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Observations on the Use of Arsenal for the Control of *Melaleuca quinquenervia* (Cav.) S.T. Blake in a High Marsh Habitat

Heather S. Stafford

Florida Department of Environmental Protection, Estero Bay Aquatic and State Buffer Preserves, 700 B Fishermans Wharf, Fort Myers Beach, Florida 33931; stafford_h@dep.ftm1.st.fl.us

Abstract

Arsenal, at a 2.6% mix with water, was applied to cut stumps of *Melaleuca quinquenervia* (Cav.) S.T. Blake to control outlying stands within the high marsh habitat of the Estero Bay State Buffer Preserve, Lee County, Florida. The effectiveness and impacts associated with the use of Arsenal within this type of habitat in southwest Florida is not well documented. Percent kill and non-target damage is examined and recommendations are made.

Introduction

Outlying stands of *Melaleuca quinquenervia* (Cav.) S.T. Blake, or melaleuca, found within the high marsh habitat of the Estero Bay State Buffer Preserve appear to have a slightly higher elevation than the surrounding marsh. The stands also exhibit similar vegetation cover. In this stressful environment, many unknown factors may come into play when considering an acceptable application rate of Arsenal for the effective control of melaleuca while keeping non-target damage to a minimum.

Arsenal, a systemic herbicide with the active ingredient imazapy, has been approved for use by governmental agencies or their contractors for the control of melaleuca in Florida. Under this supplemental label, spraying or brushing the plant's vascular cambium with a 50% mix with water is approved for cut stump treatments. Florida land managers have been successfully controlling the spread of melaleuca using lower application rates than the approved concentrations of

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50% for cut stump treatment and 100% for frill/girdle. At a melaleuca workshop held in January 1996, the American Cyanamid Company (the manufacturer of Arsenal) recommended a 50% mix with water for frill/girdle and 25% for cut stump treatments, one half that approved on the supplemental label. Under the original specimen label, application with a dilute solution (8-12 oz of Arsenal mixed with one gallon of water) is recommended for cut stump treatment of target species.

An "application tip" for professional vegetation control is that because Arsenal has both foliar and root activity, applications around desirable vegetation or trees must be at least twice the distance from the drip line, to avoid serious damage. In addition, applicators should avoid treating trees with root systems grafted to desirable vegetation as injury may occur to non-target plants. Langeland (1990) states that because Arsenal is soil activated, "desirable vegetation can be killed if roots come in contact with the herbicide", especially when using the frill/girdle method.

Methods and Materials

A total of ten days during the months of March, April, and May 1995, were spent eradicating all melaleuca trees in outlying stands within a portion of the high marsh habitat of the Estero Bay State Buffer Preserve, Lee County, Florida. A crew of two to five Florida Department of Environmental Protection's Southwest Florida Aquatic and Buffer Preserve staff members felled all trees using field axes and chain saws. Cut stumps were 1-2 ft high. Cutting was immediately followed by a cut stump application of 2.6% Arsenal mixed with water. The herbicide, with a marker dye added, was applied to the cambium using back pack and hand sprayers. All precautions were taken to avoid run off from cut stumps, overspray, and spillage. The 2.6% solution was achieved by mixing 10 oz of Arsenal in 374 oz of water for a total of three gallons.

The treatment sites were monitored for efficacy of treatment and non-target damage over the following year. In late April 1996, several of the treated cut stumps, almost all of which appeared to be dead, were inspected to confirm mortality.

Results

Over 99% of all melaleuca cut stumps treated with the 2.6% Arsenal solution appeared to be dead. When the cut stumps were examined and stripped of their bark to expose any living tissue, none was encountered. Instead, boring insects had already begun to decompose the stump. The resprouting of four stumps out of thousands treated is most likely due to incomplete wetting of the entire cut surface of the cambium.

