The Distribution of Halogeton in North America

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Abstract

Halogeton [*Halogeton glomeratus* (Stephen ex Bieb.) C.A. Mey.], a livestock-poisoning plant from central Asia, occurred in most Great Basin states in 1954. Current distribution of the species was studied by surveying botanists, weed scientists and other specialists in 1980. The survey indicated that halogeton had spread into additional counties in all states occupied in 1954 and into southern California, New Mexico, and east of the Rocky Mountains to Nebraska. The largest infestations continue to be in the Great Basin and Wyoming.

Halogeton [*Halogeton glomeratus* (Stephen ex Bieb.) C.A. Mey.] (Chenopodiaceae) is a well-known livestock-poisoning plant (James 1971) which was first discovered in the United States in 1934 growing in Elko County, Nevada (Dayton 1951). Although halogeton is poisonous to sheep and cattle, most of the deaths caused by the plant have occurred in sheep (Kingsbury 1964, Bruner and Robertson 1963). As little as 340 g (12 oz) of halogeton, which contains the toxic principal sodium oxalate, can kill a sheep (James et al. 1980). This herbaceous, annual forb is native to central Asia, where it occurs from the lower Volga River and the Caspian Sea of the Union of Soviet Socialist Republics east to Sinkiang Province, China and Mongolia (Komarov 1936). Halogeton was possibly introduced into this country as an impurity of imported crop seed, a contaminant in imported wool, or in the fleeces of imported breeding sheep (Erickson et al. 1952, Blackwell et al. 1979). After halogeton was introduced, it was probably spread by sheep. Viable halogeton seed have been found in sheep fecal pellets collected from halogeton-infested rangeland (Cook and Stoddart 1953), and early occurrence of the plant was along major sheep trails (Blackwell et al. 1979). Halogeton is a poor competitor with other vegetation (Fenley 1952) and usually invades sites where the soil has been disturbed (Cronin and Williams 1966).

Methods

Herbarium botanists, weed scientists, and other specialists throughout the United States (listed in the acknowledgments) were surveyed to obtain information on the current distribution and severity of infestations of halogeton. Respondents were provided county outline maps of their states and asked to indicate the counties where halogeton occurred and to categorize its abundance in those counties as: (1) >202 ha (>500 acres), (2) 10 to 202 ha (25 to 500 acres), or (3)<10 ha <25 acres). Information on the economics of the halogeton problem (losses due to stock poisonings, range devaluation, and control costs) was also sought in the survey, but was generally unavailable. The distribution data from the survey and a 1954 Bureau of Land Management map of halogeton infestation (U.S. Dep. Interior 1954) were used to prepare a map showing the plant's occurrence, by county, in 1954 and 1980. Survey data indicating the counties with more than 202 ha (500 acres) of halogeton were used to make a second map showing the region where the plant was most abundant.

Results

Figure 1 shows the counties in which halogeton occurred in 1954 (black areas) and in 1980 (black and grey areas). Based on information supplied by the survey responents, halogeton is now present in

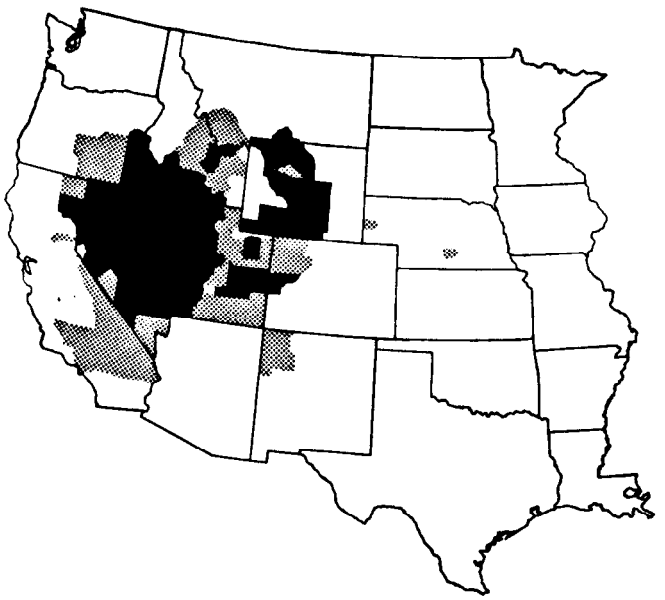

Fig. 1. *The distribution of* Halogeton glomeratus *in 1954 (black zones) and 1980 (black and grey zones). The grey zones are the areas to which halogeton has apparently spread since 1954. This map shows the occurrence of halogeton by county (the level of the survey) and does not intend to imply that halogeton occurs on all range sites within these counties.*

the following counties not shown on the 1954 map: California—Inyo, Kern, Lassen, Los Angeles, Modoc, Mono, and Nevada; Colorado—Garfield, Moffat, and Rio Blanco; Idaho—Bannock, Bingham, Blaine, Bonneville, Custer, Jefferson, and Lemhi; Montana—Beaverhead; Nevada—Clark and Esmeralda; Oregon—Harney and Lake; New Mexico—McKinley and San Juan; Utah—Cache, Davis, Garfield, Kane, Morgan, Rich, Salt Lake, San Juan, San Pete, Sevier, Uinta, and Weber; Wyoming—Hot Springs. These indicated extensions are not surprising considering their proximity to the older, well-established halogeton infestations. Less expected was the presence of halogeton in Nebraska (Buffalo and Scotts Bluff counties). The great distance of this movement suggests that it may have been caused by human activity (possibly by livestock shipments or contaminated motor vehicles).

