs and/or decrease the value of the product. Cotton lint containing bark consequently returns a lower price (a greater discount) to the cotton producer.

Classing of cotton is a means of estimating certain quality attributes which, in turn, serve as indicators of end use value associated with the fiber. Thus, classing provides information to facilitate both marketing and production processes. The official classing process, conducted by the Agricultural Marketing Service, U.S. Department of Agriculture, includes three attributes of the cotton lint: grade, staple length, and micronaire. Description of these attributes may be found in Ethridge and Davis (p. 294) and U.S. Department of Agriculture (1980). Grade may be characterized as consisting of two major factors, trash content and color. One characteristic considered in trash content is bark. The existence of excess bark in the cotton results in its being lowered one or two grades.

While bark is known to be more prominent in areas where cotton is machine stripped than where it is machine picked, the varietal, cultural, and/or environmental causes of it are not well understood. These causal relationships must be better understood in order to evaluate ways to alleviate or manage the problem. However, before

studies of causal relationships are undertaken, the problem needs to be examined in more detail. Thus, the objectives of this analysis were to:

a) Document the existence and extent of the occurrence of bark in cotton in both time and geographic dimensions and

b) Estimate the economic costs of the occurrence of bark in the Texas High Plains.

Occurrence of Bark in Cotton

The patterns of occurrence of bark are shown in Figures 1 through 5. Data are from the U.S. Department of Agriculture (1967-1983). Figure 1 shows the bales reduced in grade ("barky" bales) from 1967 through 1983 for the four major production regions in the U.S.--Southeast (Ala., Ga., Fla., N. Car., S. Car., Va., and Ky.), Midsouth (Ark., La., Miss., Mo., and Tenn.), Southwest (Tex. and Okla.), and West (Ariz., Calif., N. Mex., and Nev.).

Most of the cotton reduced in grade because of bark is grown in the Southwest, which is the region where 86 percent of the cotton is machine stripped; this compares to 95 percent machine picked in the West, and 100 percent machine picked in both the Southeast and the Midsouth (Glade and Johnson). Figure 2 shows that the Southwest is the only one region with more than 5 percent of its crop reduced from bark. The percentage of production reduced typically ranges from 5 to 30 percent in the Southwest. Figures 1 and 2 also indicate that 1971, 1976, and 1981 were the years of heaviest occurrence of bark, both in terms of total number of bales and percentage of the crop. The causes of bark occurrence are not well understood, but analysis by Hembree for the period 1963 to 1973 indicate that the causes are related to weather patterns.

