

Silviculture Trial

Project Subject/Title: Pennsylvania Sedge Treatments

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Abstract: Over the past 15 years the prevalence of Pennsylvania sedge, ironwood and the associated lack of northern hardwood regeneration has been consistently observed on portions of the Ashland County Forest. The lack of northern hardwood regeneration has been identified as a significant problem for the sustainability of these hardwood stands. This trial began in 2010 and still continues in 2019 and will continue for the foreseeable future. The trial has changed over time as our knowledge of the successes and failures has increased. This document will discuss the 3 main treatment methods, results and our observations.

Trial Location:

County: <u>Ashland</u>
Township: <u>42</u> Range: <u>1E</u> Section: <u>18 (SENW, SWNE, NESW)</u>
GPS Coordinates: Lat: <u>46.119810</u> Long: <u>-90.423044</u>
Property Name: <u>Ashland County Forest</u>
Site Map: <i>None – Contact County Forest for map</i>

Objectives:

1. *Temporarily eliminate Pennsylvania sedge and other unwanted herbaceous and woody plants that inhibit the establishment of northern hardwood regeneration.*
2. *Establish sugar maple regeneration from natural seeding.*
3. *Gain a better understanding of what types of treatments facilitate efficient and effective control.*
4. *Gain a better understanding of the types of chemicals, rates of application and timing of application for efficient and effective control.*

Prescription and Methods:

- Backpack treatments (2010):*
- *Plots were one acre, divided into two treatments – ½ ac with glyphosate 2-3% solution; and ½ acre of Oust (1oz per acre). Other plots were ½ ac of Oust only.*

Plots were flagged and plastic Whiskers (blue and red) placed in the ground to mark the plot corners. Plots were then GPS'd. Sunny conditions and no snow made it possible to do this during November.

ATV & backpack canopy gap treatments (2011- 2013):

- *Canopy gaps 15 – 60 feet in diameter were randomly selected. Gaps were sprayed with a combination of 5% - 10% Glyphosate, 5% Glyphosate mixed with 1 oz. / acre Oust and 1 oz. per acre Oust. Applications made in June and July after full leave expansion. Gaps treated were in both recently thinned stands and un-thinned stands. Locations were marked with flagging, paint and GPS'd.*

Stand level application with skidder & spray tank (2013):

- *Baseline Stand Data, Comp. 53 Stand 4*
 1. *NH (15+)3 / NH (11-15)2 / NH (00-05)3 Southern ¼ of stand had sedge understory. Northern ¾ of stand had abundant regeneration.*
 2. *127ac (+/- 40 acres treated)*
 3. *AOCa*
 4. *Butternut Silt Loam*
 5. *All-aged*
 6. *DBH = 13*
 7. *BA = 128ft/ac*
 8. *Species composition 65% Sugar Maple, 29% Basswood, 6% combined Ash, Y. Birch, Red Maple.*
- *Methods (stand level application)*
 1. *Harvested summer 2012: Single tree selection harvest w/ 30-60' canopy gaps on +/- 10% of the stand area. Cut to length harvester/forwarder harvest system. Residual stand basal area 97ft²/ac. (82ft²/ac in fix plots established for trial)*
 2. *Herbicide application August 6th 2013: Used skidder mounted herbicide sprayer to treat +/-40 acres of stand with heavy ground layer of penn. sedge and ironwood. Other species such as ferns & rubus spp. also present.*
 3. *Treated site with Garlon XRT (1.5qt/ac) Accord XRT(2.05qt/ac) and Oust (1.03oz/ac). 5 test plots and 2 control plots were established and inventoried to measure composition and abundance of tree/shrub species and percent sedge cover prior to application. Plots are 1/100th acre and are permanently marked with a metal rod plot center and GPS. Application was timed to correspond to a good seed year. Monitoring will be completed for several springs and falls to determine success.*

Results:

- *Late fall (November) applications of 2-3% glyphosate and 1oz. per acre Oust were ineffective most probably due to time of year.*
- *All treatment methods, backpack, ATV and Skidder, have done an excellent job of temporarily eliminating Pennsylvania sedge and other competing vegetation.*

- *Best results were obtained with a summer herbicide application in Mid June – Mid August. Sedge can effectively be controlled for 2-3 growing seasons.*
- *Late summer/early fall (Late Aug. & Sept.) applications were also effective but did not produce as good of results during droughty periods.*
- *A tank mix of Garlon, Oust and Accord was the most effective herbicide application for eliminating unwanted vegetation.*
- *Best sugar maple seedling establishment occurred when herbicide application is timed to coincide with a good seed crop.*

Before Stand Level Treatment



After Stand Level Treatment



Canopy gap treatment



Sugar maple seedling establishment following a poor seed crop. There are still 6000 MH seedlings per acre in this photo. Spring ephemerals such as blood root, violet, blue cohosh, were able to reestablish following the herbicide treatment.



