

GREENACRES

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A comparison of hack and squirt and cut stump methods for control of *Ailanthus altissima*, Tree of Heaven

INTRODUCTION

Tree of Heaven (*Ailanthus altissima*) (TOH) is a highly invasive tree species that has spread throughout North America and is a major threat to native biodiversity.

The objectives of this study were to inform future management of TOH and to be able to share this information with land managers.



Ailanthus altissima

Among the various removal methods, **hack and squirt** and **cut stump** are two of the more successful treatment options and were selected for this study.

Due to the complexity of hack and squirt, I hypothesized that mature tree mortality and immature tree reduction would be greater in the cut stump/foliar treatment compared to the hack and squirt/foliar treatment.

METHODS



The study took place in Cincinnati, Ohio, on Greenacres' property. There were two study sites, front pond site and back pond site. These sites were selected due to their high densities of mature and immature TOH.

Baseline data were collected in July 2021 and the initial treatment happened early September 2021.

Mature trees in the front pond site were treated with hack and squirt using triclopyr mixed with water at 1:1 ratio (Figure 1), and mature trees in the back pond site were treated with cut stump using triclopyr mixed with diesel at a 1:3 ratio (Figure 2).

All immature trees received foliar spray using 2% glyphosate mixed with a surfactant at 0.5% (Figure 3).

Both sites had a follow up foliar spray in September of 2022. Data collected were mature TOH mortality and immature TOH densities.



Figure 1: Photo of **hack and squirt** performed on mature Tree of Heaven in the Front Pond Site.



Figure 2: Photo of **cut stump** performed on mature Tree of Heaven in Back Pond Site.



Figure 3: Photo of **foliar sprayed** immature Tree of Heaven in the Back Pond Site.

RESULTS

MATURE TREES

Treatment	Baseline	Final
Front Pond Site - hack and squirt	42	0
Back Pond Site - cut stump	13	0

Table 1: Mature Tree of Heaven counts before treatment and at the end of the study.

FRONT POND SITE HACK AND SQUIRT

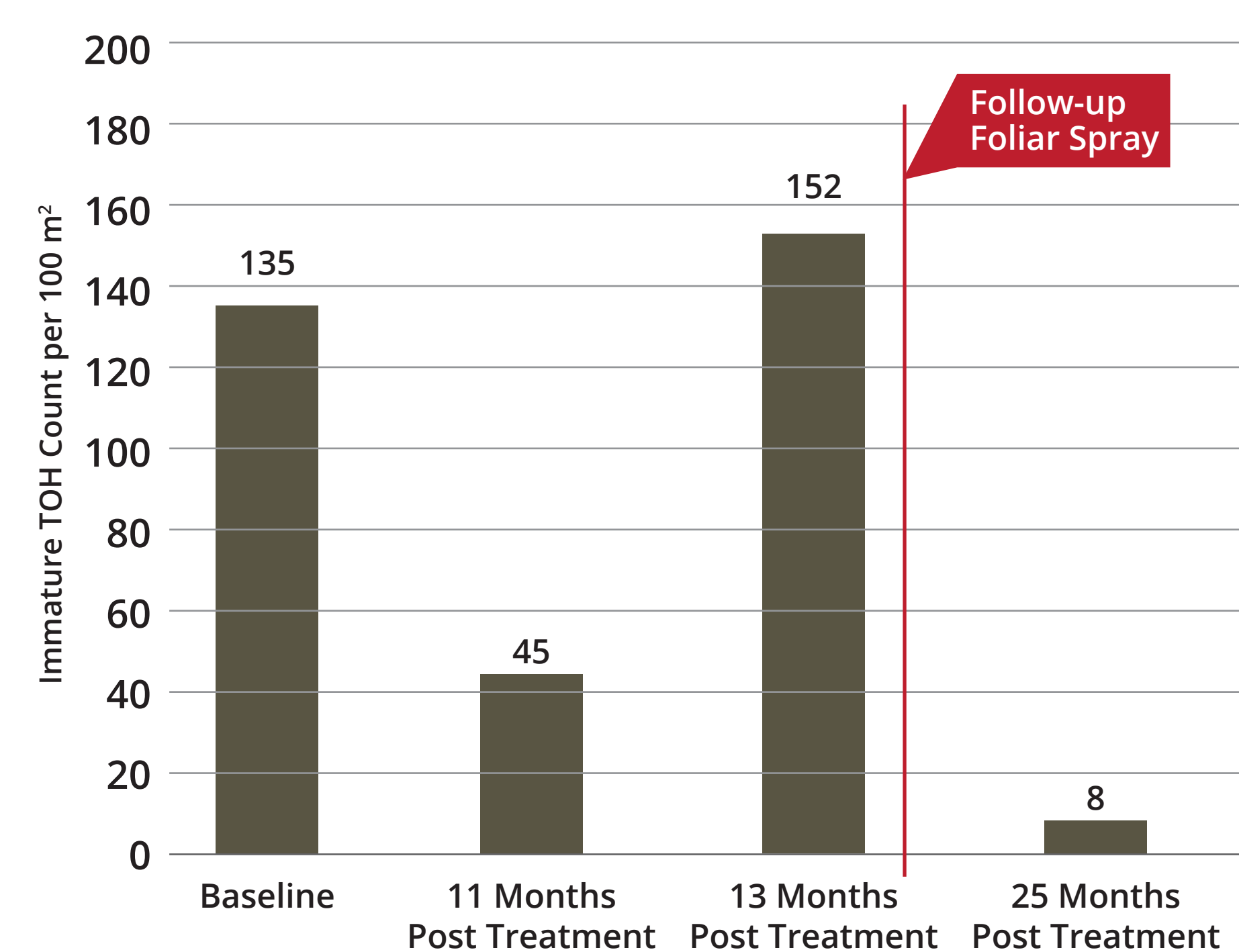


Figure 4: Front Pond Site immature Tree of Heaven counts. The red line indicates when the follow up foliar treatment took place.

