

Horsenettle Management in West Virginia Pastures and Hayfields

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Biology

Horsenettle, *Solanum carolinense* L., (also referred to as sand brier, bull-nettle, wild tomato, and devil's tomato) is an erect, perennial, obnoxious broadleaf weed prevalent in pastures, meadows, and hayfields of West Virginia. The weed is characterized by conspicuous spines that make it undesirable for cattle. Moreover, the plant contains a toxic alkaloid called solanine which is not removed upon drying. Solanine can cause gastrointestinal irritation and certain nervous disorders in cattle. This weed can reproduce from seeds that can persist in dry berries found in hay and from rhizomes or adventitious shoots that emerge from the creeping roots. A single plant can produce up to 5,000 seeds. Therefore, this persistent plant can take over entire fields if it is not managed. Large infestations can reduce the productivity of pastures and can compete with desirable forage for water and nutrients.



Cultural Factors Affecting Horsenettle Management

A pasture is considered a disturbed community because livestock typically have preferential feeding habits. The plants that are left undisturbed have a tendency to expand in numbers. Overgrazing, therefore, may contribute to an increase in horsenettle population. Horsenettle thrives well in soils that are kept moist by summer rains, but it is also capable of thriving under drought conditions because of its well-established deep root system. Although these plants prefer sandy soils or other soils with good drainage, they are prevalent in heavier soils of West Virginia. Prevention is the best strategy to manage this weed. If the conditions

are congenial, it is good to keep an eye out for this weed. Good management practices like proper fertilization, rotational grazing, and others that promote a healthy crop stand may help reduce infestations if this weed is kept at bay. Eradication is possible for small-scale infestations. Management using herbicides may become necessary for larger infestations.

Management of Horsenettle

Conventionally, weeds are managed using one or more of the following practices:

1. Cultural methods
2. Mechanical methods
3. Biological methods
4. Chemical methods

Often, using a combination of two or more strategies is better to deal with a pest than choosing a single tactic. Apart from the cultural methods discussed above, rotation to a crop like corn or soybean is one that pays off eventually. This may not be practical for most West Virginia pastures because of our topography and equipment needs. A monoculture of the same crop serves as a good host for a number of pests to which the host crop is susceptible. Rotating to a different

crop not only changes the ecosystem and affects the pest-host relationship, but it also provides opportunities to use new pest management tools that otherwise would be unavailable to the existing crop. For instance, there are more herbicides registered in corn or soybean that could be used to manage horsenettle. Varieties of corn and soybean tolerant to the herbicide glyphosate (sold commonly as Roundup) may also be useful to manage horsenettle. The field could be rotated back to a pasture after the pest problem is resolved. Proper attention must be paid to rotational restrictions of the herbicides chosen if crop rotation is followed. If it is not practical to rotate the entire area to a new crop, sections of the field could be rotated sequentially. Unfortunately, this strategy has limited implications in permanent grasslands or pastures that cannot be rotated to other crops.

Mechanical methods include hoeing, grubbing, tilling, and repeated mowing. Manipulating the soil mechanically to remove horsenettle is effective only for new and smaller infestations. Tilling results in chopping up the rhizomes and rootstocks of horsenettle, and spreading these propagules increases their incidence subsequently. Mowing is sometimes useful to prevent the plant from flowering and seeding. However, unlike other erect-growing weeds like johnsongrass (*Sorghum halepense* L.) and multiflora rose (*Rosa multiflora* Thunb.), horsenettle adapts to mowing by growing prostrate to the soil, reducing depletion rate of stored carbohydrates from the root system, which is the underlying principle of controlling perennial weeds by removing top growth. Such plants are noted to come to bloom and complete their life cycles.

Commercial biological control agents are not available for managing horsenettle. Research experiments with certain nematodes are being carried out, but biological control agents are not thought to be effective because of concern of host specificity (a number of crops like tomato and potato belong to the same family).

