Diuron provides excellent postemergence liverwort control when applied at 1.0 lb ai/A. This product is not registered for use in nursery crops, however it caused no injury to crops treated in this study. Diuron has potential as a postemergence herbicide for use in container crops.

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Pinebark Mini-Nuggets Provide Effective Weed Control in Nursery Crops Grown in Large Containers©

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While the market for large plants increases steadily, weed control in large containers presents new production problems for growers. Preemergence herbicides are inefficient in large containers due to nontarget loss, and hand weeding is expensive. Mulches can provide an alternative. Experiments were conducted to evaluate fresh pine bark nuggets for weed control in 7-gal containers. *Gardenia* were seeded with oxalis and crapemyrtle with bittercress. Treatments consisted of mulch applied at 0, 3.8, and 7.7 cm (0, 1.5, and 3.0 inches) and seeding was done before or after mulch. A separate group of treatments were included similar to the above except that a granular preemergence herbicide was applied after mulch application. Growth of gardenia and crapemyrtle were similar regardless of mulch depth. Season long weed control was obtained in all treatments when mulch was applied at 7.6 cm (3 inch) depth.

INTRODUCTION

Container nursery crops are increasingly valuable compared to agronomic crops in the southeast. However, weeds growing in containers can reduce the value of the crop by reducing growth through competitive effects (Berchielli-Robertson et al., 1990) and reducing salability due to customer demand for weed-free crops. Most growers use preemergence herbicides along with supplemental hand weeding to control weeds, thus maximizing crop value.

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Increasing demand for large plant material in the landscape has led to many growers producing more nursery crops in larger containers; however, weed control practices differ from that used in small containers. Increased spacing between large containers renders preemergence herbicides inefficient and environmentally unsafe due to excessive nontarget loss. Hand weeding is an option but increasingly expensive due to increasing labor costs (Gilliam et al., 1990; Judge et al., 2003).

Mulches are an alternative for weed control in large containers. Shredded tires, recycled newspaper, pole shavings, and kenaf mulch have been used as a weed control in large containers (File et al., 1999). Shredded tires and recycled newspaper provided good control but availability and acceptability by customers are limiting factors for use as mulches.

Pine bark mini-nuggets may provide a nonchemical mulch option for growers. Shredded pine bark mulch has provided good weed control in the landscape and is generally accepted by consumers (Llewellyn et al., 2003). Pine bark is readily available and could be mechanized at potting. Also, hydrophobic properties of fresh pine bark mini nuggets are not conducive for weed establishment. The objective of this study was to evaluate fresh pine bark mini nuggets for a long-term weed control in large container nursery crops.

MATERIALS AND METHODS

These studies were conducted at the Patterson Greenhouse Complex of Auburn University, Alabama in Fall 2004 and Spring 2005. Crapemyrtle (*Lagerstroemia* 'Acoma') were transplanted from trade gallon containers into 7-gal containers on 27 Sept. 2004 and treated on 8 Oct. 2004. The substrate was 6 aged pine bark : 1 sand (v/v) amended with 2.3 kg (5 lb) of dolimitic lime, 6.4kg (14 lb) of Polyon 18-6-12, and 0.68 kg (1.5 lb) of Micromax. All plants were potted to equal depths, approximately 7.6 cm (3 inches) below the top of the container. All plants were irrigated twice prior to treatment. Three treatments consisted of broadcasting 25 bittercress (*Cardamine*) seed on each container substrate surface followed by application of pine bark mini-nugget mulch, which was hand applied at 0, 3.8, and 7.6 cm (0, 1.5, and 3 inches) deep respectively. Particle size distribution of the pine bark mini-nuggets was as follows: 11% between 2.5–5.1 cm (1–2 inches), 68% between 1.3–2.5 cm (0.5–1 inches), 14% between 0.5–1.3 cm (1/4–1/2 inches), and 7% less than 1.3 cm (1/4 inch). Pine bark mini-nuggets were purchased for $16 per cubic yard. Mulch cost per container was 7¢ and 15¢ for 3.8 and 7.6 cm (1.5 and 3.0 inch), respectively. Two other treatments consisted of first applying mulch at 3.8 and 7.6 cm (1.5 and 3.0 inch), then broadcasting the bittercress seeds on top of the mulch. These same treatments were repeated except that a granular preemergence herbicide (Broadstar 0.25G at 150 lb product/A) was applied after all mulch and seed were present. This study was initiated 8 Oct. 2004 with a total of 10 treatments and 10 single pot reps per treatment. All plants were placed in full sun with overhead irrigation and in a completely random design.

