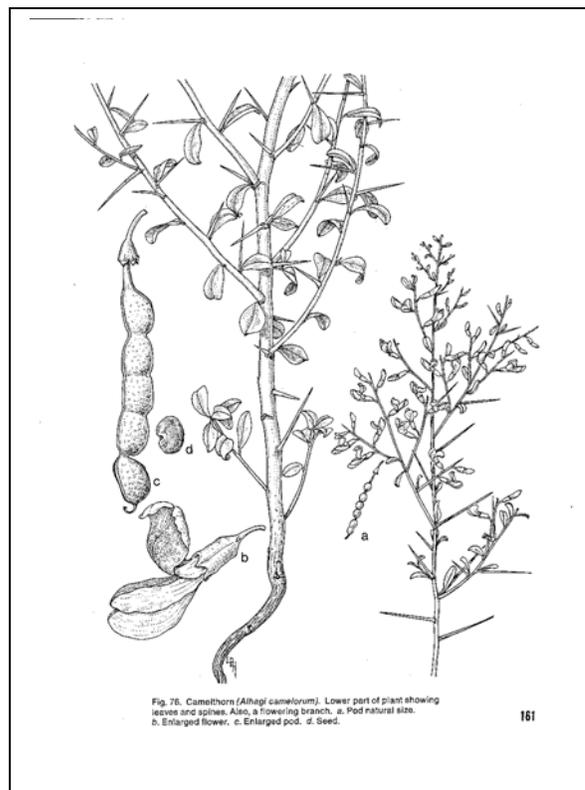


CAMELTHORN **Alhagi pseudoalhagi**

Life History/Identification:

Camelthorn is described as one of the most dangerous noxious weeds and one of the most difficult to eradicate. For centuries it has been seen as a plague on the land, devouring acre after acre in an aggressive and rapid manner. Even the Bible mentions the insidious nature of the plant, stating that "Alhagi shrubs had to be hoed down" (Isaiah 7:15 and 55:13). Camelthorn is an intricately branched, somewhat woody herb that, in cooler environments like Flagstaff, is deciduous and dies back into the ground each winter and remains dormant until spring. The root system of the weed has an extensively developed underground rhizome system. In the spring, thick rhizomes begin to spread in all directions from the parent plant. One report traced a single rhizome 12 meters away from the parent plant without uncovering the end. Vertical stems arise from buds on the rhizomes and, once the stems reach the soil surface, produce a leafy shoot. The adult stems are green and smooth and are armed at most of the nodes with stiff, leafless, spine-tipped branchlets. The leaves of camelthorn are alternately arranged, thick-textured, yellowish above with minute red dots, and bluish green underneath. The lower leaves are larger than the upper ones. After the plant goes to seed, the branchlets become persistent spines. In June and July, camelthorn alternately produces short-stalked flowers, pink to magenta in color, along each thorn branchlet axis. Flower production is high under hot, dry conditions (700-4000 per plant) and low under moist, shady conditions. Only a low percentage of flowers set seed. During July and August, seedpods appear on the plant. Pods are reddish brown at maturity, slender, often curved, constricted between the seeds, and are tipped with a small spine. There are 5 to 8 seeds in the pod and they are mottled and greenish brown in color. Seed viability in semi-arid soils may extend over a number of years.



Flagstaff Localities:

Around the early 1900's, camelthorn was introduced to Northern Arizona in tainted alfalfa seed. It is known to be a good honey plant in its native range and it is thought that beekeepers brought the plant to an area south of Phoenix in the 1920's. Camelthorn has since spread to the areas of Winslow, Holbrook, Snowflake, the Grand Canyon, the Little Colorado River, and Bullhead City. Infestations in the immediate Flagstaff area have been reported on Leupp Road, Townsend-Winona Road, Sunset Crater Road, and on service roads in the Wupatki National Monument.