Figure 1: Number of Bales Reduced in Grade due to bark, by Region and Crop Year

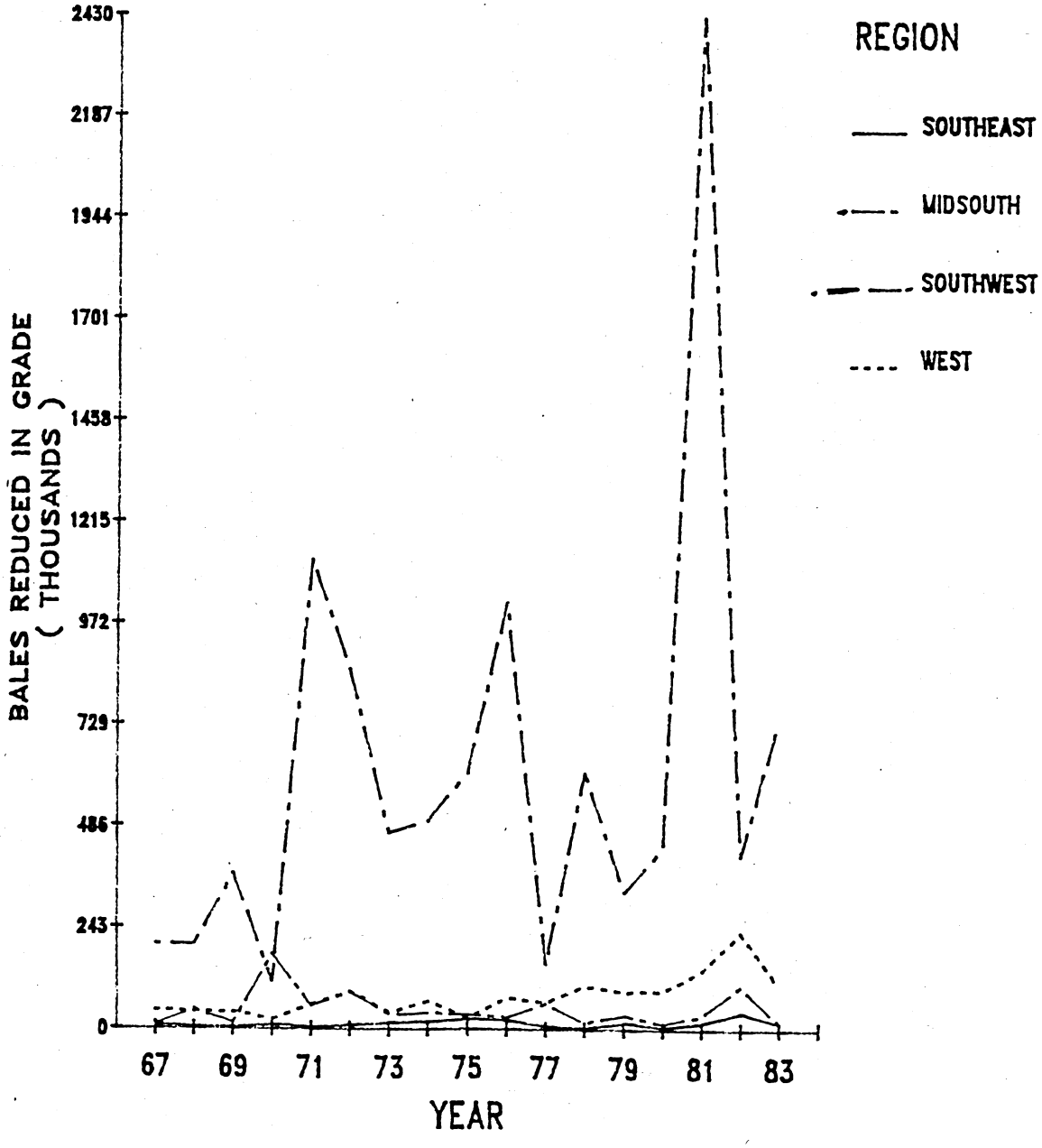


Figure 2: Percentage of Bales Reduced in Grade due to Bark, by Region and Crop Year

