

ELEMENT STEWARDSHIP ABSTRACT
for

Bassia hyssopifolia

Five-Hook Bassia, Five-Horn Smother-Weed

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The Nature Conservancy
Element Stewardship Abstract
For *Bassia hyssopifolia*

I. IDENTIFIERS

Common Name: FIVE-HORN SMOTHER-WEED

Global Rank: G?

General Description:

A densely pilose, grayish annual with stems branched from the base, similar in habit to lambs quarters (*Chenopodium album*).

Diagnostic Characteristics:

Bassia hyssopifolia is sometimes confused with Russian thistle (*Salsola iberica*). Russian thistle is more profusely branched and spiny than *Bassia* (Fischer et al. 1979).

II. STEWARDSHIP SUMMARY

Bassia hyssopifolia has a growth habit similar to lambs quarters and tends to prefer alkaline environments. From an initial collection site in Nevada in 1917, it has spread rapidly throughout western North America. Very little has been published on the biology and control of *Bassia*. It may not present a significant threat to preserves. At the Kern River Preserve the presence of the plant does not appear to be a major problem and it is being replaced by native species in some areas.

III. NATURAL HISTORY

Range:

The following description is based on Collins and Blackwell (1979).

Bassia is native to parts of Europe and Asia, its type locality being near the Caspian Sea. It first appeared in North America near Fallon, Nevada around 1915. It may have been introduced as a seed contaminant, possibly with Turkistan alfalfa seed (Alex 1982). After establishment in Nevada, *Bassia* spread rapidly in all directions. By 1939 it was recorded as far from its point of introduction as British Columbia, Wyoming and Arizona, growing well in soils too alkaline for crops. *Bassia* had also established itself on the East Coast by the mid 1930s. In the East it has maintained a limited distribution from Boston to New York City and shows no sign of extending this range to any appreciable degree.

In California, Robbins et al. (1970) mention its occurrence in the "spiny salt bush association" of the San Joaquin Valley. It is also common on abandoned agricultural fields from Bishop to Lancaster in the Owens Valley, in the Santa Ana, Imperial and Palo Verde valleys, and extends northward through the Sacramento Valley (Robbins et al. 1970).

Habitat:

In California, Robbins et al. (1970) mention its occurrence in the "spiny salt bush association" of the San Joaquin Valley.

Reproduction:

Beyond one brief article on the toxicity of *Bassia hyssopifolia* to sheep, most of the available information on this species has been summarized in four paragraphs (Collins and Blackwell 1979). It is an annual and reproduces by seeds (Muenscher 1955), which do not survive well in fresh water for extended periods (Bruns 1965). Considering the external structure of the seed, dispersal is most likely accomplished by becoming attached to the fur or feathers of passing animals (Collins and Blackwell 1979).

Impacts:

Lowell Ahart (1985) of the Mt. Lassen CNPS chapter reports a minimal presence of *Bassia* in his area. Andrew Sanders (1985), A CNPS member, describes *Bassia* as a common plant in Riverside and San Bernardino counties, although it is not a major problem there. On the Kern River Preserve it covers about 5-10 acres in a multitude of small clusters, occasionally becoming a monoculture in the most dense areas. On this preserve it probably became established by human-caused disturbance such as road building or ditch clearing. Once established it is somewhat persistent although it does not appear to be on the increase. In some areas it is being replaced by native species (Hewett 1985). *Bassia* is also an important exotic weed at Morongo Canyon and Creighton Ranch preserves in California.

Bassia is a threat to sheep farmers, as it is toxic to sheep.

IV. CONDITION

V. MANAGEMENT/MONITORING

Preserve Selection & Design Considerations:

Bassia is not yet considered a major problem and no management programs have been initiated. For this reason it is difficult to assess the recovery potential of areas where *Bassia* may occur.

Management Requirements:

Weed control involves three fundamental objectives: prevention, eradication and control.

From a practical viewpoint, methods of weed management are commonly categorized under the following categories: physical, thermal, managerial, biological, and chemical (Watson 1977). Physical methods include both manual and mechanical methods. Thermal methods include both broadcast burning or spot treatment with a flame thrower. Managerial methods include the encouragement of competitive displacement by native plants and prescribed grazing. Biological control is usually interpreted as the introduction

of insects or pathogens which are highly selective for a particular weed species. Chemical control includes both broadcast and spot application.

The most desirable approach is that of an integrated pest management plan. This involves the optimum use of all control strategies in attempts to control weeds. It is generally accepted as the most effective, economical and environmentally sound long-term pest control strategy (Watson 1977). The use of various control techniques should be compatible with each other. Broadcast herbicide application, for example, may not work well with certain managerial techniques (i.e., plant competition).

PHYSICAL CONTROL The physical control methods discussed below (manual and mechanical) produce slash debris that can be disposed of by several techniques. If the vegetation is cut before seeds are produced the debris may be piled and left for enhancement of wildlife habitat (i.e., cover for small mammals). Debris may be fed through a mechanical chipper and used as mulch during revegetation procedures. Care should be taken to prevent vegetative reproduction from cuttings. Burning the slash piles is also effective in disposing of cuttings.

MANUAL CONTROL Manual methods use hand labor to remove undesirable vegetation. These methods are highly selective and permit weeds to be removed without damage to surrounding native vegetation.

