

# Pesticide Use in Arizona

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The Arizona Community Study Pesticide Project\*\* is engaged in investigations of the effects of long-term exposure to pesticides on public health. One part of this program of research is directed toward estimating quantity of pesticides used for agricultural purposes in Arizona. This paper reports the results of this study.

Estimates of pesticide consumption have been obtained from major agricultural chemical companies doing business in Arizona. Direct contact was made with officers of each of these companies with the understanding that individual data would be confidential but that aggregated data were not. The estimates are not considered complete but regarded as a realistic estimate of actual pesticide usage. Data for 1965 are thought to be less complete because this was the first attempt at collection. Usage of chlorinated hydrocarbons and organic phosphates together with other materials are listed in Table 1.

The next step in the study was to break down the consumption figures into pesticide use by county. This type of breakdown requires several judgments due to a wide variation in application rates by areas and by crop. Since data on specific applications by crops and areas is not available, one procedure to estimate county consumption would be to proportion state totals by crop acres by county. This produces estimates which are particularly synthetic because of differences in the relative importance of specific crops in different counties. Consultation with producers, agricultural chemical companies and specialists at the Agricultural Experiment Station and Cooperative Extension Service resulted in ranking of crops by quantity of pesticide applied per acre. It was found that the heaviest pesticide use was on cotton, alfalfa and lettuce and these crops use about one third of Arizona crop land. However, a more realistic way to divide total pesticide use by counties would be to base estimates on total acreage in cotton, alfalfa, vegetables and citrus in each county. These estimates by acreage were made for 1965, 1966, and 1967 and were summarized in Tables 2 and 3.

Table 1. Pounds of Technical Material Used in Arizona

	1965	1966	1967
<i>Chlorinated Hydrocarbons</i>			
Aldrin	6,000	24,000	7,700
BHC	5,200	8,200	18,900
Captan	13,100	14,000	32,700
Chlordane	22,200	25,700	34,316
Chlorobenzilate	150	1,300	1,564
DDT	544,600	1,072,300	2,519,882
Dieldrin	10,100	14,500	9,291
Dilan	5,540	32,200	24,619
Endrin	45,900	19,200	21,640
Heptachlor	2,300	4,100	4,575
Kelthane	55,600	4,600	5,602
PCNB	121,400	44,000	46,982
Nemagon	87,300	90,500	160,826
Perthane	29,000	2,900	9,871
Rhothane	17,000	12,560	900
Strobane	158,400	126,000	213,982
Telone	101,500	374,000	453,500
Thiodan	63,000	98,200	75,156
Toxaphene	798,500	1,028,500	2,450,607
	2,086,790	2,996,760	6,092,613
<i>Organic Phosphates</i>			
Azodrin	10,400	21,800	528,744
Bidrin	11,100	2,800	16,488
Cygon	10,100	8,500	24,559
Diazinon	8,200	16,700	17,600
Disyston	32,000	5,500	31,707
Dylox	120,900	98,600	65,462
Guthion	-----	32,200	22,445
Malathion	78,800	100,100	119,524
Parathion	112,000	292,700	680,538
Phosdrin	50,700	147,000	63,150
Phosphamidon	200	4,500	8,782
Systox	300	2,100	3,000
Thimet	15,500	39,400	54,660
Delnav	5,300	1,400	6,257
DEF	2,000	58,500	166,150
	463,400	862,000	1,815,338
<i>Carbamates</i>			
Eptam	922	1,500	1,406
IPC	480	5,000	2,160
Maneb	22,100	11,240	1,575
Sevin	19,700	22,200	54,774
	43,200	39,940	59,915
Other pesticides including herbicides	950,140	1,220,400	2,241,800
Total	3,543,530	5,119,100	10,209,666