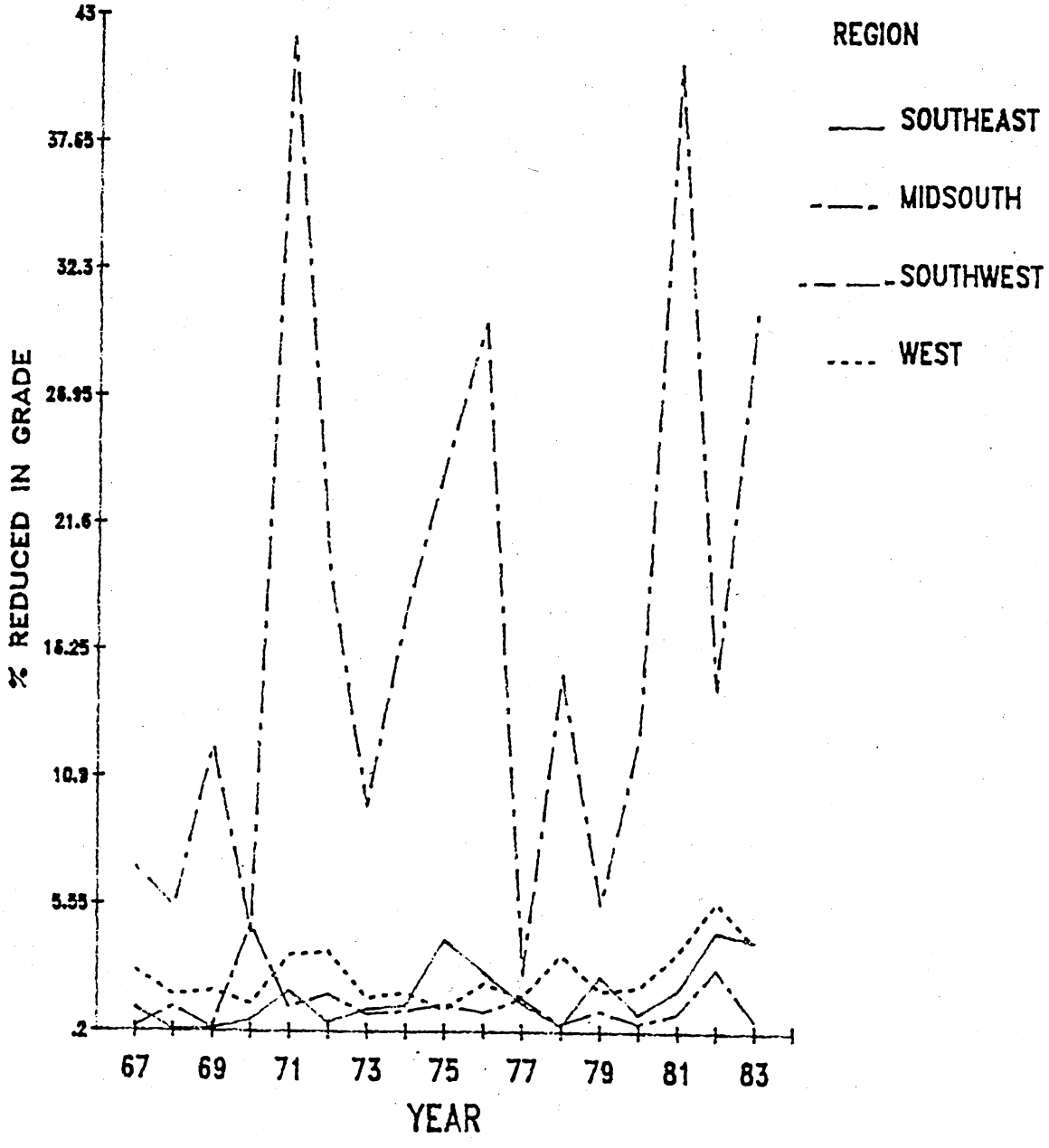


Figure 3: Number of Bales Reduced in Grade due to Bark, Lubbock and Southwest, by Year