Sugar maple seedling establishment following a good seed crop. There are over 30,000 MH seedlings per acre in this photo.

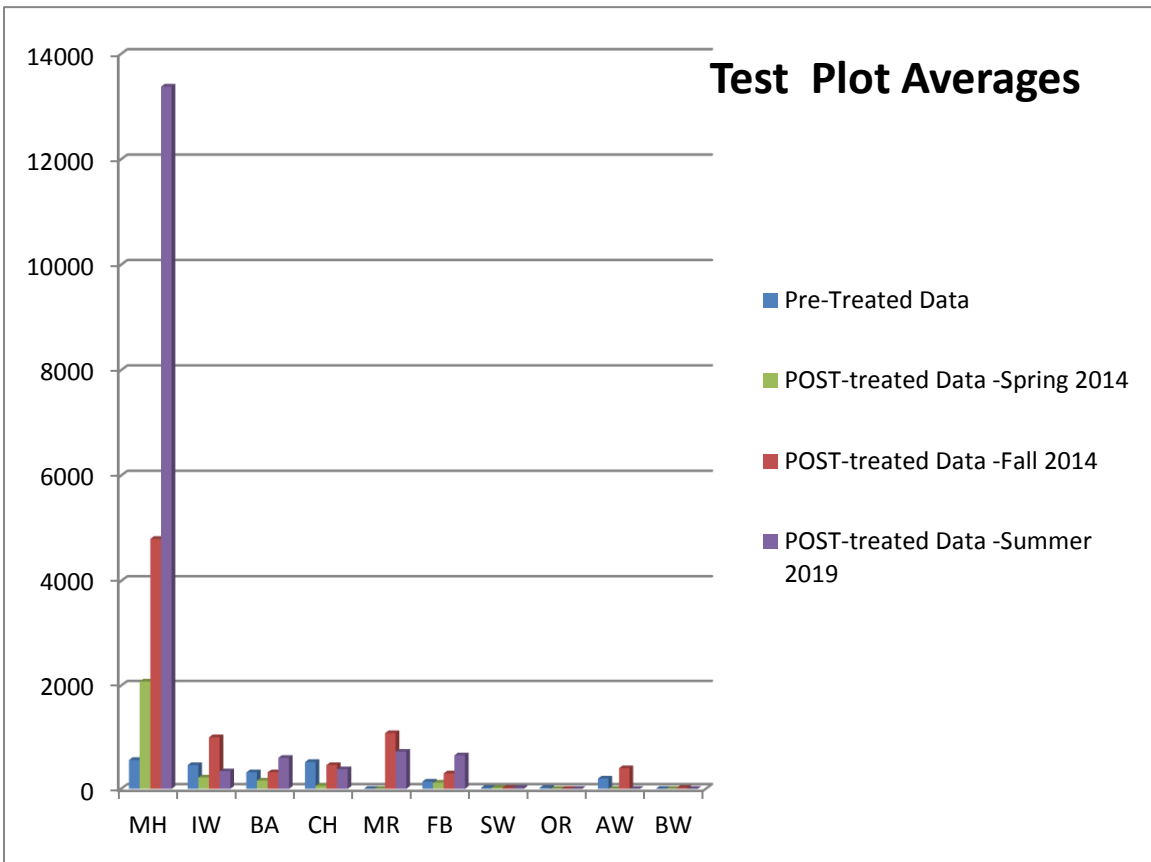


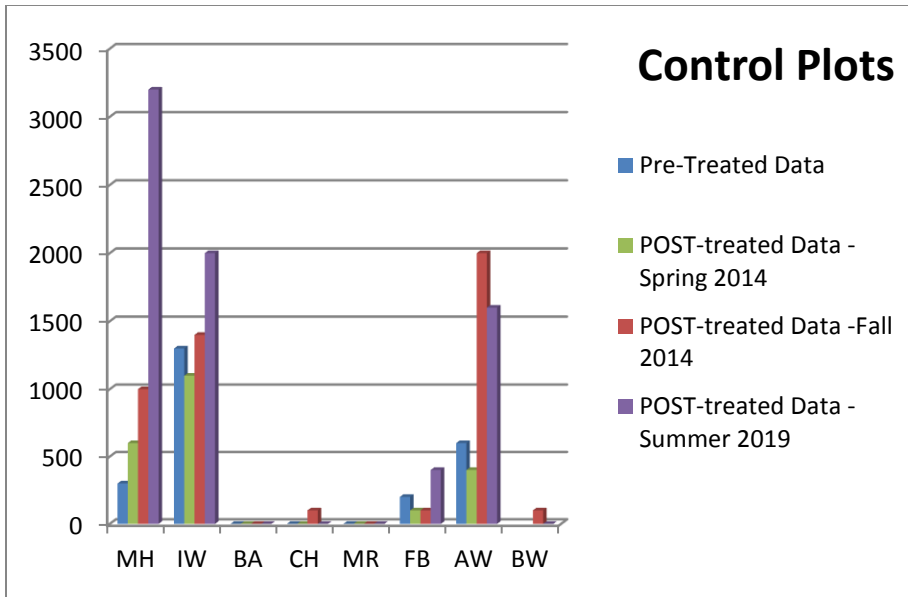
Pre-Treatment Regeneration	
1/100th Acre Regeneration	
Tree Species	Regen / Acre
MH	560
IW	460
BA	320
CH	520
MR	0
FB	140
SW	20
OR	20
AW	200
BW	0
Total Stems/Acre	2240

Post Treatment - Spring 2014	
1/100th Acre Regeneration	
Tree Species	Regen / Acre
MH	2080
IW	220
BA	160
CH	60
MR	0
FB	120
SW	20
OR	0
AW	0
BW	0
Total	
Stems/Acre	2660

Post Treatment - Fall 2014	
1/100th Acre Regeneration	
Tree Species	Regen / Acre
MH	4800
IW	1000
BA	320
CH	460
MR	1080
FB	300
SW	20
OR	0
AW	400
BW	20
Total	
Stems/Acre	8400

Post Treatment - 2019	
1/100th Acre Regeneration	
Tree Species	Regen / Acre
MH	13380
IW	340
BA	600
CH	380
MR	720
FB	650
SW	20
OR	0
AW	0
BW	0
Total	
Stems/Acre	16090





2019 understory and sedge coverage



2019. Fixed 1/100th acre plot with +/- 37,000 MH seedlings / acre.



2019. Control plot not treated



Tractor sprayer, 150 gallon, P.T.O. driven, (Multi application, (boom or 100' hose reel) boom is 12 feet, five nozzle and fully raised can cover +/- 20 feet. Spray from hose reel can reach an additional 20-30 feet beyond the 100' hose.



Discussion/Recommendations:

- *Control of sedge and other unwanted plant species is effective using a variety of application methods – back pack, ATV or skidder.*
- *The most effective herbicide application was a tank mix of Garlon XTR, Oust and Accord to control a broad spectrum of unwanted plant species.*
- *The best sugar maple seedling establishment occurred when the herbicide application coincided with a good seed crop.*
- *Sites selected for application need to be thoroughly monitored prior to application to ensure that regeneration is not establishing on its own. Preferably late spring early summer or during leaf color change in fall in first 1-3 years after harvest.*
- *Sugar maple seedlings will establish in the treated areas immediately following snow melt in the spring.*
