

It was estimated that almost half the herbicide sales in the United States in 1967 were for use on corn. More than 80 percent of the usage was on three crops: corn, soybeans, and cotton. Application of chemicals to control weeds in corn has increased steadily. In 1949, an estimated 7 percent of the corn acreage was treated for this purpose, rising to 11 percent in 1952, 28 percent in 1958, 39 percent in 1962, 41 percent in 1964, and 57 percent in 1966. The successful use of selective herbicides was the most significant development in the production of cotton in the past decade. The trend is toward their increased use on cotton.

Several factors point to an acceleration in the use of herbicides by agriculture in the future: the established place of herbicides today in modern farming practices; the increases in world food needs; the increasing labor costs; the increase in weed problems from greater use of fertilizers; and the greater number of larger, more progressive farms.

Pre-emergence herbicides reportedly are used on half the soybean acreage in some States. The use of pre-emergence or early post-emergence herbicides is likely to become of greater importance as more growers practice precision planting.

Combinations of herbicides broaden the spectrum of weed species controlled by one application and do a better job of controlling hard-to-kill species. Combinations also promise a more consistent performance with differing weed species, soil types, and rainfall.

The extent of chemical control of weeds in irrigation systems was recently indicated by the Bureau of Reclamation. About 75 percent of the channels of the approximately 38,000 miles of canals, laterals and drains operating in the Pacific Northwest, are normally treated for aquatic weed control. Copper sulfate has been effective in irrigation canals for suppressing rooted forms of aquatic weeds such as leafy pondweed and sago pondweed. In the irrigation projects of the Bureau of Reclamation in 1967, about 215,000 pounds of copper sulfate were used in 5,860 miles of canals in the 17 Western States.

The non-agricultural market now accounts for about 10 percent of herbicide sales. Military posts throughout the country use herbicides for controlling weeds and other undesirable plant growths. It has been reported that, during the 1966 fiscal year, 72,152 acres of military lands were treated with herbicides to control weeds, including 54,783 acres of improved grounds, 13,780 acres of roadway, fire lanes, and grassland, 3,395 acres where soil sterilants were used on land for munitions storage and railroad ballast and 194 acres of pond and marshland where aquatic vegetation was controlled.^{1/}

^{1/} Agrichemical West, March 1968, page 38.

Production of 2,4-D in 1969 was 47 million pounds, down 41 percent from 1968 (tables 2 and 26). For the previous 5 years, however, it increased at an average rate of 12 percent per year. Production of 2,4,5-T in 1969 was little more than one-fourth that in 1968. However, for the previous 5 years, it had increased an average of 15 percent per year.

Table 26.--2,4-D and 2,4,5-T (acid basis): Production, exports, and producers' domestic disappearance, United States, 1959-69

Year	Production		Exports <u>1/</u>	Domestic disappearance <u>2/</u>	
	2,4-D	2,4,5-T	2,4-D & 2,4,5-T	2,4-D	2,4,5-T
	<u>pounds</u>	<u>pounds</u>	<u>pounds</u>	<u>pounds</u>	<u>pounds</u>
1959.....	29,282	5,547	5,760	34,102	5,508
1960.....	36,185	6,337	8,796	31,131	5,859
1961.....	43,392	6,909	9,085	31,067	5,444
1962.....	42,997	8,369	10,192	35,903	8,102
1963.....	46,312	9,090	14,657	33,199	7,179
1964.....	53,714	11,434	13,037	43,986	8,912
1965.....	63,320	11,601	6,924	50,535	7,244
1966.....	68,182	15,489	5,419	63,903	17,080
1967.....	77,139	14,552	4,410	66,955 <u>3/</u>	15,381 <u>3/</u>
1968.....	79,263	17,530	3,391	68,404 <u>3/</u>	15,804 <u>3/</u>
1969.....	47,077	4,999	7,287	49,526	3,218

1/ Excludes military shipments abroad; these are not considered exports.

2/ Includes military shipments abroad.

3/ Revised.

(Production) Tariff Commission.

(Exports) Bureau of the Census.

Exports of technical grade 2,4-D and 2,4,5-T together picked up sharply beginning about the middle of 1968 following a decline in Government purchases. In 1969 they amounted to 7,287,000 pounds, more than double that for 1968 and more than for any year since 1964. Exports had steadily declined since 1963 at an average annual rate of 24 percent (tables 11 and 26).

The United States imported some 2,4,5-T in 1969, but only about one-seventh that of the previous year. No imports were recorded for 2,4-D (table 9).

Sodium chlorate continues to be a cheap and effective inorganic chemical for the non-selective control of weeds. About 12 percent of U. S. production is consumed in weed control and crop defoliation. Sodium chlorate is almost the only herbicide applied for soil sterilization prior to asphaltting parking lots, driveways, etc. It is applied in State programs to control noxious weeds, and is used industrially along railroad rights-of-way, etc. Small amounts are used for agricultural weed control, as along ditch banks. The chief farm use is probably for cotton defoliation. U. S. total consumption for weed control is believed to be about 24 million pounds, down somewhat owing to competition by organic herbicides. Considerable borax (perhaps 20 million pounds) is used mixed with the chlorate to eliminate fire hazard in both weed control and crop defoliation.

Sodium arsenite usage in agriculture is declining because of the hazard from run-off and from the attraction of the salty taste to livestock. Some is applied to kill off potato foliage before harvest; small quantities are used as an algacide in farm ponds.

2,4-D (2,4-dichlorophenoxy acetic acid) production has risen rapidly to 63 million pounds in 1965, an increase of 37 percent in two years. Production in the first seven months of 1966 was 39,811,000 pounds, up 7 percent over the same period a year ago. 2,4,5-T production also has risen; 1965 production amounted to 11.6 million pounds, up 28 percent from 1963. 2,4,5-T produced through July in 1966 amounted to 8,235,000 pounds, up 27 percent from the first seven months a year ago. Exports of 2,4-D and 2,4,5-T appear to have declined. However, unlike previous years the data for 1965 include only technical material. Large uses of 2,4-D in the United States are for the control of weeds in corn and small grains. U. S. disappearance of 2,4-D during the 1965 season amounted to 50.5 million pounds, that of 2,4,5-T was 7.2 million pounds. These disappearance figures, however, include the military shipments to Viet-Nam.

Many proprietary herbicides have been developed which have advantages on specific crops and against particular types or species of weeds. Production of 2,4-D and 2,4,5-T acids increased nearly 50 percent in the period 1962 to 1965. Between the same years production of all other synthetic organic herbicides more than doubled:

	Production of 2,4-D and 2,4,5-T acids	Production of other organic herbicides
1962	51,366,000 lb.	51,913,000 lb.
1963	55,402,000	64,626,000
1964	65,148,000	93,909,000
1965	74,921,000	112,855,000

MCPA (methylchlorophenoxy acetic acid) is related to 2,4-D but costs much more to produce. It is in general use to control weeds in flax. North Dakota reported 1.1 million pounds used in 1965 of which 730,000 pounds were on flax. The U.S. market for MCPA has been estimated at about a million dollars.