

The Distribution of *Halogeton Sativus* (L.) C. A. Meyer in Morocco

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With one Plate and one Figure in the Text

ABSTRACT

In the search for natural enemies of *Halogeton glomeratus* (Bieb.) C. A. Meyer, a noxious weed introduced into the United States, studies were made, in 1959-61, on the distribution of *H. sativus*, a closely related species, occurring within Morocco. This plant is found in the Rif Mountains in the north, throughout the Moulouya River Valley, along the Ziz River Valley, scattered along the southern slopes of the High Atlas Mountains as far west as Amerzgane, with an apparently discontinuous area of distribution on the northern slopes of the High Atlas in the vicinity of Asni.

INTRODUCTION

SEVERAL years ago *Halogeton glomeratus* (Bieb.) C. A. Meyer (Chenopodiaceae) became established in the United States. Since then it has spread through more than 11 million acres of grazing land in the Western States and has become a major plant pest in those areas. Because of its high oxalate content, many animals, especially sheep, have died as a result of grazing on this plant. Studies on *H. glomeratus* and closely related species in foreign countries were initiated by the United States Department of Agriculture in a search for natural enemies to help control this noxious weed. This paper is a summary of studies on the distribution in Morocco of *Halogeton sativus* (L.) C. A. Meyer, one of these closely related species.

GENUS HALOGETON

Uldrich (1934) places the genus *Halogeton* in the tribe Salsoleae of the family Chenopodiaceae. Zappettini (1953) recognizes three species of the genus: *H. glomeratus*, *H. sativus*, and *H. tibeticus* Bunge. He also lists four additional species that have been included, *H. acutifolius* Bunge, *H. articulatus* Ball, *H. tournefortii* Faub. and Spach. Jahandiez and Maire (1932) include the species *H. alopecuroides* (Delile) Moquin-Tandon in the genus.

The genus is widespread in distribution, species being found in the arid and semi-arid regions of southern Spain, North Africa, parts of the Middle East to Western and Central Asia. Fiori (1923) records the genus from northern Italy. *Halogeton sativus* and the perennial species *H. alopecuroides* are the only ones in Morocco (Jahandiez and Maire, 1932), although the *Index Kewensis* includes Morocco within the range of *H. articulatus*.

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HALOGETON SATIVUS (L.) C. A. MEYER

According to Zappettini (1953) *Halogeton sativus* has appeared under the following names and combinations: *Salsola sativa* L., *Salsola souda* Loeffling, *Suaeda setigera* Webb, and *Halogeton souda* (Loeffling) Macbride. This plant has been raised as a vegetable and as a source of soda in the Mediterranean regions (Uldrich 1934). In Morocco and Spain the succulent plant has served as a substitute for soap when the latter was scarce.

The following is a description of *H. sativus* by Muschler (Zappettini 1953): 'Herbaceous, glabrous, 15–30 cm. high, branching from base, branches erect, or ascendant, bullate-papillous. Leaves 2–8 mm. long, patulous, or deflexed, alternate, terete, oblong, linear, produced into a spine, succulent, farinoso-glaucous. Flowers in the axils solitary or sometime clustered, wing patuls erect, obovate, rotundate, fabelate, striate, often rose purple coloured.'

In Morocco, seedlings begin to appear in late March and early April, although tiny seedlings may be present in the field all winter in the immediate vicinity of the previous season's plants. Growth appears to be gradual during the spring and summer. Plants growing where moisture is more available become much larger and more luxuriant than those in the more arid regions. Flowering commences in the latter part of August and seeds mature fully in October. Seed dispersal occurs in November and December. Mature plants may attain a spread of 100 cm and a height of 40 cm under favourable conditions (Plate 1A).

DISTRIBUTION IN MOROCCO

Halogeton sativus ranges from sea level at the mouth of the Moulouya River to an altitude of 1,000–1,500 metres in the High Atlas Mountains. The plant is favoured by disturbed soil conditions such as roadsides, unused farm land, river banks, vacant lots, and similar areas. As a result its local distribution varies from year to year. The species is very tolerant of alkaline soil conditions and often will grow in areas where other plants cannot survive. It is also tolerant to drought conditions, and during an especially hot, dry summer, it is often the only green plant species in an area.

This species occurs in southern Spain, across North Africa (Uldrich, 1934), to Central Asia, with a small infestation in northern Italy (Fiori, 1923). Within Morocco the plant is common in the central part of the country (Fig. 1). The distribution presented in Fig. 1 is a summary of information obtained from literature and from observations made by the author and associates during the summers of 1959–61. There is, of course, some duplication of observations, especially in the Moulouya Valley and Rif Mountains. Pujos (1955) records this species in the Moulouya Valley 'dans l'aire à Chénopodiacées'. Thus, every location is not specifically recorded since local distribution varies from season to season.