The Bradley Method is one sensible approach to manual control of weeds (Fuller and Barbe 1985). This method consists of hand weeding selected small areas of infestation in a specific sequence, starting with the best stands of native vegetation (those with the least extent of weed infestation) and working towards those stands with the worst weed infestation. Initially, weeds that occur singly or in small groups should be eliminated from the extreme edges of the infestation. The next areas to work on are those with a ratio of at least two natives to every weed. As the native plant stabilizes in each cleared area, work deeper into the center of the most dense weed patches. This method has great promise on nature reserves with low budgets and with sensitive plant populations. More detailed information is contained in Fuller and Barbe (1985).

Hand Pulling: Muenscher (1955) recommends hand weeding of *Bassia*, done most easily after a rain when the soil is loose. Plants should be pulled as soon as they are large enough to grasp but before they produce seed. The pieces of root remaining in the soil will not sprout again.

Hand Hoeing: Plants can be destroyed readily while they are still small by hand hoeing, either by cutting off their tops or by stirring the surface soil so as to expose the seedlings to the drying action of the sun. The object of hoeing is to cut off weeds without going too deeply into the ground and doing damage to the roots of desirable vegetation.

MECHANICAL CONTROL Mechanical methods use mechanized equipment to remove above ground vegetation. These methods are often non-selective in that all vegetation on a

treated site is affected. Mechanical control is highly effective at controlling woody vegetation on gentle topography with few site obstacles such as rocks, stumps or logs. Most mechanical equipment is not safe to operate on slopes over 30 percent. It is also of limited use where soils are highly susceptible to compaction or erosion or where excessive soil moisture is present. Site obstacles such as rocks and logs also reduce efficiency.

Weeds may be trimmed back by tractor-mounted mowers on even ground or by scythes on rough or stony ground. Unwanted vegetation can be removed faster and more economically in these ways than by manual means and with less soil disturbance than with scarification. However, these methods are non-selective weed eradication techniques. They reduce the potential for biological control through plant competition and open up new niches for undesirable vegetation. In addition, wildlife forage is eliminated.

MANAGERIAL CONTROL Biological Competition: Sowing native plant species which have the potential to out-compete weedy exotics for important resources is usually a preventive method of weed control. In some cases later successional plants may be encouraged to take root among the unwanted vegetation. Once established, natives may displace weeds by competing for water or nutrients or by shading out the lower growing plants.

Some plant species inhibit the establishment or growth of other plants through the effects of allelopathy (i.e., biochemical interference of one plant's growth by metabolic products produced by another plant). Native species with such properties may be propagated in treated areas to control *Bassia* but, as allelopathy is occasionally a trait of noxious weeds, it is wise not to replace an old problem species with a new one.

Prescribed grazing: Livestock readily graze on *Bassia*, although sheep have died after a single feeding (James et al. 1976). Goats have not yet been used to control *Bassia*.

BIOLOGICAL CONTROL The term "biological control" is used here to refer to the use of insects or pathogens to control weeds. The introduction of exotic natural enemies to control plants is a complex process and must be thoroughly researched before implementation to prevent biological disasters. Such tools are not normally suitable for preserve managers to implement.

The only mention of insect herbivory on *Bassia* in the available literature is of *LYGUS* leafhoppers feeding on the species in the late summer (Parker 1972). The degree to which *LYGUS* adversely affects the growth of *Bassia* was not reported.

Please notify the California Field Office of The Nature Conservancy of any field observations in which a native insect or pathogen is seen to have detrimental effects on *Bassia*. These reports will be used to update this Element Stewardship Abstract. Management techniques which may encourage the spread of species-specific herbivores may be desirable in controlling *Bassia*.

CHEMICAL CONTROL Detailed information on herbicides are available in such publications as Weed Science Society of America (1983) or USDA (1984), and will not be covered comprehensively here. The Weed Science Society publication gives specific information on nomenclature, chemical and physical properties of the pure chemical, use recommendations and precautions, physiological and biochemical behavior, behavior in or on soils and toxicological properties for several hundred chemicals.

Herbicides may be applied non-selectively (i.e., broadcast application) or selectively (i.e., spot treatments). Chemical control of *Bassia* has not been previously reported.

Management Programs:

Contact: Ron Tiller, Preserve Manager. Kern River Preserve, PO Box 1662, Weldon, CA 93283. Tel: (619) 378-2531.

Monitoring Requirements:

Detailed observations focused on the vegetational change of the affected area over time will help to determine what method of control would be most efficient.

Monitoring Programs:

No quantitative monitoring studies of *Bassia* were discovered in this research. Qualitative monitoring of control efforts is being conducted at the Kern River Preserve (Hewett 1985).

Contact: Ron Tiller, Preserve Manager. Kern River Preserve, PO Box 1662, Weldon, CA 93283. Tel: (619) 378-2531.

VI. RESEARCH

Research Needs (General):

How important is *Bassia* in displacing native plant species? Does *Bassia* grow in undisturbed areas? Does it only occur on alkaline soils? Does it have any noteworthy preferences or aversions with regard to its physical environment? What are distinguishing field marks of seedlings? Do individuals grow clumped or scattered? What is known of seed productivity, seed viability, means and rate of seed dispersal, as well as dormancy and germination?

Management Research Needs:

Monitoring is needed to determine whether *Bassia* is extending its range and whether it displaces native vegetation.

VII. ADDITIONAL TOPICS

VIII. INFORMATION SOURCES

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IX. DOCUMENT PREPARATION & MAINTENANCE

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