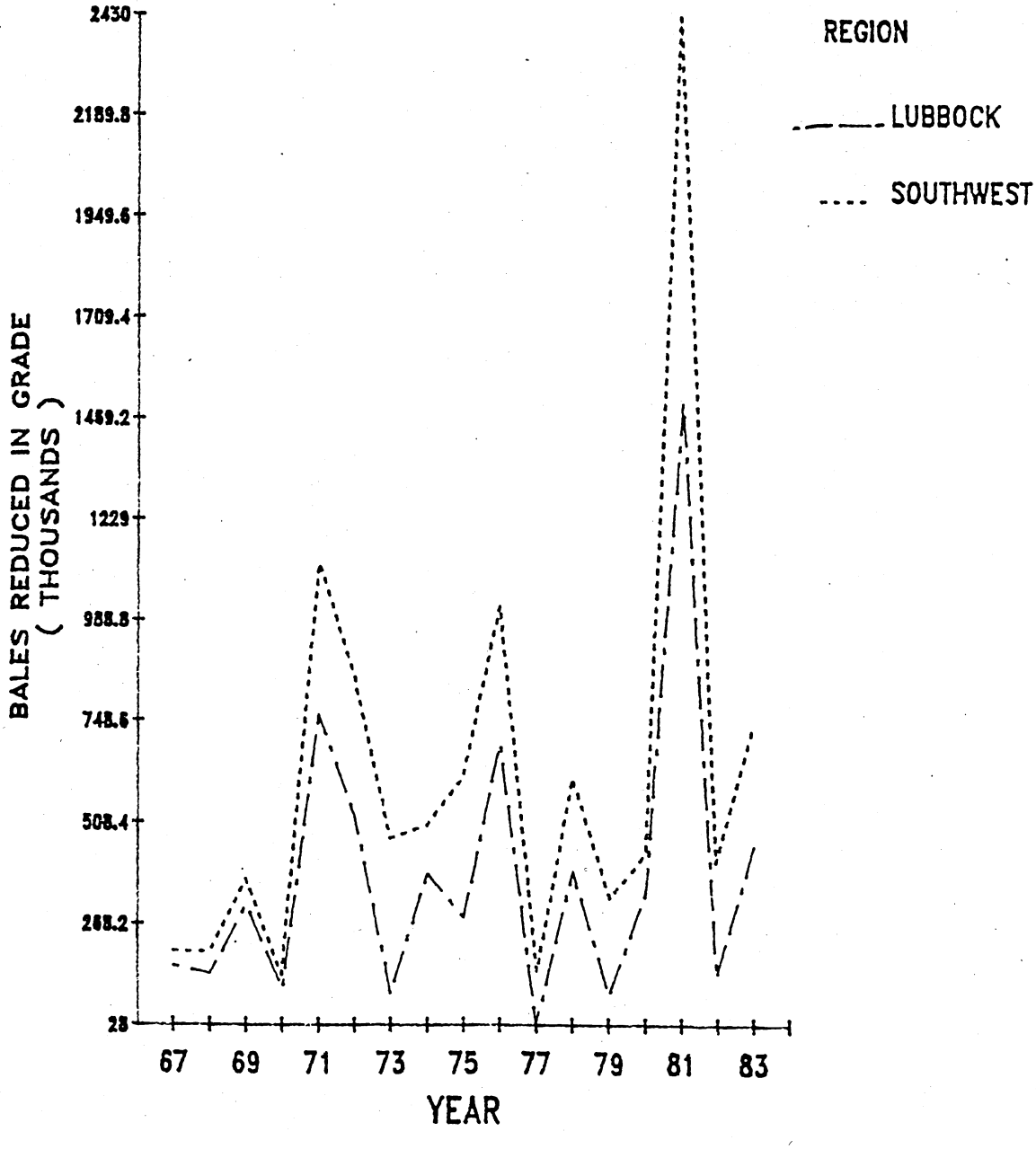


Figure 4: Percentage of Bales Reduced in Grade due to Bark, Lubbock and Southwest, by Year

