

PHREATOPHYTES IN REGION 5

O. J. Lowry

Salt cedars, one of the predominant phreatophytes, were first noted growing along the Rio Grande and Pecos River in about 1910, and since that time they have spread and infested the river bottoms and flood plains. It is estimated that at least 145,000 acres of phreatophyte infested areas exist along the Rio Grande and Pecos River between the Alamogordo Reservoir and the State line, and Otowi and the State line on the Rio Grande. In addition to these major infestations, salt cedars are known to exist in varying densities along the Canadian, Red River, Washita, Arkansas, and Cimmaron watersheds in Texas, Oklahoma, New Mexico, southern Kansas, and Colorado. Since the southwestern part of the United States is in an area of insufficient water and where all waters are appropriated, the water to be used for beneficial purposes must be salvaged from water presently going for nonbeneficial purposes. One method for providing this salvage is by the control of phreatophytes or other plants which non-beneficially consume precious water.

A brief resume of the work which has been conducted under the supervision of the Bureau of Reclamation, in an effort to control salt cedars and other phreatophytes, is as follows:

Pecos River

Beginning in 1948, salt cedars on the McMillan Delta area were sprayed in an effort to determine if aerial applications of herbicides could be used for the control. In the fall of 1948, 200 acres were sprayed with a formulation of 2,4-D at one pound per acre, and in the spring of 1949, 100 acres of this area were resprayed. Kills ranging up to 85 percent were observed on the salt cedar plants which received two applications. In 1951 an additional area of 2,650 acres was sprayed using various formulations of 2,4-D and 2,4,5-T; however, the results did not come up to our expectations. During this period several plots of salt cedars were sprayed with ground spray rigs to determine the most effective and economical herbicide for use to control woody plants primarily along irrigation and drainage ditches.

In conjunction with work done on the McMillan Reservoir, a 20-acre plot of salt cedar infested area was cleared and seeded to native and tame grasses. These grasses were irrigated the first two years after seeding. Of the 15 varieties of grasses that were seeded in 1950 and 1951, observations made in August this year indicated that the alkali and Giant Sacaton, Blue Panicum, and *Aeluropis Littoralis* have survived. Since these grasses were seeded, they have been inundated with water for short periods of time, and have been heavily grazed by livestock converging in the area. Also growing quite extensively in the area is Bermuda grass and Salt grass.

Middle Rio Grande

During the period of 1951 to 1954, a 250-acre plot of phreatophyte infested area comprised of salt cedar, cottonwood, and willow were sprayed with 2,4-D Amine in emulsion, using an aircraft. During this four-year-period five applications of herbicide were applied. However, no root kill was evident, only top kill having been obtained on the plants.

In the summer of 1953 an extensive aerial spraying program was undertaken in cooperation with the State of New Mexico, and an area of approximately 10,000 acres was sprayed using formulations of 2,4-D and 2,4,5-T. The primary results obtained here were top kill and temporary retardation of plant growth. With the floodway above Elephant Butte Reservoir having been completed, it has become mandatory that woody plants be controlled. Primarily the control of these plants has been accomplished by use of mechanical means. The towner disk and the root-cutter, which are used extensively, cost approximately from \$10.00 to \$12.00 per acre to operate. The towner disk affords only temporary removal of the plants, while the root-cutter so far has removed all existing plant growth.

In the fall of 1959, 1,250 acres of floodway area were sprayed with 14 formulations of 2,4-D, 2,4,5-T and 2,4,5-TP. Rates of one, two, and four pounds were applied by helicopter, and from observations made in May 1960, it appeared that the two and four pounds of 2,4,5-TP in water were the most effective rate for control of salt cedar plants. The 2,4,5-T Amine at two pounds per acre in emulsion appeared most effective for the control of broad-leaved phreatophytes, which include cottonwood, willow and baccaharis. Based on these observations, an additional area of 900 acres was sprayed in September 1960 with the helicopter, using two pounds of 2,4,5-T Amine in emulsion, primarily for the control of broad-leaved phreatophytes and silvex, or 2,4,5-TP in water for the control of salt cedar. These applications were made by helicopter at the rate of four gallons per acre. The cost of spraying the 900 acres was \$12.50 per acre.

Caballo

We have long recognized that salt cedars are a high water user, and the control of these plants should yield an additional source of irrigation water. Beginning in 1951 an area on Caballo Reservoir was sprayed by fixed-wing aircraft, using formulations of 2,4-D and 2,4,5-T. This program did not prove effective; thus in 1958 a cooperative program between the Bureau and the State of New Mexico was initiated to remove the phreatophytes from Caballo Reservoir. Since that time a total of 4,700 acres have been removed from the Government-owned land of Caballo Reservoir. This clearing has been accomplished by the use of 84-inch rotary cutters and root rakes. The rotary cutters were used to cut plants which were less than two inches in diameter, and the root rakes were used to clear the large growth. After the clearing with root rakes, the debris was stacked and burned. Over a two-year period the average cost of operation for the rotary cutter was \$6.20 per acre on 1,540 acres, and the cost for clearing with the root rakes was approximately \$14.00 per acre covering 3,500 acres.

Since the area has been cleared, a control program has been initiated, and several methods of control are being practiced. The rotary mowers have been used extensively for the cutting of regrowth, and the cost of their operation for control of regrowth on 1,700 acres has averaged \$2.20 per acre. Control by using the towner disk is also practiced; however, this method of control is only temporary, and is used primarily as a means to level the land in order that other equipment may operate more effectively.

Spraying with the trailer-mounted spray rig has also been practiced for the control of regrowth. In 1958 there were 684 acres sprayed with formulations of 2,4-D Amine and LV 2,4-D, 2,4,5-T, and 2,4,5-TP. The cost of

spraying using these applications averaged \$7.05 per acre. Unfortunately, this area was inundated, and no results were apparent from the spraying operations.

Beginning in 1959 an additional 630 acres were set aside in the upper reaches of Caballo Reservoir, and this area has been sprayed using 19 formulations of herbicides at rates of two, four, and eight pounds per acre. From observations which were made this past summer, it appears that the 2,4,5-TP at two and four pounds per acre in water produced the most effective results for the control of salt cedars. So far it has cost approximately \$1.00 per acre to operate the ground-spray rig, plus the cost of the chemicals. During 1959 and 1960 the total cost for spraying salt cedars by ground-spray machine has been \$7.00 per acre.

One of the most interesting items on Caballo Reservoir has been the spread of native and tame grasses in the area since the clearing operations have been concluded. At present Salt grass and Bermuda grass have spread almost uniformly in all of the area cleared, and are offering considerable grazing.

The above explanations have been a brief resume of the work which has been conducted in New Mexico for the control and removal of salt cedar and other phreatophytes.