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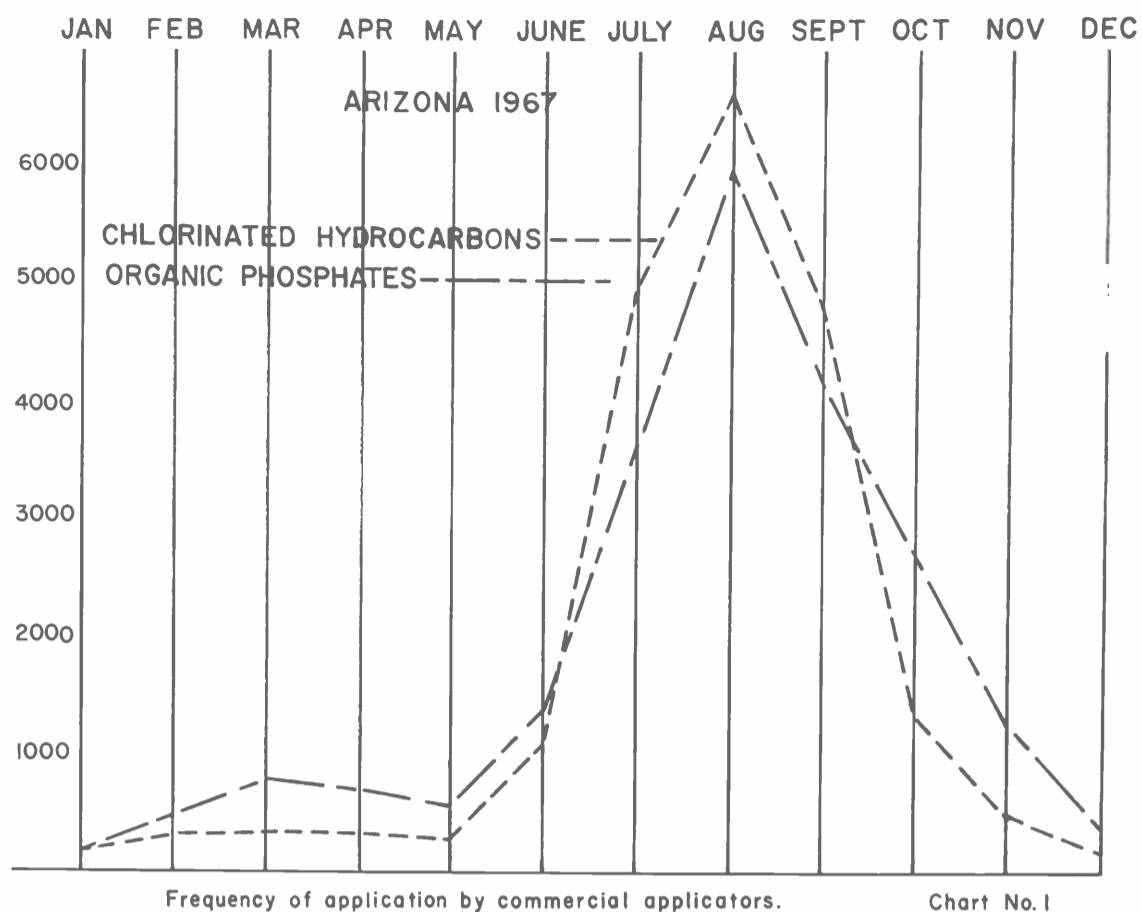


Table 2. Acreages of Cotton, Vegetables and Citrus in Arizona by Years

County	1965		1966		1967	
	By County	% of Total	By County	% of Total	By County	% of Total
Maricopa	289,940	43.3	261,260	43.8	258,820	44.9
Pinal	148,585	22.2	118,900	19.9	115,870	20.1
Yuma	135,045	20.2	137,440	23.1	126,805	22.0
Cochise	30,386	4.5	20,267	3.4	19,054	3.3
Pima	24,935	3.7	19,450	3.3	20,020	3.5
Graham	24,090	3.6	20,880	3.5	18,500	3.2
Other 8 Counties	16,994	2.5	18,113	3.0	17,016	3.0
Totals	669,975	100.0	596,310	100.0	576,085	100.0

Table 3. Use of Pesticides in Arizona By Counties Based on Acreages in Table 2

County	Chlorinated Hydrocarbons Lbs. of Technical Material			Organic Phosphates Lbs. of Technical Material		
	1965	1966	1967	1965	1966	1967
Maricopa	904,000	1,313,000	2,736,000	201,000	378,000	815,000
Pinal	463,000	596,000	1,225,000	103,000	712,000	365,000
Yuma	422,000	692,000	1,340,000	94,000	199,000	400,000
Cochise	94,000	102,000	201,000	21,000	29,000	60,000
Pima	77,000	99,000	213,000	17,000	28,000	64,000
Graham	75,000	105,000	195,000	17,000	30,000	58,000
Other 8 Counties	52,000	90,000	183,000	12,000	26,000	54,000
Totals	2,087,000	2,997,000	6,093,000	465,000	862,000	1,816,000

The striking feature of Table 3 is the increase in quantity of chlorinated hydrocarbons and organic phosphates. The increase in chlorinated hydrocarbons was 192 per cent between 1965 and 1967, Table 4. The organic phosphates increased even more, 291 per cent, between 1965 and 1967. Breaking the increase up by county shows distribution of pesticide increases. The largest proportion of increase in usage of chlorinated hydrocarbons occurred in Maricopa, Yuma and the other eight counties with Cochise having the smallest. In terms of organic phosphates, major increase again was in Maricopa, Yuma and the other eight counties with Cochise county having the smallest relative increase.

