

Field bindweed in California

Extent and cost of infestation Sara S. Rosenthal

Field bindweed, or wild morning glory, probably originated in western Asia or the Mediterranean region and was accidentally transported along with agricultural crops wherever people migrated. It is now considered the world's 12th most important weed.

The first reliable record of the occurrence of field bindweed, *Convolvulus*

arvensis L., in California is its presence in bricks used to build the Jesus Vallejo adobe near the southeastern end of San Francisco Bay in 1838. Bindweed spread rapidly after the turn of the century and is now widely distributed on agricultural land, as well as along roadsides and in other uncultivated places.

In the 1965 Noxious Weed Acreage

Report, James Koehler reported that field bindweed infested 1,454,000 acres in California. Only yellow star thistle, *Centaurea solstitialis* L., infested more land. An attempt was made in 1981 to update Koehler's report, to determine the extent of field bindweed and its economic cost to California today.

As in the 1965 survey, information was obtained from a questionnaire mailed to each county commissioner. Additional information was acquired from University of California Cooperative Extension farm advisors and from California Department of Transportation (Caltrans) district landscape specialists. Acres planted to various crops and their values were obtained from recent county reports and from the California Crop and Livestock Reporting Service.

Field crops reported to be infested with field bindweed include grains, oil crops, vegetables, sugarbeets, hay, and alfalfa. Thirty counties, representing 88.1 percent of the state's field crop acreage harvested during 1980, reported on the weed's occurrence. Of the total acreage harvested, 18.1 percent had been invaded by field bindweed. No attempt was made to extrapolate from the figures obtained to calculate data for counties that provided none.

Bindweed infests a greater percentage of perennial crops. Figures from 18 counties reporting on 72.1 percent of California's vineyards showed 30.8 percent of the grape acreage to be infested. Orchard crops containing field bindweed include apples, pears, peaches, apricots, prunes, cherries, almonds, walnuts, avocados, and citrus. In 30 counties containing 78.6 percent of the tree fruits and nuts harvested in the state during 1980, the weed occurred on 28.4 percent of the land.

Commercial ornamental plantings reported to contain this weed include nursery stock, roses, daffodils, wisteria, field-grown cut flowers, Christmas trees, bluegrass turf, and dichondra grown for seed. Residential plantings

Nearly 2 million acres of California land are infested with field bindweed. It is a costly weed in tomatoes and other crops. A worldwide search has turned up some natural enemies (see page 18), including the plume moth and leaf beetle (inset), but most also attack desirable plants.

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were mentioned, but no acreages were given for them. Of the 7,054,764 acres planted in ornamentals in the 11 reporting counties, 3.8 percent were infested with field bindweed.

Figures for the amount of field bindweed growing on uncultivated land along roadsides, on ditchbanks, and the like, were available from only 12 counties and from Caltrans for the roads under their control. Known infested rights-of-way totaled 15,022 acres. The actual acreage may be higher, because in many cases, particularly along roadsides, the number of acres treated for bindweed was known, but not the number infested.

The crop and uncultivated acreages specified add up to a conservative total of 1,788,493 acres of California land infested with field bindweed. If figures are included for counties that did not conduct surveys but gave rough estimates of the extent of infestation, the total comes to 1,917,758 acres. That includes estimated infested acreage that could not be categorized, plus 1,000 acres for each of the four counties where bindweed was known to have invaded more than 1,000 acres (no acreage added for those reporting less than 1,000 acres infested).

It is tempting to conclude that field bindweed is increasing in importance. Koehler obtained data from 47 counties in 1965; the 1980 figures come from 54 counties. However, most of the additional seven counties were only lightly infested. Individual counties did report changes. Field bindweed appeared to be increasing in some parts of Riverside County and wherever land had been shifted from annual to perennial crops in others. Decreases reported in Orange, Sacramento, and parts of Riverside counties were attributed to greater urbanization, and in Sacramento and Kings counties to the development of the herbicide glyphosate.