Economic Impact:

Camelthorn is a native of the Turanian Desert and the Iranian Plateau, west through Anatolia to Rhodes and Cyprus. The common name is derived from the high affinity that camels have for eating the plant in its native range. There is a medicinal use for its sap, which contains mannitol, and may be used as a laxative. It was introduced to the United States in 1915 in shipments of alfalfa seed from Turkestan and in camel dung packing around date palm offshoots. Camelthorn was declared a noxious weed in California in 1921, and extensive efforts to control the species were initiated in nine

counties by the mid-1920's. However, the aggressive plant was not eradicated and it has since spread to Washington, Idaho, Nevada, Utah, Arizona, Colorado, New Mexico, and Texas. Its deep and extensive root system allows it to tap into a water table up to 15 meters below the surface. This allows camelthorn to thrive in areas of little rainfall and to out-compete native plants for necessary moisture and nutrients. In many places it effectively crowds everything else out and will eventually have a pronounced effect on native wildlife that depend on indigenous plants for survival.

Control:

One of the most common ways in which camelthorn is spread is through livestock grazing. Seeds in or under bovine manure, where soil moisture and temperature is higher, have an advanced probability of germination, seedling growth, and survival. In addition, the digestive scarification of the thick, hard seed coat by livestock is very important (if not essential) for the establishment of this species. Careful monitoring of grazing activities in an area where camelthorn exists is necessary to ensure that native grasses are not overwhelmed by this unwanted pest. Animals should be held in a storage area for 10 to 14 days before being moved from an infested site to ensure that all seeds have passed through their digestive tracts.

Cultural Control:

Preventative measures such as promoting the use of certified weed-free hay, not allowing livestock to eat and thus disperse the seeds, and not allowing the spread of seed through the use of heavy equipment in land manipulation of infested areas are recommended. The prevention of new infestations of camelthorn is the best and most inexpensive method of control.

Mechanical Control:

Research has shown that mechanical methods of controlling camelthorn are futile by themselves. In one experiment, within three weeks after being sheared down to ground level, camelthorn grew 194 new shoots from underground buds. In unshowered plants, only 8 new shoots were produced from these underground buds. Although it seems that mowing will only aid in the spread of camelthorn, some research suggests that repeated removal of the tops of the plant could eventually exhaust food reserves in the roots and aid in its control. It is clear, however, that any mechanical control should first aim for the eradication of camelthorn above and below the ground. Several papers report the use of flooding in the control of camelthorn, but no details are given on how this is accomplished.

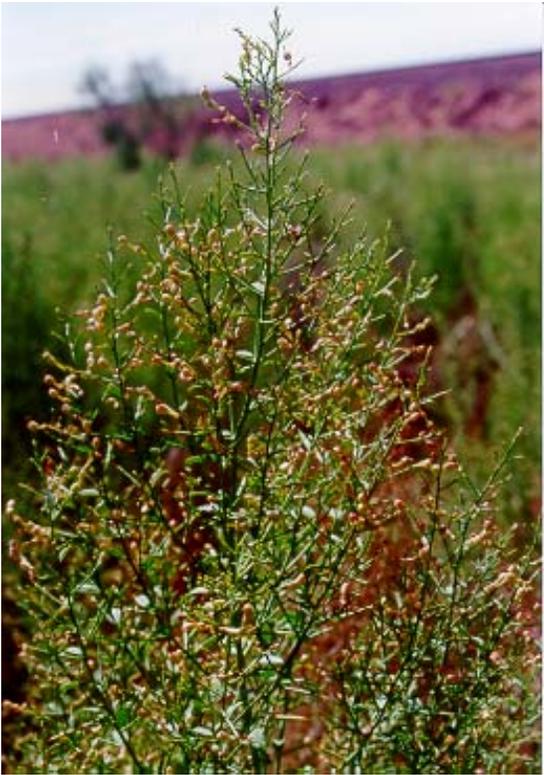
Chemical Control *(Noted here are chemical control techniques that have been used in other areas. Always check with weed specialists or chemical suppliers before treatment to ensure correct dosage and application. Mention of these products does not imply endorsement by the Northern Arizona Weed Council or The Nature Conservancy.):*