Increases in pesticide applications in the recent past leads to speculation about future applications. Are recent increases an indication of increasing trend in materials applied? Pesticide application depends on type of pest, size of populations, and degree of control sought. When pest populations are small, they can be controlled by less pesticide material. Populations of pests are related to weather conditions, previous populations and the degree of control achieved. Thus, the amount of pesticide appears to be cyclic in nature.

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# Pesticide Use In Arizona

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Data in the tables cannot be interpreted as an indication of simple trends.

Pesticides used in Arizona can be evaluated in terms of value as well as quantity applied. When quantities of each material are multiplied by a typical price, the value of material is obtained. These values for chlorinated hydrocarbons, organic phosphates, carbamates and other materials are summarized in Table 5.

Organic phosphates dominate the picture from a value point of view. Azodrin, parathion, malathion and cygon are the largest value segments in this category. Chlorinated hydrocarbons rank second in value, with DDT being the major value component. Other pesticides rank third because of the value of treflan, dalapon, MSMA diuron.

Timing of the application of major pesticides is of concern. For example, it is thought that hay with minimum pesticide content can be obtained during the first few months of the year. Frequency of applications of materials was obtained from records filled out by custom applicators. These records contained the material applied, location of application, date and other information. Chart 1 shows the frequency of pesticide application by material types by month, with August being the highest month. Rise in application begins in May and reaches a low level by November. Although application frequency data were obtained only on custom applicators, it appears safe to assume that other applications, i.e., individual owners parallels these figures.

It is apparent that the estimated value of these pesticides in Arizona represents about two per cent of gross value of agricultural production.

Table 4. Changes in Pesticide Application From 1965 to 1966 and 1967

County	Chlorinated Hydrocarbons		Organic Phosphates	
	% Change 1966	% Change 1967	% Change 1966	% Change 1967
Maricopa	+ 45	+ 203	+ 88	+ 305
Pinal	+ 29	+ 165	+ 67	+ 254
Yuma	+ 64	+ 218	+ 112	+ 326
Cochise	+ 9	+ 114	+ 38	+ 186
Pima	+ 29	+ 177	+ 65	+ 276
Graham	+ 40	+ 160	+ 76	+ 241
Other 8 Counties	+ 73	+ 252	+ 117	+ 350
Totals	+ 44	+ 192	+ 85	+ 291

Table 5. Value of Pesticide Used in Arizona, 1967

Chlorinated Hydrocarbons	\$ 3,594,004
Organic Phosphates	4,350,729
Carbamates	67,878
Other	2,387,635
Total	\$10,400,246

## Cattle Auction . . . (from page 4)

a lot of effort to organize a thing like this. It's the small rancher like myself who really benefit."

Jim Armer, assistant vice president of livestock loans at First National Bank of Arizona told Dr. C. Curtis Cable, marketing specialist with the Cooperative Extension Service at the U of A (left to right respectively in photo 5th col., top) "this sale had to come because the cattle industry is becoming more sophisticated. Expenses must be cut. The buyers must be able to come to one place and buy all the cattle he needs to fill his orders at one time; at one place. He can no longer afford more than one trip these days. The buyers as well as the cattlemen need a fair shake in the market."

Cable has been working with Pat Gray and between them will prepare a summary of all three sales for the cattlemen.

"I like the sale well. It's great for the small fellow. Generally, I'd have to send my cattle in with another rancher (pooling arrangement) in order to make a sale. That kind of sale sure makes a small operator big. I sell about 25 head a year which doesn't even make a truck load. But

this sale gives us all an even break," said Billy Garlinghouse (5th col., middle).

Art Ohlfest, manager of First National Bank of Arizona in Globe (5th col., bottom) said "we thought the sale was great. I've talked to many cattlemen about the sale and they all like it — seemed pleased with the results. It also provides advantages to the buyers who can see exactly what he's going to get. He can put a full load together at one place which reduces his total operating costs and he saves considerable time by not going around to many places."

In general, cattlemen feel it an overall success. Oh, there are problems, yet. But, each year they face up to the problems as soon as they are recognized and initiate the changes.

They all agree that it's about the best thing to happen to Gila county cow-calf operators . . . the prices they received have been better, which is welcome . . . large and small ranchers, alike, benefit by working together to market their cattle; sorting them; and "having more than one buyer there to stimulate competition."

And, next year? Naturally, an even better sale!