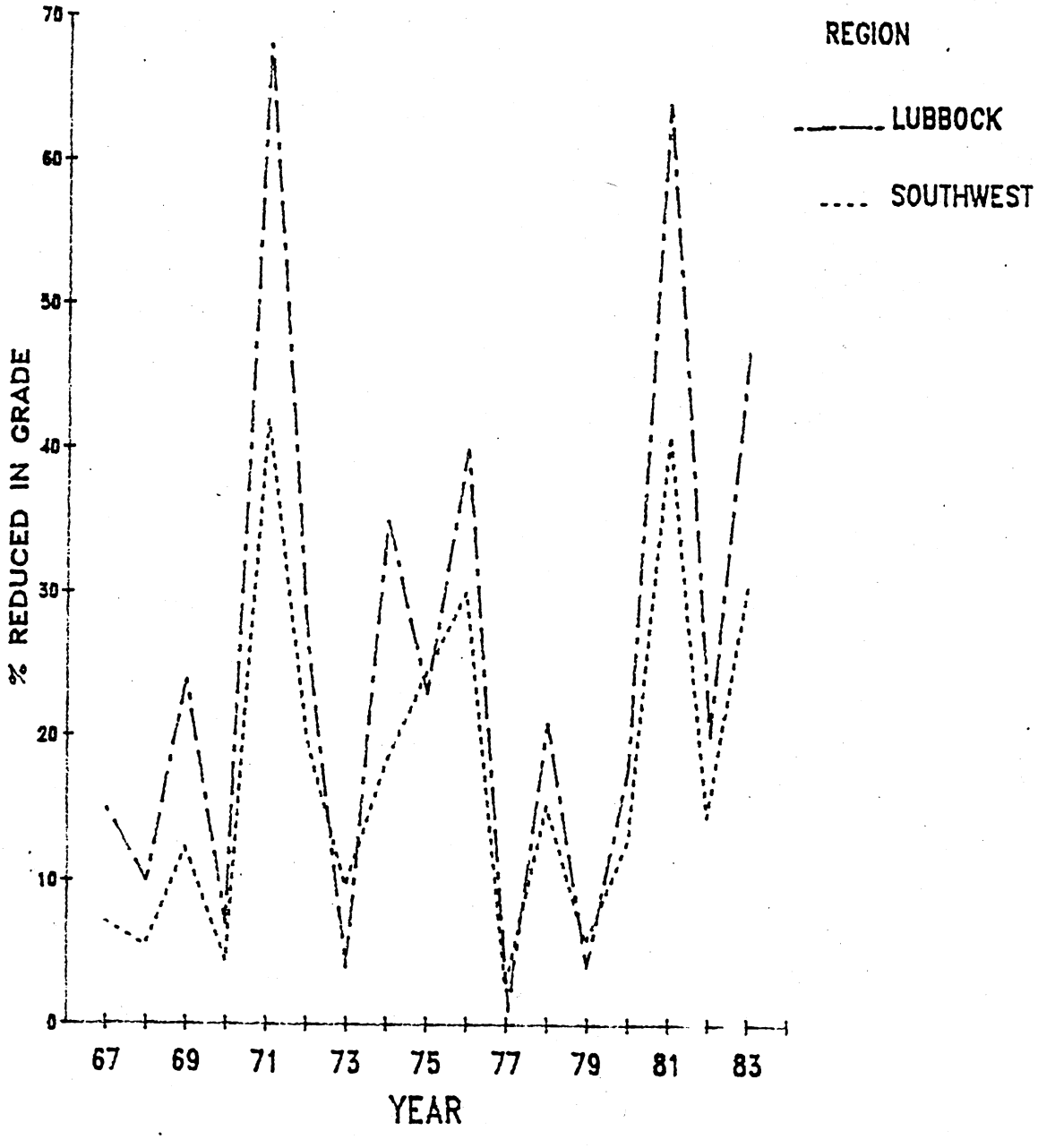
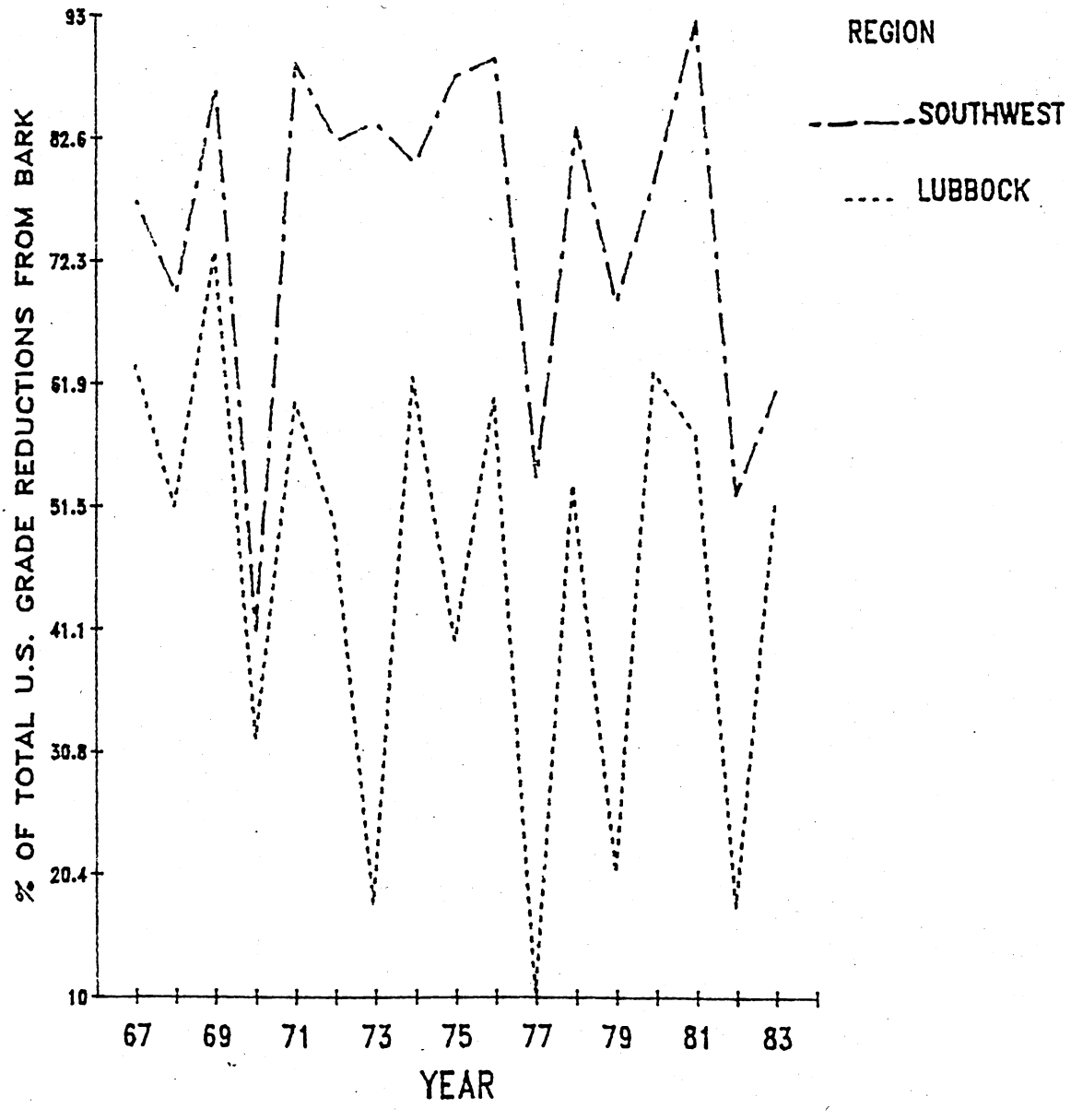