- 1) Grazon DS™ (active ingredients: picloram and triclopyr) can be used on camelthorn when it is actively growing in the spring and summer months. Two liters per plant of 1:80 Grazon™ mix injected up to 1 meter into the soil at the base of the plant has proven to be effective.
- 2) Tordon 75D™ (active ingredients: picloram and 2,4-D) is also a good herbicide to use in the spring and summer months. For more information on the use of herbicides on camelthorn, the Weed Management Library can be reached at 1-800-554-WEED.

Biological Control *(No exotic species should be introduced into an ecosystem without extensive research into the long-term effects. Mention of the species below does not imply appropriateness for use in Northern Arizona):*

There are currently no biological control agents used on camelthorn. In Israel, there have been reports of a wasp that forms galls on the vascular tissue of camelthorn, but it has not been integrated as a possible biological control method in the United States.

Note: No single control method, or any one-year treatment plan, will ever achieve effective control of an area contaminated with camelthorn. The fast growth, deep root system, fast rate of spread, and long seed dormancy of this plant require long-term cooperative integrated management programs and planning to prevent, contain, and reduce camelthorn infestations.



Species Management Plan Camelthorn

Alhagi pseudoalhagi (Beib.) Desv.

(*Alhagi camelorum* Fisch., *Alhagi maurarum* Medik.)

Status: Camelthorn is recognized as a noxious weed on the Coconino, Kaibab and Prescott National Forests. And is a restricted noxious weed in Arizona.

Life History/Identification: Camelthorn is a member of the pea family, Fabaceae. It is a perennial shrub with deep roots and extensive rhizomes. The plant is from 1 ½ to 4 feet high and is covered with spines. The spines are yellow tipped. The leaves are small and wedge shaped. The undersides of the leaves are covered with small hairs. Camelthorn has small pea- like pink flowers. The seedpods are maroon to brown in color. The seedpod is constricted between each seed, forming a distinct outline around each seed. Reproduction can occur from seeds or from the extensive underground rhizomes. The extensive rhizomes can grow to over 6 feet deep and can spread

over an area of 40 feet or more. New plants can be produced from deep within the ground. Each new plant can form its own rhizome system. The successful establishment rate from seeds is very low. Reproduction is mostly from rhizomes but can also be spread by seeds dispersed by animals, wind or water. Seeds do not sprout in direct sunlight but will sprout when buried in shallow soil. Seeds in or under animal manure have a higher success rate of germination and survival. Camelthorn is a native of the Mediterranean area and Asia and was accidentally introduced into the United States around 1915. It is now found in 35 states.

Known Locations: This species had been found on the Coconino National Forest on Leupp Highway and on Forest Road 545. It has also been found on Highway 64 on the Tusayan Ranger District, east of Grand Canyon National Park. It is reported to occur in the Wupatki National Monument along some of the access roads. Many locations of this plant have been found on the Navajo Reservation and are reported in the SWEMP Database.

Impacts: Camelthorn has the ability to spread over large areas due to its clonal nature. It has been reported to penetrate asphalt and building foundations. This has been observed in the Winslow and Holbrook areas. Livestock browse on camelthorn and may contribute to its spread. No data was found on the nutritional value of camelthorn to grazing animals. As with all invasive exotic plants, camelthorn impacts native ecosystems by competing with native species for their habitat.

Control:

1. Cultural Control:

Education can be a valuable way to combat any weed infestation. Currently most people are probably unable to identify camelthorn and recognize it as a noxious weed. Education in the identification of the plant may help reduce its spread.