In a similar study, gardenia (*Gardenia jasminoides*) were transplanted from trade gallon containers into 7-gal containers on 27 Sept. 2004. On 30 Sept. 2004 the same treatments were applied to the gardenia except 25 oxalis (*Oxalis stricta*) seed were used per container instead of bittercress. In both studies, data collected were weed number per container at 30, 60, 90, and 180 days after treatment (DAT) and percent coverage of designated weeds at 60, 90, 180 DAT. Shoot fresh weight of weeds and growth indices of crop were taken for each container at 180 DAT. Plants were covered for overwintering from 23 Dec. 2004 until 1 March 2004. Crop growth indices and general weed coverage were taken on all crapemyrtle and gardenia at 300 DAT. Duncan's multiple range test ($\alpha = 0.5$) was used to separate treatment means.

RESULTS AND DISCUSSION

Crapemyrtle-Bittercress. These studies show that fresh pine bark mini-nuggets can provide effective season-long weed control for nursery crops grown in large containers. At 90 DAT and 180 DAT, bittercress was growing vigorously in the no mulch, no herbicide containers. These containers averaged 48% and 100% coverage of container surface, respectively, and 59.6 g of bittercress dry weight per container at 180 DAT (Table 1). In comparison, no herbicide, 3.8 cm (1.5 inches) of mulch treatment with seeding after mulching averaged 5% coverage at 90 DAT and increased to 44% coverage of container surface and 33.7 g per container at 180 DAT. All other treatments provided excellent bittercress control at 90 and 180 DAT.

After weeding at 180 DAT (6 April 2005), crapemyrtles were placed in a nursery area for the rest of the growing season. Plants reached marketable status by 300 DAT, thus weed pressure was low throughout the summer due to the crapemyrtles' canopy shading the container surface. No herbicides were applied beyond the initial treatment. General weeds at 300 DAT showed 16% coverage of the containers surface for the no mulch, no herbicide treatment and 32% coverage for the no mulch, herbicide treatment; there was slight but minimal weed coverage in the 3.8 cm (1.5 inches) of mulch treatments. There were no weeds in the 7.6 cm (3 inches) of mulch at 300 DAT.

Gardenia-Oxalis. At 90 and 180 DAT, oxalis coverage in the no mulch, no herbicide treatment averaged 18.5 and 35% coverage of container surface, respectively. At 180 DAT shoot dry weight was 12.9 g per container. All other treatments resulted in minimal oxalis growth at 90 and 180 DAT. The combination of mulch plus herbicide provided complete oxalis control 180 DAT. General weed coverage at 300 DAT averaged 71% coverage per container for the no mulch, no herbicide, 56% coverage for no mulch, with herbicide and 24% for 3.8 cm (1.5 inches) of mulch, seeded before mulch with no herbicide. All other treatments with 3.8 cm (1.5 inches) of mulch contained minimal weeds similar to the containers with crapemyrtle. Results are similar for gardenia compared to crapemyrtle in that 7.6 cm (3 inches) of mulch provided excellent weed control.

Crop growth for crapemyrtle and gardenia were not significantly different among treatments at 180 DAT (Table 2). However at 300 DAT gardenia were significantly smaller in the no mulch no herbicide treatment. The reduced growth was attributed to the excessive amount of weeds in those containers.

In summary, these data show that pine bark mini-nuggets provide excellent weed control in large containers when applied at a 7.6-cm (3-inch) depth. These results are likely due to the hydrophobic properties of the fresh pine bark, the depth of the mulch, and the lack of favorable growing conditions for weed germination and growth. Growers at potting could easily mechanize the process of applying this type of mulch. Fresh pine bark mini-nuggets mulch could virtually eliminate the use of herbicides and handweeding in production of nursery crops grown in large containers.

Table 1: The influence of mulch and herbicides on weed control in container-grown nursery crops.

			Crapemyrtle				Gardenia			
			bittercress			general[Z]	oxalis			general
			90 DAT[Y]	180 DAT		300 DAT	90 DAT	180 DAT		300 DAT
Herbicide[X]	Seeded[W]	Mulch[V]	% cover	% cover	SDW	% cover	% cover	% cover	SDW	% cover
No	Before	0	48a	100a[U]	59.6a	16b	18.5a	35a	12.9a	71a
No	Before	3.8(1.5)	0b	2.5c	3.5c	5cb	0.5b	0.9b	0.9b	24b
No	Before	7.6(3)	0b	0c	0c	0c	0b	0b	0b	0b
No	After	3.8(1.5)	5b	44.2b	33.7b	5cb	0b	2.5b	1.3b	6b
No	After	7.6(3)	0b	1.0c	1.4c	0c	0b	1b	0.8b	0b
Yes	Before	0	2b	8c	3.8c	32a	1.5b	2.5b	1.1b	56a
Yes	Before	3.8(1.5)	0b	0c	0c	0c	0b	0b	0b	3b
Yes	Before	7.6(3)	0b	0c	0c	0c	0b	0b	0b	0b
Yes	After	3.8(1.5)	0b	0c	0c	0c	0b	0b	0b	8b
Yes	After	7.6(3)	0b	0c	0c	0c	0b	0b	0b	0b