Figure 5: Southwest and Lubbock Cotton reduced in Grade as a percentage of U.S. Cotton Reduced due to bark, by Year



Within the Southwest, grade reductions due to bark for cotton grown in the High Plains area (Lubbock Territory), which is the area of greatest concentration of production, are shown in Figure 3. The volumes of production with bark reduction tend to move together, as expected. However, in most years, the High Plains has had a higher percentage of barky cotton than the Southwest in general (Figure 4). Thus, the problem with bark in cotton is most serious in the Texas High Plains. In 12 of 17 years, over 40 percent of the cotton in the U.S. which was reduced in grade because of bark was High Plains cotton (Figure 5). In 1969, over 70 percent of all barky cotton in the U.S. was from the High Plains. However, the data in Figure 5 suggest that the percentage of U.S. barky cotton from the Lubbock Territory may be declining over time.

The above discussion demonstrates that bark in cotton may be a serious problem in the Southwest region and especially in the High Plains area. The degree of severity of the problem depends on the economic losses it generates.

Estimated Costs of Bark

The procedure for estimating the economic loss from bark in cotton for each year was: (a) estimate the actual value of the crop for that year, (b) estimate the value of the crop assuming there had been no grade reductions from bark, and (c) subtract the former from the latter to measure the loss.

The actual value of the crop was estimated by multiplying the number of bales in each grade (U.S. Dept. of Ag., "Cotton Quality")

by the average bale weight times the average annual price for each grade (U.S. Dept. of Ag., "Cotton Price Statistics"). All bales were assumed to be of the average annual staple and micronaire, i.e., the average price for each grade was for the average staple and micronaire for that year. Prices were interpolated for staple lengths between whole 32nds of an inch. For example, for the 1967 Lubbock Territory crop, the average staple length was 31.4 (32nds of an inch), average bale weight was 490 pounds of lint, and the average micronaire was 3.3. There were 280,242 bales of grade 41 cotton. The price of grade 41 (SLM), staple 31, 3.3 micronaire cotton in 1967-68 was 19.15¢/lb and the price for the same grade and micronaire values but with staple 32 was 21.11 ¢/lb. Therefore, the interpolated price used for the 1967 Lubbock crop was 19.93 ¢/lb [.4(21.11 - 19.15) + 19.15]. The estimated value for this cotton that year was:

(280,242 bales) x (490 lbs/bale) x $.1993/lb) = $27,367,593.

USDA data on the tinged grades (14, 24, 34, 44, and 54) were all grouped together, as were the stained (15, 25, and 35), light gray (16, 26, 36, and 46), and gray (17, 27, 37, and 47) grades. Prices for these grades were estimated using the assumption that the number of bales in each group was evenly distributed among the grades within that group. Under this assumption, the price used was a simple average of the prices for grades in that group. For example, there were 430 bales of stained cotton in the Lubbock Territory in 1967. The price per pound used for this cotton was the average of the annual prices for (a) grade 15, staple 31.4, 3.3 micronaire, (b) grade 25, staple 31.4, 3.3 micronaire,

and (c) grade 35, staple 31.4, 3.3 micronaire. This price per pound times 430 bales times 490 lbs/bale gave the estimated value of stained cotton in 1967.

