

Economics of Turfgrass in Arizona

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Many large areas of agriculturally-related industries and endeavor have gone unnoticed by people who are concerned only with traditional concepts of plant and animal economics. One little noticed area of agriculturally related endeavor is that concerned with turfgrass. The establishment and maintenance of turfgrass in home lawns, parks, recreational areas, golf courses, school campuses, and industrial areas constitute a highly important agriculturally-oriented Arizona industry. This agri-industry affects every citizen of the state; and more people have contact with it than any other. Although the relationships of turfgrass to citizens are obvious, the magnitude of the industry in Arizona is not generally understood. This article presents available information relevant in evaluating the turfgrass industry in the state.

Home Lawns

In 1960 the Arizona population was 1,321,000 with 312,036 family units.¹ Population in 1967 was estimated at 1,668,000.² Assuming the same proportion of family units as in 1960 there were 394,000 family units in 1967. If 50% of these families had home lawns upon which they spent an average of \$75 each year for water, fertilizer, mowing and pest control, their 1967 expenditures were \$14.8 million.

Golf Courses and Parks

The most expensive turfgrass to maintain is that on golf courses. In 1967 there were 72 regulation golf courses in Arizona with a total of 999 holes.³ Total maintenance cost per hole on golf courses in the far west averaged \$4,653 according to the National Golf Foundation.⁴ Assum-

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¹ 1960 Census Report.

² Arizona Statistical Review. Valley National Bank. Sept. 1968.

ing this figure as representative of expenses in Arizona annual maintenance expenditures on regulation courses in 1967 were \$4.6 million.

In addition to the regulation golf courses there were in 1967, 19 par three courses in Arizona with a total of 234 holes. If we assume maintenance costs per hole on par three courses of only half those for regulation courses, or \$2,326 per hole, total 1967 expenditures on Arizona par three golf courses were over \$5 million. Estimated total 1967 expenditures in Arizona for golf course turfgrass maintenance exceeded \$5.1 million.

In 1965, Arizona had 249 municipal and county parks covering a total of 132,898 acres and representing \$6.6 million in operating costs.⁵ Although portions of these parks were undeveloped, and other portions devoted to golf courses, a significant portion of most park acreages is general purpose turfgrass. If we assume that 25% of total park expenditure is devoted to maintenance of general purpose turfgrass we derive an estimate of \$1.65 million which, with inflation to 1967 can be rounded off at \$1.7 million.

School Campuses and Cemeteries

Large areas of turfgrass are maintained on school campuses, and cemeteries, while high school and college athletic fields represent a considerable turfgrass acreage which is relatively expensive to maintain. In addition, motels, airports, and industrial centers usually maintain some turfgrass as part of their landscaping. Nationally, it has been estimated that cemeteries and school campuses, including colleges and universities represent 9.7% of total turfgrass main-

³ National Golf Foundation Information Sheet ST2.

⁴ National Golf Foundation Information Sheet GC4.

⁵ 1967 Statistical Abstract of the United States.

tenance expenditure.⁶ Combining maintenance cost estimates for home lawns at \$14.8 million, golf courses at \$5.1 million, and parks at \$1.7 million we obtain a total of \$21.6 million. If 9.7% of total expenditure on turfgrass estimated nationally for cemeteries and campuses holds for Arizona then \$21.6 million is 90.3% of total expenditure, cemeteries and campuses would involve \$2.3 million expenditure and Arizona's total would be \$23.9 million. Since motel, industry, and other miscellaneous turfgrass areas are not included in this total it is certainly a conservative estimate.

Turfgrass Expenditures in Other States

Data from states which have made intensive surveys of turfgrass expenditures might help to evaluate their importance in Arizona. In 1964, a Texas study⁷ estimated total annual turfgrass maintenance costs of more than \$211 million in that state. This represents an annual per capita expenditure of \$20.34. A detailed 1966 study in Pennsylvania⁸ derived figures which indicated turfgrass maintenance and establishment costs at the rate of \$161 million per year or a per capita expenditure of \$13.90. A study in Ohio in 1967⁹ based in part on the Pennsylvania results indicated a total expenditure of \$181 million for a per capita figure of \$16.16. A West Virginia estimate in 1968¹⁰ indicates a total expenditure in that state of \$64 million for turfgrass maintenance for a per capita figure of over \$30.00.

If one assumes an Arizona per capita expenditure of \$14.00 — a most reasonable figure in light of estimates from other states — he obtains an estimate of \$23.4 million spent in Arizona in 1967 for turfgrass maintenance. This compares closely to the first approximation of \$23.9 million — a per capita expenditure of \$14.25.

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⁶ Nutter, Gene C. 1965. Turf-grass is a \$4 billion dollar industry. *Turfgrass Times* 1(1).

⁷ Turfgrass maintenance cost in Texas. *Texas Agr. Exp. Sta. Bull. B1027* November 1964.

⁸ 1966 Turfgrass Survey. *Pennsylvania Crop Reporting Service. Pennsylvania Department of Agriculture. Harrisburg, Pennsylvania.*

⁹ Unpublished Special Problems Study in Agronomy. *Ohio State University* 1967. "Importance of Turfgrass in Ohio." Garry L. Seitz.

¹⁰ Henderlong, Paul R. 1968. *The Turf Industry in West Virginia. West Va. Misc. Publ. 5.*

Table 1. Effects of several insecticides and/or insecticide combinations in reducing pink bollworm infestations. Phoenix, 1967.