Damage to non-target species is shown in Table 1. The mortality of grasses and

sedges were confined to the immediate treatment areas and a 2-3 ft band surrounding the treatment areas. One year after treatment, these species were reestablishing along the perimeters of and within the treatment areas. Where individual outlying trees were treated, no observable “dead zone” of grasses and sedges or any other plant species was observed. Because the grasses and sedges are reestablishing, the damage is considered to be temporary and moderate.

The other moderately damaged species were *Salicornia bigelovii* and *Sesuvium portulacastrum*. This damage is considered to be moderate because most individual plants appeared normal, while only a few showed the short shoots associated with Arsenal treatment. It is believed that these species will also reestablish within the treatment areas with a normal growth pattern.

Species that did not show non-target damage one year after treatment were either present prior to treatment, died off and resprouted, or have recruited into the treatment areas. Although some of these species were known to occur within the outlying stands prior to treatment, there was no baseline documentation, so it cannot be determined which is the case. But the fact that these species are growing normally one year after treatment within the treatment areas indicates that the residual effect of the Arsenal is not impacting these plants currently, even if they were killed initially.

Not unexpectedly, the most severe non-target damage was evident in the woody species *Avicennia germinans* and *Conocarpus erectus*. Although only one specimen of *A. germinans* was observed, the short shoots were predominant along the trunk and branches. The individual tree survived and will be monitored at least yearly.

Conocarpus erectus showed severe short shoot development in the majority of plants observed. Because care was taken not to overspray the herbicide, this damage is considered to be due to the close proximity of their roots to the roots of the treated melaleuca cut stumps. Some observed mortality may also have occurred due to the effect of Arsenal, but this area also suffered from severe freeze damage this past winter and many *C. erectus* within and outside the treatment areas died back. Most are resprouting from the base of their trunks. There were also *C. erectus* trees within the treatment areas that showed no signs of non-target damage. It is assumed that the roots of these plants did not come in contact with those of the treated melaleuca stumps.

Monitoring of all treatment areas will continue on an annual basis. Where Arsenal non-target damage was evident for three years in a treatment area on Little Pine Island, Lee County, Florida, normal growth is now occurring (M. Barry, pers. comm.).

Acknowledgements

Table 1. Damage to non-target species, observed one year after treatment by Arsenal.

Species	Type of damage ¹	Extent of damage
<i>Acrostichum aureum</i> L.	None	-
<i>Aster bracei</i> Small	None	-
<i>Aricennia germinans</i> (L.) L. ²	SS	Severe
<i>Baccharis angustifolia</i> Michx.	None	-
<i>Borrchia frutescens</i> (L.) DC.	None	-
<i>Conocarpus erectus</i> L.	SS	Severe
<i>Cynanchum angustifolium</i> Pers.	None	-
<i>Distichlis spicata</i> (L.) Greene ³	M	Moderate
<i>Eleocharis cellulosa</i> Torr. ³	M	Moderate
<i>Erechtites heiracifolia</i> (L.) DC.	None	-
<i>Eupatorium capillifolium</i> (Lam.) Small	None	-
<i>Fimbristylis spadicea</i> (L.) Vahl ³	M	Moderate
<i>Juncus roemerianus</i> Scheele ³	M	Moderate
<i>Lycium carolinianum</i> Walter	None	-
<i>Mikania scandens</i> (L.) Willd.	None	-
<i>Pluchea odorata</i> (L.) Cass.	None	-
<i>Salicornia bigelovii</i> Torr.	SS	Moderate
<i>Sesuvium portulacastrum</i> (L.) L.	SS	Moderate
<i>Spartina bakeri</i> Merr. ³	M	Moderate
<i>Spartina spartinae</i> (Trin.) Hitchc. ³	M	Moderate
<i>Sporobolus virginicus</i> (L.) Kunth ³	M	Moderate

¹ Type of damage: SS, short shoot (commonly referred to as rosetting or witch brooming); M, mortality.

² Only one specimen observed.

³ Despite initial mortality, these species are currently reestablished within the treatment areas.

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Literature Cited

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