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PURDUE UNIVERSITY 1913 - 2013 Forestry & Natural Resources

Southern Indiana Purdue Agricultural Center
Forestry Research

Title: 2012 Prescribed grazing using goats for integrated management of non-native invasive vegetation.

Cooperators: Purdue FNR, Animal Science, Ag. Centers, Kentucky State Univ.

Funding: Mary S. Rice grant.

Date Initiated: 2012

Location: SIPAC, D

Background

Prescribed or targeted grazing is the use of grazing animals as a component in an integrated vegetation management system to achieve certain land management objectives or ecosystem conditions. Although the idea of using animal grazing to manage vegetation is not new, the use of prescribed grazing for management of unwanted non-native invasive plant (NNIP) populations is a relatively recent development (Launchbaugh 2006). Much of the research and experience in use of prescribed grazing for NNIP management comes from western U.S. rangelands. Prescribed grazing is also seen as an alternative to the use of herbicides or to reduce the amount of herbicide needed to accomplish vegetation management objectives. The development of intensive rotational grazing techniques and mobile fencing systems allows entrepreneurs to provide prescribed grazing services to landowners (i.e., herd for hire). Prescribed grazing services can provide an alternate source of income for livestock growers. However, such prescribed grazing services are few in number in the eastern U.S.

Problem

Land managers are faced with a lack of information on needed animal stocking rates, timing of grazing, and duration of grazing to achieve desired conditions in natural ecosystems under invasion stress from a variety of NNIP species. Information is also needed on grazing impacts to native plant communities so land managers can weigh their options when designing an integrated vegetation management plan.

Objectives

To begin providing data needed in developing grazing prescriptions for the integrated management of non-native invasive vegetation in forest and other non-crop environments. This study will specifically address the following objectives:

1. Determine optimum goat stocking levels and duration for significantly reducing NNIP brush species common in Midwestern forests.
2. Measure impacts to native vegetation of goat prescribed grazing and a standard mechanical/herbicide control prescription.
3. Determine costs of the tested goat grazing prescriptions in comparison to the standard mechanical/herbicide control prescription.

Methods

Site: Steep hardwood forest slopes.

History: When Purdue acquired property in 1953, the bulk of the center part of study area was open pasture. In 1953-54, red and white pines were planted. 1000 multiflora rose were planted in a row along the west field edge for wildlife. Natural hardwood regeneration overwhelmed the pine in spite of a study installed to determine effective hardwood control methods. Few of the

pine remain. By 1961, multiflora rose was widely established. IN 1961-62 multiflora rose control studies were implemented on the site testing the use of 2,4,5-T in diesel as a basal spray and amino-triazole as foliar spray. 2,4,5-T appeared to be very effective, but, alas, no follow-up eradication apparently took place. No known attempts to control the rose were made from 1962 to 2002. In the spring of 2002, an attempt was made to use prescribed fire to knock back the rose. Because the site is primarily an east – northeast aspect, fuel moisture conditions were not conducive to carrying a fire, so not much area was treated. Prescribed fire was again applied in fall of 2003 and fall of 2005. In 2003, conditions were good and a fairly hot fire carried well through the stand. The rose was knocked backed. By 2005 it had already grown back to pre-2003 levels but with less fuel to carry fire. The 2005 fire was thus spotty and less effective.

Stands: Dense shrub layer in understory of hardwood forest comprised primarily of the NNIP multiflora rose (*Rosa multiflora*) with lesser amounts of Japanese honeysuckle (*Lonicera japonica*), Amur honeysuckle (*Lonicera mackii*), autumn olive (*Eleagnus umbellatum*), and Chinese privet (*Ligustrum sinense*). The native spicebush (*Lindera benzoin*) is also a major component of the shrub layer on this site.

Treatments:

1 = control (no treatment)

2 = conventional (cut stump w/brush saw + 50% Garlon 3A herbicide applied with Sideswipe applicator and sprayed 4% glyphosate + 0.25% non-ionic surfactant as foliar on smaller shrubs and low vines)

3 = 4 goats (16/acre), 2 grazings/season (spring + mid- to late summer)

4 = 4 goats (16/acre), 1 grazing/season (spring)

5 = 12 goats (48/acre) in 2012 and 8 goats (32/acre) in 2013, 2 grazings/season (spring + mid- to late summer)

6 = 12 goats (48/acre) in 2012 and 8 goats (32/acre) in 2013, 1 grazing/season (spring)

Table 1. Leaf cover of woody shrub layer species in a hardwood forest understory immediately prior to prescribed grazing with doe goats

	Treatment					
Species	No Trt.	Conventional	16 goats/acre 2 grazings (May 9 - June 11)	16 goats/acre 1 grazing (June 11 – July 2)	48 goats/acre 2 grazings (May 9 - May 20)	48 goats/acre 1 grazing (May 20 – June 1)
	(% cover)					
Multiflora Rose	55.9	38.9	54.8	62.3	67.2	58.9
Other Woody NNIS[1]	18.6	7.7	13.9	7.4	11.9	7.1
Spicebush	27.0	11.3	15.2	26.8	17.1	20.7
Other Woody Natives[2]	9.9	16.1	6.1	10.8	7.5	14.3

[1]In order of abundance: Japanese honeysuckle, Amur honeysuckle, autumn olive, Chinese privet

[2]Exceeding ½% total cover in order of abundance: hydrangea, pawpaw, poison ivy, sugar maple, sassafras, blackberry, greenbrier

Results

Immediately following first 2012 grazing

- 16 goats/acre resulted in 84% reduction of multiflora rose leaf cover area, 78% reduction of other NNIP, 56% reduction of spicebush, and 57% reduction of other woody natives.
- At the 16 goats/acre rate, it took 33 days to deplete the forage/browse.
- 48 goats/acre resulted in 80 – 85% reduction of multiflora rose leaf cover area, 88 - 95% reduction of other NNIP, 59 - 80% reduction of spicebush, and 75 - 76% reduction of other woody natives.

- At the 48 goats/acre rate, it took 11 - 12 days to deplete the forage/browse.
- Both native and non-native shrub heights were not reduced. Goats did not reach much higher than 7 ft.

Immediately prior to first 2013 grazing

- Woody NNIP leaf cover was reduced by an average of 14 to 20 percent from pretreatment cover with no significant differences between grazing treatments.
- Native woody leaf cover was reduced by 16 to 20 percent.
- The conventional mechanical + herbicide treatment reduced woody NNIP cover by 85 percent and native woody cover by 14 percent from pretreatment cover.

Other observations

- If pressed, leaving them a little longer, they will reach a little higher, dig a little deeper into MFR thickets, an browse on a little tougher stems. Downside is they will more severely graze non-target vegetation.
- MFR is resilient. Will require multiple years of grazing to produce mortality.
- One grazing session opens up the understory making it easier to use chainsaws or brush saws to cut taller shrubs. Sprouts can be grazed in 2nd year. Facilitates conventional mechanical and herbicide treatments
- Non-target herbaceous vegetation was reduced in 1st year
    - Some spring ephemerals spared direct grazing pressure
    - Long-term data needed to see what recovers and what new species recruit, considering new growing space from reduced NNIPs.
    - Some species selectivity. Ginger and twinleaf were obviously avoided.
    - Tradeoffs with some native species harmed and others benefitted.
    - In stands under severe NNIP pressure, prescribed grazing's long-term outcome could be no worse than no action.
    - How will impact compare to conventional control?