Since the early 1970s, increasing use has been made of glyphosate sprays on solid acreage (at a cost of \$40 to \$100 per acre per application with up to four treatments per year according to responses by the counties) or spot treatments (\$45 to \$125 per treated acre) and subsurface layering of trifluralin (\$25 to \$100 per acre). Other herbicides reported as being used against field bindweed include 2,4-D (\$12 to \$50 per acre), dicamba, difenzoquat methyl sulphate, MCPA (\$6 to \$16 per acre), MSMA, paraquat (\$10.65 per acre plus cost of application), cyanazine (\$25 per acre), EPTC (\$30 per acre), pebulate (\$39 per acre), Bactril (\$22 per acre), and picloram. Soil fumigation with 1,3-dichloropropene, a mixture of dichloropropenes (\$115 to \$215 per acre), or methyl bromide were also mentioned by the

questionnaire respondents. (No judgment of the efficacy of the herbicides is suggested by their inclusion in this discussion. These chemicals and costs were given in reply to the questionnaire.)

Mechanical controls used by the respondents include cultivation (\$12 to \$50 per acre), hand weeding (\$30 to \$150 per acre), flaming in orchards, planting cover crops or sod plus mowing in orchards, and the use of plastic film and gravel in ornamental plantings.

Reported control costs varied from county to county, depending on the crop being treated and the time in the crop growth cycle when a chemical is applied.

Relatively few counties provided crop loss figures in terms of control costs and yield losses caused by field bindweed. Expenses reported, or calculated from the lowest herbicide prices given, for control in the crops indicated amounted to:

\$3,755,380, field crops	in 11 counties
684,481, vineyards	6 counties
458,635, orchard crops	6 counties
26,500, ornamental plantings	3 counties

These figures represent costs incurred in only 24 percent of California's field crops, 13.3 percent of its vineyards, 7 percent of its orchard crops, and less than 1 percent of its ornamental plantings.

The total value calculated for yield losses in field crops, \$24,754,056, is from only eight counties. The only loss in grape yield given was 0.1 percent, or \$4,400, in Kings County. Thirteen counties reported yield losses of orchard crops totaling \$434,940 due to field bindweed infestations. Only Ventura County reported lower yield in ornamentals, costing \$35,000.

Of the 41 counties responding to the question on whether land values would increase if field bindweed were controlled, 32 answered that there would be little or no change; two said there would be a minimal increase in land values; and seven stated a definite yes. Siskiyou County estimated that 20,000 acres of dry farm land would increase 20 percent in value; Sonoma said 6,700 acres planted to grapes, prunes, and pears would increase 10 percent; and Ventura claimed that 140,000 acres would increase 5 percent. Some respondents commented that land prices would not increase, because land is already at top value.

As for possible beneficial qualities of field bindweed, Glenn and Solano counties reported it to be useful where it infests dryland wheat stubble used as sheep pasture. Caltrans often does not control the weed on roadsides where it may provide erosion control and is considered attractive.

While figures on the economic impact of field bindweed are not kept regularly, the \$4,924,996 reported to be expended for its control plus the recorded yield losses of various crops totaling \$25,228,396 are impressive. In summary, based on the information gathered in this survey, field bindweed has increased as a pest since 1965. New, imaginative control measures are needed to suppress the weed.

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California cultivated land infested with field bindweed*

Drainage basin (and counties reporting)	Infested acres planted to:				Unspecified use
	Field crops	Grapes	Tree fruits and nuts	Ornamentals	
San Joaquin (Amador, Fresno, Kern, Kings, Merced, San Joaquin, Stanislaus)	412,189	70,509	124,301	321	8,260
Madera County					<1,000†
Mariposa County					<1,000†
Sacramento (Butte, Colusa, Glenn, Nevada, Placer, Plumas, Sierra, Sutter, Tehama, Yolo, Yuba)	323,107	350	86,182	1,077	107,505
Sacramento County					>1,000†
South Coast (Los Angeles, Orange, Santa Barbara, Ventura)	31,825	2,100	23,079	269,326	--
San Diego County					>1,000†
Southeast Desert (Imperial, Riverside, San Bernardino)	28,325	0	1,001	80	--
Inyo County					<1,000†
Central Coast (Contra Costa, Monterey, San Benito, San Luis Obispo, San Mateo)	123,285	23,185	4,329	101	--
San Francisco County					<1,000†
North Coast (Humboldt, Mendocino)	20,011	15,000	6,000	--	964
Del Norte County					<5
Trinity County					<1
Northeast Interior (Mono)					<1,000†

* Information for the individual counties can be obtained from the author.

† Only a rough estimate of total infested land is available.