- *Newly established seedlings are very susceptible to moisture stress after germination.*
- *Stand level application probably not the best method. Better to focus on canopy gaps, groups or patches.*

- *Stand level application resulted in minor ground surface erosion in areas with minor slopes.*
- *Stand level application allowed hemp nettle & Canada thistle to establish in treated area after second year. At year five they were much less abundant than year two.*
- *Oust Considerations - Between fall 2014 & spring 2019 a decline in ironwood, black cherry, ash and red maple seedlings occurred. Other than casual observations the stand was not inventoried 2015-2018. This period of time saw average to above average precipitation so moisture stress is unlikely. It was also observed in 2019 that most hard maple seedlings were much smaller than expected and appeared to be only 2 years old. It is suspected that the pre-emergent activity of Oust may have contributed to some seedling mortality while it remained active in the soil. Rich Ludholz, Ludholz North Star Acres Tree Nursery has had similar issues with failure of nursery stock after seed beds were treated with Oust in the prior year(s) (personal conversation). The length of time Oust will remain active in the soil will depend on soil characteristics, environmental factors, weed size/intensity and application rate. While it is suspected that Oust may have contributed to some seedling loss, the use of it did not prevent adequate regeneration from establishing, but perhaps delayed it an additional 2-3 years from the application date, while at the same time controlling sedge and ironwood for 2-3 years.*
- *From 2014-2019 canopy closure was 13% whereas plot basal area only changed 2.4% (2sqft/ac).*
- *Sedge is a player in regeneration. Other factors are less apparent but appear to be very significant contributors to a sedge / regen problem. (Soil moisture, seed production, timing of harvest, herbivory, canopy closure, earth worms, aspect, tree ages, ect.)*