CONTROL OF REGROWTH FROM AIR POTATO (*Dioscorea bulbifera L.*) BULBILS

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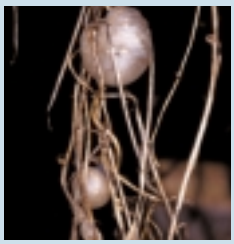
Introduction

Air potato (*Dioscorea bulbifera* L.) is an herbaceous vine native to Asia. It was first introduced into Florida in 1905 and can now be found throughout much of the state (Langeland and Burks 1998). *D. bulbifera* is listed as a Category I plant by the Florida Exotic Pest Plant Council (www.FLEPPC.org/01list.htm) meaning that this plant is capable of altering native plant communities by displacing native species. In 1999, air potato was added to the Florida Noxious Weed List (FDACS, F.A.C. Chapter 5B-57).

D. bulbifera produces aerial tubers or bulbils which drop to the ground to produce new plants. These structures enable the plant to spread rapidly and engulf native vegetation (Langeland and Burks 1998). Management of this vine is challenging, largely because of the plant's ability to grow from bulbils. Repeated herbicide application and mechanical methods (i.e., hand-pulling) are the most common control methods (Gordon et al. 1996).

The purpose of this research was to evaluate the effectiveness of two herbicides on pruned air potato vines. A potential large-scale management technique would be to cut and remove vines, and then treat the remaining stems with herbicides. Removing vines is labor-intensive, and would ideally occur before bulbil formation. However, if air potato vines were removed after bulbil formation, leaving bulbils on the ground, herbicide treatment could reduce the number of plants the following season. Our goals were to determine the most effective herbicide and method of application to control regrowth from bulbils.



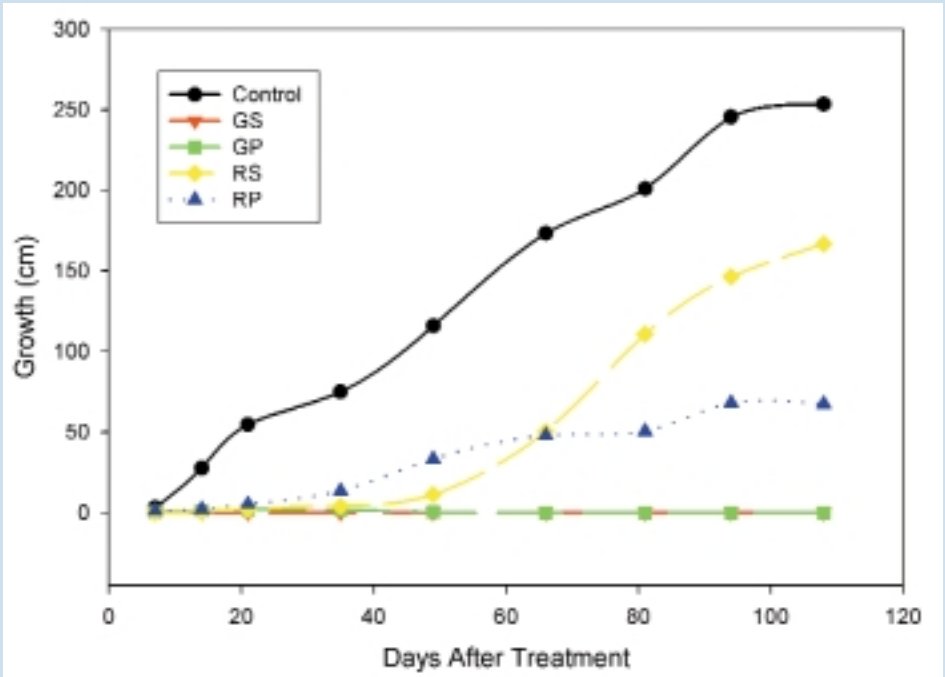


Figure 1. Cumulative growth of air potato (*Dioscorea bulbifera* L.) vines following cutting and herbicide treatment. Herbicide treatments consisted of: GS = Garlon Spray, GP = Garlon Paint, RS–Roundup Spray, and RP–Roundup paint. There was no growth for GS and GP treatments.