Figure 2 shows the counties which contained more than 202 ha (500 acres) of halogeton in 1980. This area corresponds closely to halogeton's 1954 distribution and is the region where the halogeton

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The following specialists provided information on halogeton occurrence: H.P. Alley, Univ. of Wyoming, Laramie; L.O. Baker, Montana State Univ., Bozeman; D. Barbe, California State Dep. of Food and Agr., Sacramento; J.B. Gerard, Univ. of New Mexico, Las Cruces; R.B. Hawkes, Oregon State Dep. Agr., Salem; E.P. Heiker, Colorado State Univ., Fort Collins; R.E. Higgins, Univ. of Idaho, Moscow; P.C. Martinelli, State of Nevada Dep. Agr., Reno; M. McCarty, USDA, Univ. of Nebraska, Lincoln; and L.M. Shultz, Utah State Univ., Logan. The author also wishes to to thank L. Andres, R. Evans, R. Hawkes, and J. Young for reviewing the manuscript, and G. Johnson for technical assistance.

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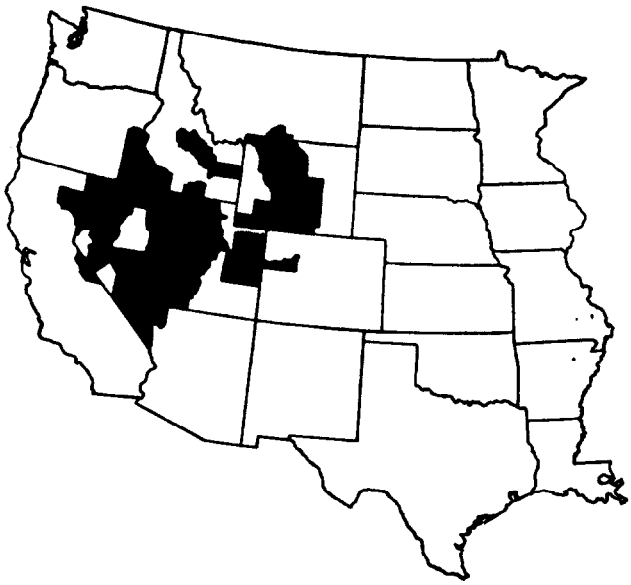

Fig. 2. *Counties which had more than 202 ha (500 acres) of halogeton in 1980.*

problem is most serious.

Halogeton can probably be expected to increase its range in the future. Its present occurrence in southern California, Nevada, Utah, and New Mexico suggests that it may eventually occur in northern Arizona, or that it may currently be there undetected. The plant might also move into eastern Washington and into other plains states. Halogeton could become a problem in the cool deserts of Arizona and Washington but is unlikely to become a problem in the plains states, except possibly on arid-saline soils to which it is well adapted.

Halogeton's persistence and spread is related to prolific seed production (Tisdale and Zappettini 1953). Cronin and Williams (1966) found that halogeton typically produces about 75 seeds on each inch (= 30 seeds/cm) of stem and that a large plant can produce more than 100,000 seed. Halogeton produces a winged seed that germinates during the first year after production and an unwinged, dormant seed which can remain viable in the soil for many years (Cronin 1965, Reed and Hughes 1970).

Few of the existing infestations of halogeton are currently being controlled. Control of this species with herbicides is generally too expensive to be widely used on the low-value ranges the plant infests. Ray Evans and James Young (USDA-ARS, Reno, Nevada, pers. commun.) feel that the main deterrent to halogeton control is that the plant occurs on sites which are so arid and/or saline that desirable forage plants do not readily establish after halogeton is controlled. A stem-boring moth (*Coleophora parthenica* Meyrick, Coleophoridae) from Pakistan has been released for biological control of halogeton but the moth failed to become established (Robert Hawkes, Oregon State Dep. of Agriculture, formerly USDA-ARS, Albany, Calif., pers. commun.). Other potential biological control agents have been observed in Soviet central Asia, but they are not available for study at this time (Lloyd Andres, USDA-ARS, Albany, Calif., pers. commun.). Prudent management of livestock and rangeland is currently the most effective method for reducing the impact of halogeton. If possible, livestock should be herded to avoid halogeton-infested areas, especially during late fall and early winter when halogeton is most toxic, and livestock should not be allowed to become hungry or thirsty while grazing in areas infested with halogeton (Fenley 1952, James et al. 1980). Feeding pellets containing 5% dicalcium phosphate has protected sheep from the poisonous oxalate in the weed. Grazing management that maintains vigorous stands of perennial plants and minimizes soil disturbance reduces halogeton's ability to increase and invade rangelands (Cronin and Williams 1966).

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