



PRODUCTION

Dodder: biology and management no. 3.112

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Quick Facts...

Dodder is a parasitic seed plant that attacks alfalfa and clover in Western Colorado.

Dodder infestations are serious concerns for forage and seed production of alfalfa and clover.

Integrated management is the best approach to control.

The USDA recommends the following steps to prevent the spread of dodder seed:

1. Use clean, certified seed.
2. Clean equipment before leaving an infested field.
3. Confine livestock while feeding contaminated hay.
4. Avoid spreading contaminated manure on uninfested soil.
5. Control dodder on irrigation ditches and other border areas.

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Introduction

Dodder is a parasitic seed plant that has many potential host plants. Alfalfa and various clovers are the typical host plants in Colorado. Forage, and especially seed production, can be severely impacted by an infestation. Lower yields, delayed or poor curing, and stand reduction are common problems from an established infestation.

Dodder is an annual plant that reproduces from seed and stem pieces. Seedlings must attach to a suitable host soon after emergence for survival. This relationship is parasitic, not symbiotic. Seedlings grow upright for 2 to 4 inches before attaching to host.

Plants are yellow due to a very limited amount of chlorophyll and stems appear as leafless, thread-like branching vines. Older plants produce a mat of stems over the host and entwine and attach to the host with sucker-like organs called haustoria.

Roots are non-existent or very reduced. Roots support the seedling until attached to the host. The root system is not suitable for nutrient uptake, but can absorb water. However, dodder is succulent and seldom needs water as a seedling.

Flowers are white to pink, bell-shaped, inconspicuous, in small numerous compact clusters. Flowering occurs from early summer to early autumn. Fruits are two to four globular capsules with a slight depression on top. Seeds are gray to brown, small, oval, and range in size from 1/25 to 1/16 inch long. Dodder seeds are easily confused with alfalfa and clover seeds. However, some species have a distinguishing rough seed coat.

Dodder, *Cuscuta* spp., are members of the Convolvulaceae (morning glory) family. Largeseed dodder (*C. indecora*), field dodder (*C. campestris*), and smallseed dodder (*C. planiflora*) are the more destructive species. Some species are native plants.

Other names for dodder include: Love vine, devilguts, goldthread, strangleweed, pulldown, devilsringlet, hellbind, hairweed, devilshair, and hailweed.

Distribution and Habitat

Largeseed and field dodders are more common in the Western United States. Basic characteristics and impacts are similar between all three species with subtle differences, as in germination temperatures. Dodder is found throughout Colorado with the greatest occurrence and impact west of the Continental Divide.

An adequate habitat for a host plant is also sufficient for dodder. A healthy dodder plant produces a large amount of seed. A high percentage of seed has a hard seed coat which delays germination. Seed has been estimated to be viable in the soil for 20 or more years. The majority of germination will occur within the first few years after seed development.

Phenology

Emergence and development. Seeds usually emerge from shallow soil depths. The entire seedling looks like a yellow thread with no stem-root differences. Dodder must attach to a host within a few days or the seedling will die. In Colorado, dodder typically attaches to alfalfa and various clovers.

Seedlings emerge as an arch and the plant tip extends and straightens upward after emerging. A slow counter-clockwise rotation occurs after extension. The stem entwines around any elongated object within 1 to 3 inches of the seedling.

After initial twining, dodder will introduce haustoria into the host vascular system. If this attachment is successful, the stem portion in contact with the soil withers. The dodder seedling then draws sustenance from the host plant. Shading can inhibit initial growth and attachment.

Stem growth increases and branches at rate of up to 3 inches per day. Haustoria are continually produced at the point of stem-to-stem contact between the plant.

Nodes and small scale-like leaves also are present and branching occurs at the nodes. The degree of twining, branching and attachment varies among species. Some species have tendrils for twining. A dense mat will develop over the host as the dodder spreads.

Reproduction and dispersal. Many clusters of flowers will develop after a short period of vegetative growth. An abundant number of capsules with two to four seeds are produced and fall to the ground or are gathered during harvest.

The dodder stems, nodes, tendrils, and even haustoria also have regenerative cells. These cells are capable of developing new shoots. Twenty or more shoots can develop from one tendril that is attached to a host. Even when all stems are removed from the host, the haustoria can reintroduce the infestation from within the host.