Within Morocco *H. sativus* is found in the Rif Mountains eastward from Targuist (Sauvage, personal communication), becoming very heavy in the vicinity of Azib-de-Midar, to the area near Melilla (Jahandiez and Maire,

1934). Heavy concentrations are again encountered in the fields and mountains near the mouth of the Moulouya River (Plate 1B). It occurs in varying densities southward through the Moulouya Valley well into the High Atlas Mountains (Emberger and Maire, 1941; Pujos and Quezel, 1955; Sauvage

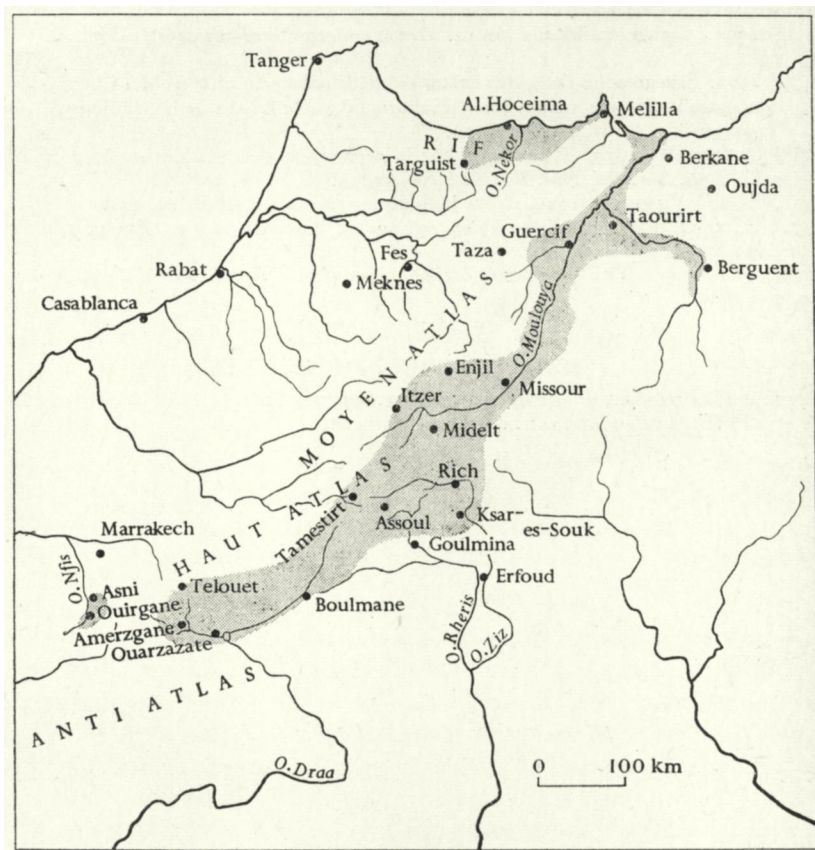


FIG. 1. The distribution of *Halogeton sativus* in Morocco.

and Vindt, 1949). It is also reported from various locations in the heart of the High Atlas and along the southern margins of these mountains to Ouarzazate (Emberger and Maire, 1941) and Amerzgane. Numerous discontinuous stands have been found along the Ziz River Valley as far south as Ksar-es-Souk. The only known stands in the northern slopes of the High Atlas have been found in the vicinity of Ourgane (Pujos *in litt.*) and Asni.

ACKNOWLEDGEMENTS

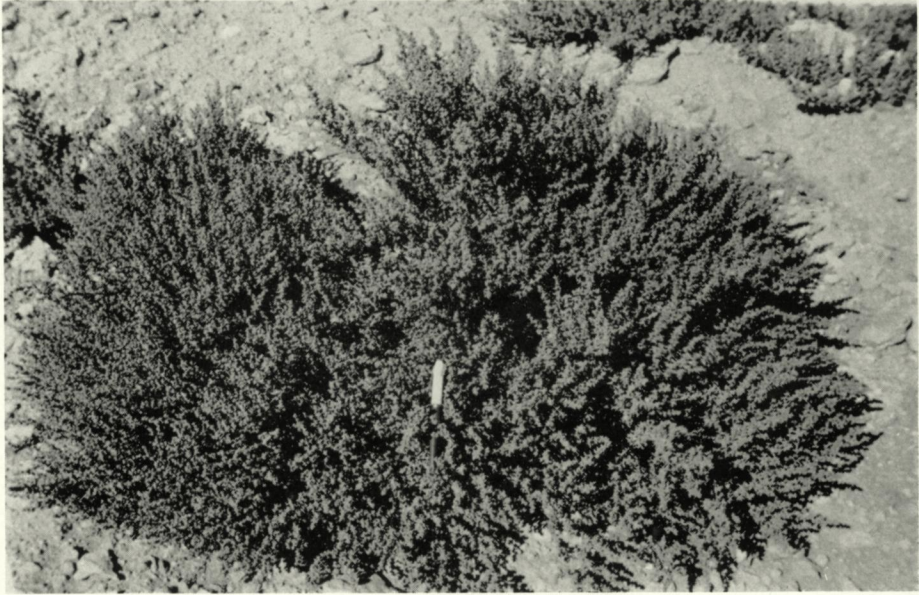
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EXPLANATION OF PLATES

- A. An individual *Halogeton sativus* plant in October ($\times 1/10$).
- B. A stand of *Halogeton sativus* in northern Morocco.



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