BACK POND SITE CUT STUMP

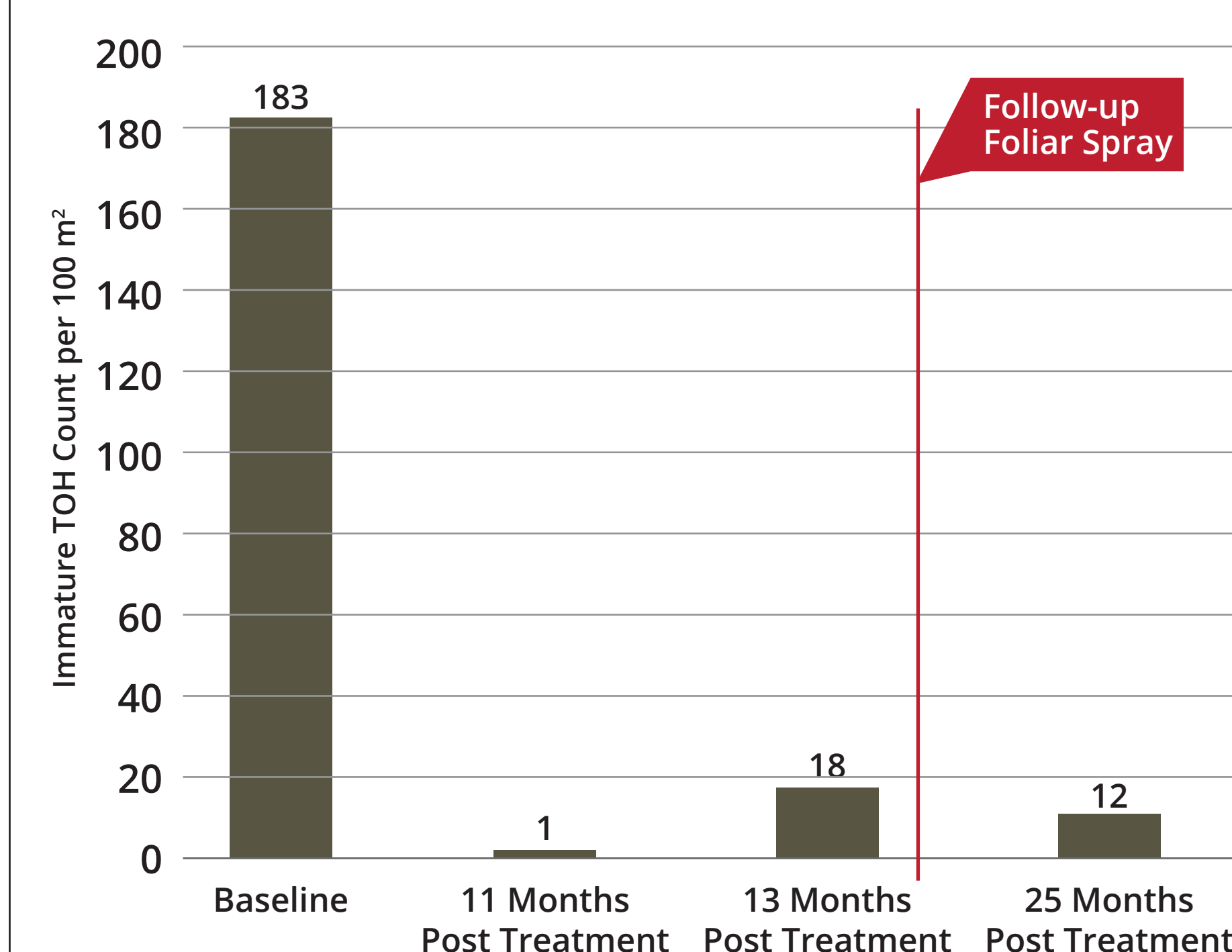


Figure 5: Back Pond Site immature Tree of Heaven counts. The red line indicates when the follow up foliar treatment took place.

Discussion

By the end of the study, both methods had a high success rate of controlling Tree of Heaven.

However, hack and squirt had a large increase of immature trees within the first 13 months. I speculate that the increase of immature TOH was due to the high level of skill needed to carry out this method. The initial treatment calls for the bark to be hit with a hatchet and then peeled back to allow herbicide application and for the trees to be felled by March. For this study the bark was not peeled back and a good portion of the herbicide ran down the bark and was not absorbed in the cambium. The trees were also felled in late April which is later than recommended. By the time the trees were felled, some TOH, not killed by the initial treatment, were leafing out. I believe that because these trees were still able to photosynthesize before they were felled, TOH used its reserves to send out a flush of clones; thus, increasing the density of immature TOH beyond baseline numbers.

Due to the critical timing of the initial treatment and removal using the hack and squirt method, the cut stump method is less prone to treatment error and may be the better option.