[Z] These data represent native weed populations occurring through the summer months.

[Y] DAT= days after treatment.

[X] Application of a preemergence herbicide (Broadstar 0.25G 150 lb product/A).

[W] Timing of seeding compared to mulching, before = seeds under mulch, after = seeds on top of mulch.

[V] Mulch depth in cm (inch), % cover =percentage of the container surface covered by designated weed species, SDW = shoot dry weight (g/container).

[U] Means within column followed by the same letter are not significantly different (Duncan's Multiple Range Test: $\alpha = 0.05$).

Table 2. The influence of mulch and herbicide on growth of gardenia (*Gardenia jasminoides*) and crapemyrtle (*Lagerstroemia* 'Acoma').

			Growth-index[Z]			
			180 DAT		300 DAT	
Herbicide[Y]	Seeded[X]	Mulch[W]	Gardenia	Crapemyrtle	Gardenia	Crapemyrtle
No	Before	0	59ab[V]	85a	75c	129a
No	Before	3.8(1.5)	54b	77a	79bc	128a
No	Before	7.6(3)	59ab	80a	83.7ab	126a
No	After	3.8(1.5)	56ab	82a	82ab	126a
No	After	7.6(3)	56ab	80a	80b	119a
Yes	Before	0	55ab	80a	80b	131a
Yes	Before	3.8(1.5)	60a	88a	84ab	129a
Yes	Before	7.6(3)	56ab	79a	82ab	121a
Yes	After	3.8(1.5)	54b	75a	86a	123a
Yes	After	7.6(3)	58ab	74a	83ab	125a

[Z] Growth index = height + 2 perpendicular widths/ 3, taken at 180 DAT(days after treatment) and 300 DAT.
[Y] Application of a preemergence herbicide(Broadstar 0.25G 150 lb product/A).
[X] Timing of seeding compared to mulching, before = seeds under mulch, after = seeds on top of mulch.
[W] Mulch depth in cm (inch).
[V] Means within column followed by the same letter are not significantly different.
(Duncan's Multiple Range Test: $\alpha = 0.05$).

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A Propagator's Notebook©

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INTRODUCTION

A number of months ago a former employer, James Gilbert of Gilbert's Nursery, suggested that I might consider giving a talk for this year's I.P.P.S. program. I decided he was right. Year after year I have come with notebook in hand to eagerly seek the knowledge and wisdom so generously offered by others. It's time I shared. I have been a member of I.P.P.S. for 20 years now and have tried my hand at propagating since 1981 when I first went to work as an intern for Ed Kinsey at Kinsey Gardens in Knoxville. Not long ago, in the process of moving, I came across my original propagation notebook. While rereading those notes I realized how many of my early observations were still valid today. While I certainly value my formal education in horticulture, it became very apparent to me early on as I tried to put my knowledge to work that it was going to take a lot more than "book learning" to be a successful propagator. Propagation is a field that depends heavily on empirical knowledge. Knowledge is gained daily through experience and doing. I grew up in Appalachia where empirical knowledge was considered to have great value. "Book learning" was fine, but "real" learning came by doing. I highly value both education and experience and use both in my work. However, I think that in this modern day of high technology, we sometimes neglect our ability to learn from our observations and keen senses. We neglect to observe, follow our intuitions, or "think outside the box." The I.P.P.S. was originally founded by a group of propagators who came together to share empirical knowledge. In that same tradition, I would like to share some of my observations and thoughts during my fascinating journey in the world of propagation.

I like to compare rooting a plant to getting a chemical reaction to take place. The reaction will not take place if any of the necessary parts of the equation are left out. The same is true when rooting plants. The secret is coming up with the right combination of events. Since I have spent many years working with difficult-to-root deciduous plants such as *Acer palmatum*, *Stewartia*, and *Styrax*, I would like to share some of what I have learned. The problem with most of these plants is not only do they have a short window when the wood is in a receptive state for root-