Survey of Management Techniques: What Works, What Doesn't and Why

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I. Introduction

A. Content of this outline will cover mechanical and chemical control, but not biological treatments

B. Understanding the biology of terrestrial invasive plants and how these characteristics can guide management techniques is critical for successful long-term control of invasive species

C. Common Treatment Methods which will be discussed include (A) Mechanical Uprooting, (B) Destruction of Basal Collar, (C) Herbicide Treatment, (D)Prescribed Burning, (E) Solar Sterilization, (F) Organic or Natural products, as well as a discussion of combined treatments

II. MECHANICAL TREATMENT: Most appropriate for invasive plants capable only of sprouting from the root collar and NOT from dormant buds in other portions of the root system.

A. MECHANICAL TREATMENT METHODS: Invasive Species which can feasibly be mechanically uprooted using the proper tools (weed wrench, hydraulic root grapple, etc.) OR which can be managed through destroying dormant buds in the basal collar by stump grinding, heat treatment (with propane torch), or repeated targeting cutting as low to the ground as possible, etc. Level of invasion and/or establishment of invasive species tends to significantly affect level of effectiveness on a species-by-species basis. REMEMBER, Early Detection and Rapid Response nearly always results in less intensive management.

1. Garlic Mustard (Alliaria petiolata)
2. Autumn Olive (Eleagnus umbellata)
3. Shrub-Form Honeysuckles (Lonicera spp.)
4. Border Privet (Ligustrum obtusifolium)
5. Multiflora Rose (Rosa multiflora)
6. Barberry (Berberis spp.)
7. Sycamore and Norway maple (Acer spp.)
8. Buckthorn (Rhamnus spp.) {Root morphology makes this rather infeasible in established, dense stands}
9. Vine Honeysuckle (Lonicera japonica) {Root morphology makes this infeasible in established stands}

III. CHEMICAL TREATMENT: Invasive Species which respond most effectively to chemical control tend to be capable of vigorously re-sprouting from anywhere in their root system. This is primarily due to a biological characteristic where the plants contain dormant root buds within the larger root systems which allows nearly any portion of a root remaining in the ground or of the soil surface to sprout and re-establish invasive species.

A. CHEMICAL TREATMENT METHODS: Invasive Species can be effectively controlled through various chemical treatment techniques including foliar spray, foliar wipe, cut stump (or stem), stem injection (woody or herbaceous) and basal bark application methods:

10. Japanese Knotweed (Fallopia japonica)
11. Common Reed (Phragmites australis)
12. Asiatic Bittersweet (Celastrus orbiculatus)
13. Porcelain berry (Ampelopsis brevipedunculata)
14. Pale and Black Swallow-worts (Cynanchum spp.)
15. Black Locust (Robinia pseudoacacia)
16. Tree of Heaven (Ailanthus altissima)
17. Asian Gray Willow (Salix cinerea, L. spp. atrocinerea)

EXCEPTION: Early Detection & Rapid Response of newly established root-sprouting plants can be effectively managed by hand removal if they are pulled before the plants become well established.

IV. Management Techniques which are generally ineffective, unfeasible or environmentally irresponsible.

A. **Intensive Mowing:** This technique generally contributes to additional re-sprouting, unless it is done at a frequency sufficient to essentially create a mowed lawn, which is generally unacceptable in most sensitive wetland resource areas and buffer zones and does NOT result in desirable or beneficial habitat.

B. **Prescribed Fire:** Non-Sprouting Conifers are the only types of plants which be effectively managed exclusively using Prescribed Burning (Proceedings of 2003 Conference, "Using Fire to Control of Invasive Plants – what's new, what works in the Northeast", at UNH Urban Forestry Center, Dr. William Patterson, closing remarks). EXCEPTION: Young barberries and buckthorns can be successfully controlled with fire, but older, more established stands cannot (Remember EDRR). Prescribed fire can be a useful strategy when combined with other management techniques. Unfortunately, many invasive plants respond vigorously to fire.

C. **Solar Sterilization:** (Black of Clear Plastic fastened to the soil surface): This technique is sometimes considered as an alternative to chemical control. In addition to the fact that it tends to only be effective on extremely shallow rooted plants in certain environmental conditions, when effective, it sterilizes virtually all of the micro-organisms, fungal and bacterial communities, which are the foundation of healthy soils and healthy plant communities. This treatment should be more fairly compared to an aggressive fumigation treatment with

synthetic, restricted-use chemicals when considering the subsequent effect on soil health. While avoiding chemical use is beneficial in some circumstances, when weighing all the true impacts of this management technique, solar sterilization is rarely if ever a wise choice for invasive plant control.

D. **EPA Minimal Risk Pesticides / FIRFA 25(b) products (Organic and Natural Treatments):** Products such as acetic acid and citrus oil function by burning the foliage and above-ground portions of the plant. They do not translocate within the plant and travel to the root materials. While it could be technically possible to wear down the carbohydrate reserves within the roots, this treatment is comparable to cutting or mowing as it only removes above-ground portions of the plant and nearly all invasive species will re-sprout vigorously. An exception to this could be herbaceous plants without significant carbohydrate reserves in their roots, such as garlic mustard. These natural products are generally ineffective on woody invasive plants or herbaceous plants with significant carbohydrate reserves within roots and rhizomes such as Japanese knotweed and common reed. These products generally work by destroying foliage and tender plant tissues, so they can only wear down root reserves and diminish invasive plants through frequent application in the growing season (4-8 times per season for many years) and this intensity of disturbance is generally unacceptable in most sensitive wetland resource areas / buffer zones and does NOT result in desirable or beneficial habitat.

V. Conclusion

A. Understanding Plant Biology is at the root of all effective invasive plant management. Knowledge of how invasive plants respond to management treatments is critical to being an effective land manager. With an understanding of plant biology, other factors such as phenology including carbohydrate cycling, in particular, can then be combined with other environmental and habitat factors to determine an appropriate protocol for effectively managing invasive species.

B. Combining Mechanical and Chemical treatments can often be the most effective management technique with the shortest duration and consequently improve wildlife habitat. Examples of effective combinations are:

- Targeted Cut and Wipe Application on root-sprouting invasive plants (to neutralize the portions of the root materials most capable of rapid re-colonization) followed by mechanical removal using a root grapple and soil conditioner to destroy smaller root materials and other propagules.

- Aggressive Cutting of a basal crown on an invasive plant species which re-sprouts from the root collar followed by intensive follow-up cutting and/or targeted, ultra-low volume herbicide treatment.

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