Spread of dodder is essentially by seed. Dispersal is not typically by wind due to the seed weight. Most seed is spread by cultural practices as in contaminated seed, soil, and hay by man, livestock, and machinery. Irrigation water can also spread dodder seed.

Production Impact

A dodder infestation can recur for many years once seeds enter the soil. A portion of the dodder seed from the soil seed bank is typically always available for germination under environmental conditions suitable for the host plant.

A mature dodder plant develops a mat up to 30 feet in diameter over and around the host plant. Yield and stand reduction can occur from severe infestations. Severe infestations can stunt, smother and kill host plants. The moisture and density of dodder can cause harvesting and curing problems. Dodder is not considered poisonous or nutritious to livestock.

The greatest concern in cultivated agriculture is typically in seed production of alfalfa and clover. The similarity in appearance and size of dodder seed to the crop seed causes difficulty in cleaning seed. The roughness of the dodder seed often is utilized to remove dodder from contaminated seed, but some contamination commonly remains. Dodder is the only weed restricted legally as a contaminant in crop seed in each state of the continental United States.

Integrated Control Management

An integrated management approach is the best approach to controlling any weed infestation. The general control classifications are cultural, mechanical, biological, and chemical.

The host plant, site, environment of the infestation, and similar considerations dictate what combination of controls can be implemented properly

and safely. Control treatments may need to be repeated to overcome an infestation.

Scouting potentially infested fields aids control success. The size and location of infestations should be mapped. Note control progress should be noted by re-scouting on a regular basis.

Cultural. Thick forage growth can shade dodder seedlings limiting development and growth; however, dodder establishment still is possible. Healthy forage plants will have a greater tolerance to the parasite. Crop rotation with non-host plants for five years will minimize the infestation of dodder seed in the soil. Any grass plant including small grains and corn is a suitable non-host crop.

Mechanical. Burning has been used effectively, but care must be taken to avoid serious damage to the forage plants. Two passes with a weed burner about two to four days apart will wilt and then kill the plant. Some forage loss will result, but regrowth should still occur.

Flail mowing before burning can predispose the dodder to this control practice. Mowing by itself can be successful; however, mowing with burning can increase control success.

Removing and destroying infested plants also can limit field infestation. Though not feasible for large infestations, reasonable success may be achieved with this practice on small patches of dodder.

Tillage can dislodge, bury and/or dry-out seedlings. However, timing is crucial since attachment to the host makes dodder immune to tillage. Repeated tillage treatments may also be necessary due to uneven dodder emergence, though can be risky for the forage plants.

Biological. Biological (i.e., insects) controls are not readily available for dodder.

Chemical. Successful use of herbicides has been limited. Repeated applications are common. Any recommendation needs to be compared to the current product label. Application of any pesticide must follow label instructions, limitations and state restrictions.

Herbicide recommendations for dodder in forages can be more complicated than for other row crops. Not all potential treatments are legal for application to the different stages of growth (i.e., seedling alfalfa) or forms of production (seed compared to forage).

Soil-applied herbicides offer the most effective means of control, because control occurs before dodder attachment to the host. Unfortunately, these herbicides have a limited longevity making repeated treatments necessary. Potential soil active herbicides include: DCPA, chlorpropham (limited supply, discontinued product), protamide, dichlobenil, and trifluralin.

Herbicides applied after attachment have limited success. General contact herbicides can be effective, but also will injure the forage plants. Paraquat is a herbicide in this classification. Herbicide selectivity is difficult to accomplish at this stage. Selective herbicides can control the stems but often the haustoria escapes. Research has shown limited success but no practical recommendation is presently available.

Studies in California in the late 1980s showed trifluralin, pendimethalin, and prodiamine to be effective soil-applied herbicides for dodder control. However, dodder control diminished throughout the growing season. A high, early season application rate or a split application improved season-long control. The low rate and split application of trifluralin were the only label recommendations; the other applications were experimental. Dodder plants that escaped the treatments were controlled by burning or flail mowing. The studies' conclusions recommended an integrated control approach using pesticide, mowing, and burning.