Many infestations of camelthorn appear to be occurring along roadways throughout Northern Arizona. Distribution of the plant may be occurring by **transportation** on vehicles. Vehicle travel through noxious weed populations should always be discouraged. Seeds and plants fragments may be traveling into the National Forests by vehicles traveling from infestations in other areas such as the Navajo Reservation. **Cooperation** among agencies could be a valuable asset in controlling infestations.

Grazing animals are known to spread camelthorn seeds through their feces. Seeds that pass through the digestive systems of the herbivores are scarified, therefore increasing the chance of reproduction. Currently, no known infestations occur on grazing lands on the Coconino, Kaibab or Prescott National Forests. However, if this should occur grazing in infested areas should be discouraged or movement of animals should be restricted for a period of time to ensure that the seeds are not spread from one place to another. Movement of wild herbivores is difficult to control. In areas of infestations, periodic surveys could help to monitor the occurrence of new populations.

Other measures such as the use of weed free hay and certified seed will help reduce the possibility of new introductions of this species.

2. Mechanical Control:

Pulling or chopping is not an effective method of control. These techniques remove only the above ground portion of the plant and can encourage clonal reproduction by fragmenting underground rhizomes. **Mechanical removal** of this species may be a futile effort.

No information was found on the effects of **fire** on camelthorn. Since camelthorn originated in a desert environment where fire is not usually a major ecological factor, there may some potential for controlling this species through the use of fire. However, a more comprehensive review of the literature and consultation of experts should be done before anyone uses this technique to control the species.

3.Chemical Control: *Noted here are chemical control techniques in use in other areas. Always check with weed specialists or chemical suppliers to ensure correct dosage and application. Mention of these products does not imply endorsement by the Northern Arizona Weed Council, San Francisco Peaks Weed Management Area, the USDA Forest Service, nor the Nature Conservancy. Currently the use of herbicides is not allowed on lands administered by the Coconino, Kaibab and Prescott National Forests. Always check with your local land manager before using herbicides on public lands.*

Grazon DS™ (active ingredients: picloram and triclopyr) can be used on camelthorn when it is actively growing in the spring and summer months. Two liters per plant of 1:80 Grazon™ mix injected up to 1 meter into the soil at the base of the plant has proven to be effective.

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4. Biological Control: There are currently no biological control agents approved for use on camelthorn.

5. Integrated Control techniques available for the use on camelthorn are apparently limited. Traditional non-chemical treatments such as chopping and mowing do little to effectively treat this species. There are no biological control agents and the effectiveness of the use of fire is unknown. Therefore, the most effective non-chemical control of this species on land administered by the Coconino, Kaibab and Prescott National Forest is prevention.

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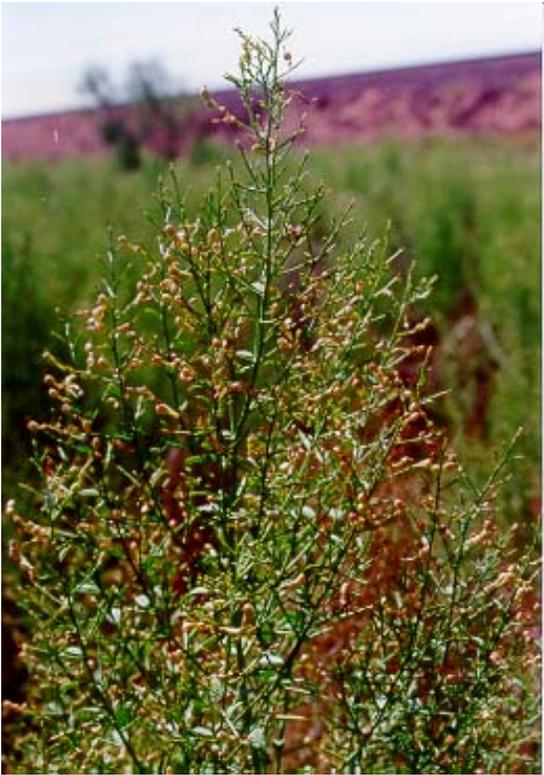
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