Methods

This study was performed in Lake Buena Vista, Orange County, Florida. On 26 March 2001, we planted forty *D. bulbifera* bulbils in 3.8 L pots containing #121 potting soil. Plants were grown outside, under ambient conditions, and watered daily. On 15 June 2001, after 81 days of growth, the plants had grown an average of 200 cm. We then pruned them to 5 cm, with no leaves. The remaining stems were randomly assigned to one of four treatments, each containing 10 replicates. The four treatments consisted of: a control, Garlon3A® spray (GS), Garlon3A® paint (GP), Roundup® spray (RS), and Roundup® paint (RP). Herbicides were applied at typical label rates: Garlon 3A® (44.4% A.I.) is a triclopyr herbicide and was applied at 6 oz/gal (4.7% solution). Roundup® (41% A.I) is a glyphosate herbicide and was applied at a concentration of 3 oz/gal (2.3% solution). The plants were treated with herbicides immediately after cutting. The spray treatments were applied with a backpack sprayer to wet the stems, and attempts were made to minimize runoff. Because the pruned stems did not have any leaves, we also applied each herbicide with a hand brush to insure that coverage was complete. While this is not a practical method to apply herbicides on a large-scale, we felt this would insure that the herbicide was applied evenly over the pruned stems. After cutting and herbicide treatment, the plants were watered on a daily basis. We measured the length of new growth from the bulbils (including regrowth from the pruned stem, as well as new stems from each bulbil) at 7, 14, 21, 35, 49, 66, 81, 94, and 108 days after treatment (DAT).

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Results

We found that growth rates from untreated cut stems were similar to the pre-cut growth rates. For example, before pruning, the plants grew an average of 2.5cm/d. After pruning, the control plants grew an average of 2.3 cm/d. In contrast, the growth rates of bulbils treated with herbicides were suppressed (Fig. 1). However, the herbicides appeared to differ in their effectiveness. We found that Garlon® was more effective than Roundup®, achieving 100% control with both spray and paint application methods. We measured a 100% and 73% reduction in growth rates for Garlon® Paint and Roundup® Paint, respectively, compared to control plants. We also found that Roundup® Spray treatment was less effective than Roundup® Paint treatment; causing a 34% reduction in growth rate, compared to a 73% growth rate reduction.

Discussion and Conclusions

We found that regrowth from pruned air potato bulbils is rapid, averaging 2.3 cm/d. We also found that herbicides were effective in controlling regrowth. However, there were differences in the efficacy of the two herbicides tested, as well as in the method of application. Garlon® was more effective than Roundup®, completely inhibiting regrowth from pruned bulbils in both the spray and paint treatments. Spray and paint application of Roundup® reduced plant growth by 34% and 73%, as compared to controls, respectively. Thus, it also appears that painting of the herbicide resulted in better coverage, and subsequent control of plant growth.

These results are similar to previous research conducted on air potato. For example, Mullahey and Brown (1996) compared the efficacy of six herbicides applied to vines approximately 10 m in height. They found that Roundup®, Remedy®, and Garlon® provided higher growth suppression at 91 DAT than Finale®, Weedmaster®, and Banvel®. Another group of investigators (Gordon et al. 1996) compared a one-time treatment of hand pulling of air potatoes with Roundup® and hand pulling. They then assessed growth and survival for three years. Although this effort was confounded by disturbance from a hurricane, the results suggested that hand pulling was effective without herbicide treatment. However, the results were inconclusive as to whether repeated herbicide application would have controlled regrowth from tubers.

Thus, our data suggest that the growth of air potato can be controlled by mechanical cutting, followed by application of Garlon® to the cut stems. Removing cut stems could potentially reduce the amount of climbing structure available for new growth and, if removed during or after aerial tuber formation, the number of these structures that potentially could grow in the following season. Further study at a larger temporal and spatial scale is warranted to determine the most efficient method for controlling the long-term growth of air potato.

Literature Cited

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Great Air Potato Roundup

The City of Gainesville Nature Operations Division held the fourth annual Great Air Potato Roundup in February. Almost 900 volunteers collected over 12 tons of tubers from the air potato vine in Gainesville public areas. Students from Brentwood School joined in the effort to reduce the invasive vine in their schoolyard. – *K. Brown*