Cornell University Cooperative Extension

Forest Connect

Supporting Sustainable Management of Private Woodlands

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Forest Vegetation Management Matrix

Brett Chedzoy is the South-Central Regional Extension Forester for Cornell Cooperative Extension and Manager, Arnot Teaching and Research Forest. CCE Schuyler, Montour Falls, NY. 14891. (607) 742-3657

Peter Smallidge, NYS Extension Forester and Director, Arnot Teaching and Research Forest, Department of Natural Resources, Cornell University Cooperative Extension, Ithaca, NY 14853. Contact Peter at pjs23@cornell.edu, or (607) 592-3640. Visit his website www.ForestConnect.info, and webinar archives at www.youtube.com/ForestConnect.

Overview:

Woodlot owners and forest managers face a growing number of problematic plants in wooded landscapes. There are numerous practices and treatments that can be applied to regulate the abundance of these problematic plants, whether native or non-native, collectively considered as interfering plants. Treatments are categorized into method and mode. Methods include mechanical, chemical and biological. Mode is either broadcast or individual stem. Depending on circumstances, all have merit. More information about the principles of Forest Vegetation Management (FVM) are available at https://bit.ly/CCE-FVM and in archived webinars on this subject at www.youtube.com/ForestConnect

Any woodland might have interfering plants that are of various species, mixed or not with desirable species, located in areas with easy or limited access, of small or large sizes, herbaceous or woody, and other circumstances. Added to this array of conditions are the objectives and constraints of the owner. Each of these circumstances can influence the type of treatment that is suitable or that can be applied.

In addition to variation in woodland conditions, the treatments have various attributes and opportunities for optimization. Some treatment methods are better or suboptimal depending on whether vegetation is sparse or dense, dormant or growing season, tall or short, expensive but efficient, inexpensive but requiring multiple entries, and more. Many of the treatment methods can be applied in multiple situations, but with the caveat that they require greater or lesser effort, expenditure, time or some other resource.

It's worth noting, and addressed in other technical resources, that interfering plants often become abundant as a result of the selective browsing by white-tailed deer on desired plants. The selective browsing reduces the height and survival of desired plant species and favors the growth of undesired plant species. Failure to address the cause of the interfering plant abundance will result in their reemergence.

The effectiveness of management treatments can be associated with a vegetative type, or vegetative growth form, as seen in the matrix (Figure 1). The specific technique for applying a treatment will depend on the circumstances of abundance of target species, abundance of desired species, plant size, area, equipment, terrain, season, owner objective and ability for repeated treatments.

Shade-tolerant Interfering Forest Vegetation Management Matrix for the Northeast							
	Chemical		Mechanical			Integrated	Biological
Vegetation Growth Form	Foliar (broadcast or individual)	Basal/ injection (individual)	Mow/Cut (broadcast or individual)	Girdle (individual)	Excavate (broadcast or individual)	Cut-stump, Cut-surface, or Cut-stubble	Silvopasture/ livestock impact
short-lived herbaceous	2	3	2	3	3	3	2
low perennial herbaceous	1	3	2	3	3	2/3	2
tall perennial herbaceous	1/2	3	2	3	3	2	2
annual vines	1	3	2	3	3	3	2
perennial vines	2	3	2	3	3	1	2
canes	1	3	1	3	2	1	2
shrubs	2	2	1	2	1	1	2/3
trees	2/3	1	1	1	2	1	2/3

Figure 1. Forest Vegetation Matrix. The anticipated success of a treatment method and mode is represented by codes (see text).

FVM Matrix Codes (see also Treatment Caveats)

1 = good results - While correct protocol is important, this treatment has a high degree of control of the target and is generally robust in the effectiveness of the application.

2 = mixed results- These treatments can be applied successfully, but particular attention must be used to ensure that correct protocols are followed. Without this attention, the treatment is unlikely to succeed.

3 = impractical to implement or insufficient results - There is limited research or experience to recommend this type of treatment, or while the treatment is theoretically possible it is unlikely to succeed due to logistical or practical constraints.

Examples of vegetation form/habit in the FVM Matrix

Vegetation Growth Form	Common Examples
Herbaceous, short-lived	stiltgrass, garlic mustard
Low herbaceous perennial	ferns, grasses
Tall herbaceous perennial	knotweed, swallow wort
Annual vines	mile a minute
Perennial vines	grape, bittersweet, poison-ivy
Canes	Rubus, multiflora rose
Shrubs (< 10')	barberry, autumn olive, honeysuckle, privet, Euonymus, buckthorn
Trees (> 10')	beech, Carpinus, Ostrya, striped maple, tree-of-heaven

Explanations for predicted outcomes:

Chemical/broadcast: Selective (i.e., applied to individual stems), non-selective (i.e., broadcast) and pre-emergent herbicides for labelled use can be at least partially effective when properly applied under the right conditions. Factors limiting effectiveness in forest applications include: access; coverage/abundance of target species; plant conditions like growth phase and drought stress; resistance features, both genetic and morphological; meteorological conditions; and skilled application. Broadcast herbicide treatments can be effective for several years of control - such as to temporarily reduce understory interference to establish or release regeneration. Eventually the target plants usually reestablish. Less herbicide may be used and often with greater effectiveness when coupled with other control strategies.

Chemical/basal or injection: Basal spray and injection are impractical treatment methods for non-woody and small growth forms of interfering vegetation. Basal bark treatment formulations will be most effective on thin-barked species like beech and for stems less than 6 inches in diameter. Multi-stemmed specimens can be difficult to access and treat all stems. Systemic herbicides labeled for injection will yield the best results when wood is not frozen and the proper dosage is used.

Mechanical/mow or cut: Severing stems by cutting either with simple tools or specialized machines provides instant gratification, but usually short-lived results. Most of the example plants are capable of vigorously resprouting. Intensive and continued mowing would be necessary to exhaust root reserves to the point of mortality for most species. Nonetheless, judicious mowing can increase the viability of more durable methods from the chemical and biological categories.

Mechanical/girdle: Impractical except for larger-diameter woody stems that are unlikely to sucker or coppice. The cambium tissue beneath the bark must be fully severed, and some species can take up to several years to die after girdling. Girdling can be coupled with an herbicide for an improved and faster response.

Mechanical/excavate: Plants and most roots are removed using heavy equipment. Effective for species that will not propagate from root fragments. However, the significant soil disturbance normally associated with excavation will often stimulate the soil seed bank and potentially give rise to other noxious plant problems.

Biological/silvopasturing: Managed livestock impacts such as defoliation, girdling, browsing and trampling are skillfully used to limit the growth of undesirable plant species, while fostering the growth of desirable ones. Silvopasture establishment usually requires some combination of initial treatments from the other treatment methods to reduce vegetation height and density before livestock can be effective. Targeted livestock impacts through intensive rotational grazing will gradually shift understory vegetation to a more stable vegetative complex that, with continued intensive rotational grazing, will be resistant to invading plants.

Other biological controls: The only plant from the list of examples that is known to be somewhat controlled from a biological agent (other than livestock) is the mile a minute vine. Solarization (prolonged, dense shading) is another method that could be practical when used on small patches of emerging or resprouting plants.

For additional information on woodland management go to:
www.ForestConnect.com & www.CornellForestConnect.ning.com

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