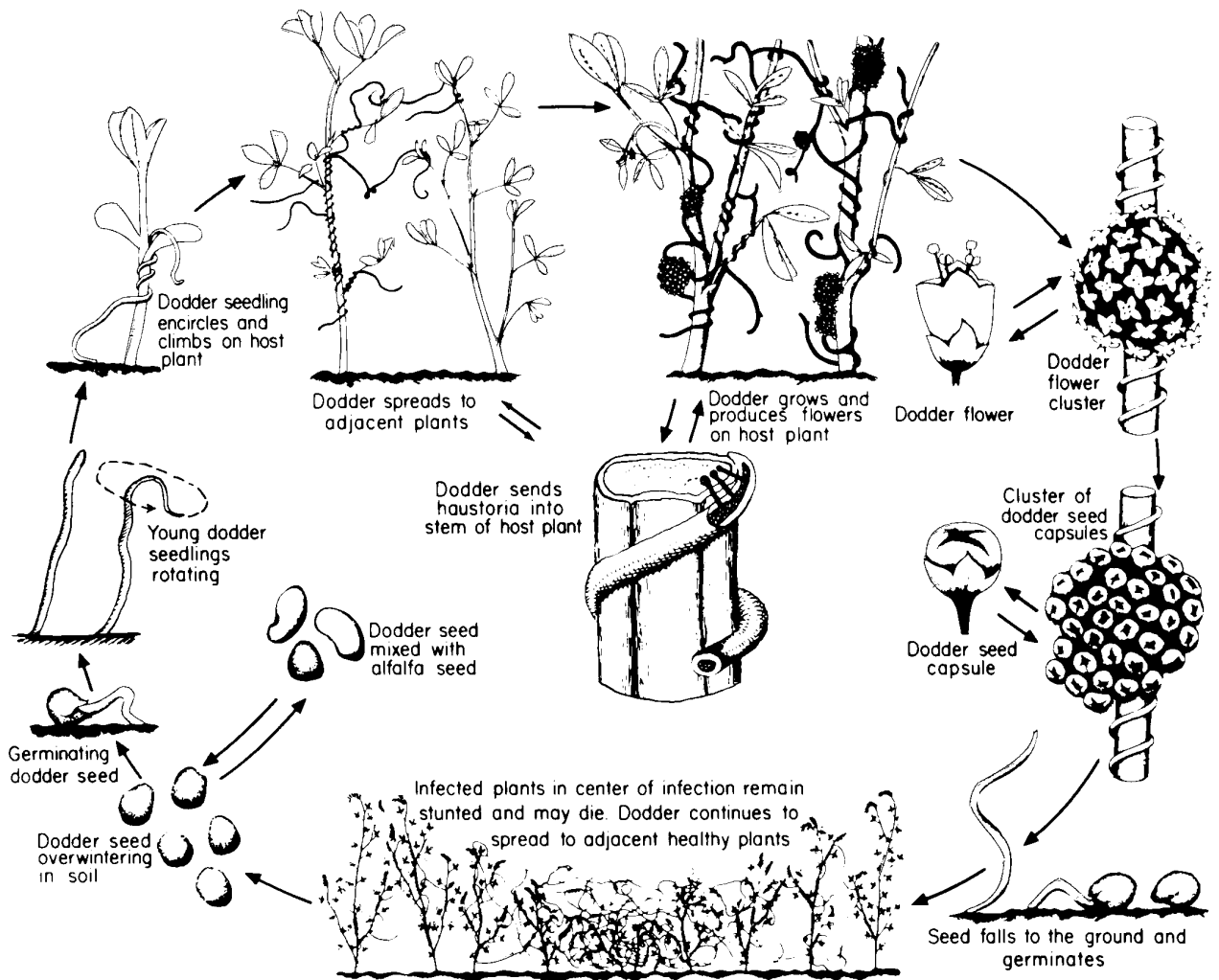


Figure 1: The Life Cycle of Dodder (*Cuscuta* sp.) (Reprinted, by permission from G. N. Agrios, *Plant Pathology*, 3rd ed., Copyright, Academic Press, San Diego.)

References

USDA's *Dodder and Its Control*, Farmer's Bulletin #2276, May 1984.

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