Treatment ¹	Rate lbs./A.	Pre- treat	Mean No. Larvae/100 bolls Collected on:						
			August				Sept.		
			1	8	17	25	30	13	21
Check	—	95.5	95.0	77.0	102.5	103.5	212.5	249.0	307.0
Thuricide	2 qts.	68.0	68.5	61.5	62.5	92.0	132.5	147.5	130.5
Methyl Parathion	0.5	60.0	62.5	45.0	17.5	44.0	100.0	92.5	84.5
Toxaphene-Dylox	3-1.5	56.0	55.0	30.5	34.5	54.5	62.5	77.0	74.0
Toxaphene-Methyl Parathion	3-.63	48.0	47.5	40.0	26.5	22.5	70.5	44.0	50.0
CP 47114	1.0	84.0	84.5	41.0	17.0	31.5	55.5	39.5	48.0
Azodrin	0.63	54.5	60.0	34.5	16.5	22.0	47.5	41.0	32.0
Mobam	1.0	61.5	68.0	28.5	26.0	24.0	43.5	29.0	30.0
GC 6506	1.0	58.0	58.0	35.0	27.0	37.5	60.0	35.5	29.0
Toxaphene-Azodrin	3-.63	43.5	41.0	29.0	12.0	18.0	29.0	20.0	19.5
Toxaphene-DDT	4-2	45.5	48.5	29.5	17.0	20.0	28.5	15.5	18.5
Toxaphene-Azinphosmethyl (Guthion)	3-1	63.5	69.0	45.5	14.0	11.0	8.0	5.5	5.5
Azinphosmethyl (Guthion)	1.0	77.5	63.0	29.0	18.0	14.0	6.5	2.0	3.0

¹ Insecticidal applications were made on the following dates: 7/28, 8/2, 8/8-9, 8/15, 8/22, 8/28, 9/2, 9/6-7, and 9/12.

Table 2. Influence of insecticidal treatments on per cent bolls infested with pink bollworm larvae. Phoenix, 1967.

Treatment	Rate lbs./A.	Per Cent Infested Bolls Collected On:				
		8/17	8/25	8/30	9/13	9/21
Check	—	51.5	56.5	86.0	95.0	98.0
Thuricide	2 qt.	45.0	53.0	67.5	73.5	64.5
Methyl Parathion	0.5	13.5	33.0	59.0	54.5	47.5
Toxaphene-Dylox	3.0-1.5	22.0	29.0	41.0	41.0	36.5
Toxaphene-Methyl Parathion	3.0-.63	19.5	14.5	42.5	34.0	32.5
CP 47114	1.0	14.0	26.5	37.0	28.0	31.5
Azodrin	0.63	13.5	19.5	33.5	27.0	22.0
Mobam	1.0	19.5	20.5	29.0	23.5	21.5
GC 6505	1.0	18.0	29.5	39.5	27.0	18.5
Toxaphene-Azodrin	3.0-.63	10.0	18.0	21.5	18.5	12.5
Toxaphene-DDT	4-2	14.0	15.0	19.5	12.0	10.5
Toxaphene-Azinphosmethyl (Guthion)	3.0-1.0	8.5	10.0	7.5	5.5	4.5
Azinphosmethyl (Guthion)	1.0	16.0	12.0	5.5	1.5	3.0

Table 3. Comparison of yields from insecticidal treatments for pink bollworm control. Phoenix, 1967.

Treatment	Rate lb./A.	Mean Plot Yields	Stat. Sig. ¹	
			5%	1%
Check	—	201.0	a	a
Thuricide	2 qts.	285.0	b	b
Toxaphene-Dylox	3-1.5	355.0	c	c
Mobam	1.0	358.5	c	c
Methyl Parathion	0.5	378.5	cd	cd
CP 47114	1.0	395.0	cd	cd
Toxaphene-Methyl Parathion	3-.63	396.5	cd	cd
GC 6505	1.0	413.5	de	cde
Toxaphene-Azodrin	3-.63	418.0	de	cde
Azodrin	0.63	430.5	de	cde
Toxaphene-DDT	4-2	431.5	de	cde
Toxaphene-Azinphosmethyl (Guthion)	3-1	453.0	ef	de
Azinphosmethyl (Guthion)	1.0	485.5	f	e

¹ Duncan's Multiple Range Test; treatment means followed by the same letter are not significantly different.

Turfgrass

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Both the Pennsylvania and the Ohio survey added replacement value of lawn equipment to their maintenance totals to estimate the total magnitude of turfgrass expenditures in their states. In both cases the replacement estimates were nearly twice

those for maintenance. If we assume that in Arizona replacement costs were only equal to those for maintenance we would derive estimated annual values of \$46.8 million or \$47.8 million for turfgrass as a segment of Arizona's total economy. Among the traditional agricultural sectors of the economy for which statistics are kept, these estimates exceed all but three —

cotton, cattle, and vegetable crops.¹¹ Although turfgrass expenditures are primarily toward aesthetic and practical values rather than monetary returns they do represent a major part of the Arizona economy and turfgrass as a crop is one of the most important in the state.

¹¹ 1968 Arizona Agriculture. Arizona Cooperative Extension Service and Agricultural Experiment Station Bul. A-54.