Chemical control is perhaps the most effective method of managing horsenettle in pastures. However, it should be used in conjunction with proper management (cultural) and mechanical methods to be optimally effective. Managing horsenettle in pastures composed primarily of grasses could be achieved by using selective herbicides. Two new selective herbicides are available for weed control in permanent pastures. The trade names of these herbicides, the active ingredients, and their respective concentrations are given here:

<i>Product</i>	<i>Active ingredients</i>	<i>Concentration</i>
Redeem R & P	triclopyr + clopyralid	2.25 lbs/gal + 0.75 lbs/gal
Grazon P + D	picloram + 2,4-D	0.24 lbs + 2.0 lbs/gal

Note: Grazon P+D is a restricted-use pesticide and is NOT labeled for use in the West Virginia counties of Cabell, Jackson, Lincoln, Mason, Mineral, Putnam, Roane, and Wirt.

The application rates of both herbicides range from 1-4 pints/A. Research trials in 2001 and 2002 demonstrated that Grazon P+D applied at the prebloom to bloom stage, controlled horsenettle acceptably (80% to 90%) when applied at 2 to 3 pts/A. Redeem R&P at the high rate also provided partial control of this weed. These herbicides are selective but may cause negligible temporary discoloration of the grasses. Based on our field studies, these herbicides also provide effective control of some of the more difficult to manage broadleaf weeds like Canada thistle (*Cirsium arvense* (L.) Scop.), dock (*Rumex* spp.), common burdock (*Arctium minus* (Hill) Bernh.), and mugwort (*Artemisia vulgaris* L.). Both herbicides list a number of other broadleaved weeds that are controlled.

The restrictions on Grazon P+D are due to the picloram (Tordon) content of this herbicide, which can potentially cause injury to tobacco, tomato, and other sensitive broadleaf crops, especially those belonging to the Solanaceae family. Note that this herbicide has a high water solubility (and low mammalian toxicity, comparable to table salt!) and should not be applied near flowing water used for irrigation or near slopes where water flow is toward sensitive crops. Do not allow the spray to come into contact with desirable broadleaf crops. Do not apply it near residential areas or ornamental trees and shrubs. Both of these herbicides are systemic and are most effective on annual weeds when applied to young and actively growing plants, and on perennials at the bud or early bloom stage when the flow of carbohydrates is high from shoots to roots for optimal translocation of such herbicides to the perennating structures. Systemic herbicides are less effective when applied to plants under water stress. Because there are limited grazing and haying restrictions for both herbicides, follow directions carefully.

Other herbicides, including triclopyr + 2,4-D (Crossbow) or formulations containing dicamba or any of the above active ingredients, may provide varying levels of control of horsenettle. While using any of the above-mentioned products, you must add a non-ionic surfactant to the tank mixture for optimal foliar uptake.

There are limited options for controlling horsenettle selectively in legumes like alfalfa and clovers. 2,4-D B (Butyrac) and imazethapyr (Pursuit) are two herbicides labeled to control broadleaved weeds in alfalfa, but they provide poor control of horsenettle. Nonselective herbicides like paraquat (Gramaxone) and glyphosate (Roundup, Touchdown, etc.) may help suppress this weed, if applied at the proper time. During establishment, paraquat (Gramaxone) may be used to suppress horsenettle. After establishment, glyphosate may be used to control horsenettle using a wick applicator. Selectivity is achieved by height

differences between the crop and the weed. Therefore, care must be taken to avoid contact of the herbicide with the crop if you use this method. A good time of the year to apply glyphosate, either as a spot application or as a wick application, is in fall when there is more downward translocation of the solutes in the plant system.

Integrated Approach

A combination of various strategies works best to control horsenettle in pastures. Testing the soil for pH and applying fertilizers based on the soil test, applying fertilizers following herbicide treatment to improve the stand, proper rotational grazing to reduce overgrazing, and establishing a good stand are all theoretically important factors for successful weed management in pastures.

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