The estimation of the value of the crop without a grade reduction from bark was accomplished by adjusting the number of bales in each grade designation for each grade except the tinged, stained, light gray, and gray groups; those groups were estimated by adjusting the average price. Two assumptions were employed in the adjustment: (a) all grade reductions were one grade and (b) the percentage grade reduction for the year was distributed evenly across all grades. For example, in 1967, 15 percent of Lubbock Classing Office bales were reduced in grade because of bark. Therefore, 15 percent of the bales in grade 31 were moved to grade 21, 15 percent of the bales in grade 41 were moved to grade 31, etc. The new values were estimated in the same manner as previously described. The adjusted prices for the tinged, stained, light gray, and gray groups were determined by re-weighting the prices of grades within the group according to the percent reduced from bark. For example, for 1967, the average price for the gray group was derived by the formula:

$$[(.85)(\text{Price grade } 47) + (\text{Price grade } 37) + (\text{Price grade } 27) + (1.15)(\text{Price grade } 17)] \div 4.$$

This is equivalent to adjusting quantities within the group. Consequently, the new values were estimated by multiplying the quantity in each group by the adjusted price.

During the 17 year period studied, the average percentage of bales reduced in grade because of bark was about 24 percent, but varied annually from 1 to 68 percent (Table 1). However, the loss in value

Table 1. Summary of Estimated Economic Losses from Bark in Cotton, High Plains, 1967-68 through 1983-84

Years	No. of Bales	Average Bale Net Weight (lbs.)	Average Staple Length (32nds in.)	Average Micronaire	Percent Barky Bales	Base Price[1/] (¢/lb.)	Estimated Crop Value (Current $)	Estimated Crop Value Without Bark (Current $)	Loss from Bark		
									Current $	Percent	1983 $ [2/]
1967-68	1,134,713	490	31.4	3.3	15	26.07	107,990,794	108,743,075	752,281	.7	2,049,254
1968-69	1,497,978	489	32.7	3.5	10	23.59	148,337,257	149,360,638	1,023,381	.7	2,669,922
1969-70	1,231,414	491	31.4	3.8	24	22.86	113,680,404	115,151,965	1,471,561	1.3	3,651,516
1970-71	1,615,484	493	31.1	3.9	7	23.76	175,277,671	175,506,012	228,341	.1	537,652
1971-72	1,132,467	494	30.4	3.0	68	32.26	151,609,197	155,008,054	3,398,857	2.2	7,622,465
1972-73	1,955,216	501	31.3	3.2	26	33.94	228,233,266	232,245,630	4,012,404	1.8	8,639,974
1973-74	2,537,158	502	31.0	4.2	4	61.87	648,770,764	649,218,387	447,623	.07	911,470
1974-75	1,112,726	484	31.8	3.1	35	40.52	164,772,103	168,345,773	3,573,676	2.2	6,687,268
1975-76	1,227,310	483	30.3	3.0	23	55.06	267,702,693	269,450,613	1,747,920	.7	2,992,501
1976-77	1,737,915	489	31.6	3.6	40	67.79	524,674,199	529,182,450	4,508,251	.9	7,335,260
1977-78	2,960,081	491	31.7	4.3	1	50.04	683,971,374	684,055,693	84,319	.01	129,642
1978-79	1,893,489	493	31.7	3.7	21	58.27	491,789,574	494,541,566	2,751,992	.6	3,939,860
1979-80	2,480,872	491	31.2	3.0	4	66.43	684,946,652	685,381,875	435,223	.06	573,492
1980-81	1,902,977	493	31.9	3.9	18	79.66	671,450,248	675,568,377	4,118,129	.6	4,969,984
1981-82	3,127,362	495	31.5	3.4	64	57.96	740,680,388	764,817,160	24,136,772	3.26	26,573,568
1982-83	1,120,911	495	31.3	3.8	20	60.84	293,376,948	294,705,021	1,328,073	.5	1,379,100
1983-84	1,134,695	493	32.4	3.7	47	70.35	352,470,861	357,054,566	4,583,705	1.3	4,583,705
Simple Average	1,753,104	492	31.5	3.6	25	48.90	379,396,141	382,843,344	3,447,206	1.0	5,014,508
Weighted Average		493	31.5	3.6	23.8	51.2			4,119,646	.975	6,471,326

[1/] Price for grade 41, staple 34, 3.5-4.9 micronaire as reported by Agricultural Marketing Service, U.S.D.A.

[2/] Adjusted to 1983 dollars using implicit GNP deflator.

averaged only .98 percent and ranged from .01 to 3.26 percent. The 1981-82 loss was more substantial than the other years; it comprised 31.2 percent of the total loss over the 17 year period in constant dollar terms. However, the annual losses to producers may not represent the total loss, especially if textile mills use other fibers rather than cotton because of processing problems, then the decreased demand for the area's cotton would be an additional economic loss.

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