

---

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

Ben M. Richardson<sup>1</sup>, Charles H. Gilliam, and Glenn R. Wehtje

Auburn University, Department of Horticulture, Auburn, Alabama 36849

Glenn B. Fain

USDA-ARS, Southern Horticultural Laboratory, Poplarville, Mississippi 39470

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.

---

<sup>1</sup>Graduate Student Research Paper Winner; 2nd Place.

International Plant Propagators'  
Society, Combined Proceedings  
2005, Volume 55.

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 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.

Herbicide <sup>x</sup>	Seeded <sup>w</sup>	Mulch <sup>v</sup>	Crapemyrtle						Gardenia					
			bittercress			general <sup>z</sup>			oxalis			general		
			90 DAT <sup>v</sup>	180 DAT	SDW	300 DAT	90 DAT	180 DAT	SDW	180 DAT	90 DAT	180 DAT	SDW	300 DAT
			% cover	% cover	SDW	% cover	% cover	% cover	SDW	% cover	% cover	% cover	SDW	% cover
No	Before	0	48a	100a <sup>u</sup>	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				

<sup>z</sup> These data represent native weed populations occurring through the summer months.

<sup>v</sup> DAT = days after treatment.

<sup>x</sup> Application of a preemergence herbicide (Broadstar 0.25G 150 lb product/A).

<sup>w</sup> Timing of seeding compared to mulching, before = seeds under mulch, after = seeds on top of mulch.

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

<sup>u</sup> 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'*).

Herbicide <sup>v</sup>	Seeded <sup>s</sup>	Mulch <sup>w</sup>	Growth-index <sup>z</sup>					
			180 DAT			300 DAT		
			Gardenia	Crapemyrtle	Gardenia	Crapemyrtle	Gardenia	Crapemyrtle
No	Before	0	59ab <sup>y</sup>	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		

<sup>z</sup> Growth index = height + 2 perpendicular widths/3, taken at 180 DAT(days after treatment) and 300 DAT.

<sup>y</sup> Application of a preemergence herbicide(Broadstar 0.25G 150 lb product/A).

<sup>x</sup> Timing of seeding compared to mulching, before = seeds under mulch, after = seeds on top of mulch.

<sup>w</sup> Mulch depth in cm (inch).

<sup>v</sup> Means within column followed by the same letter are not significantly different.

(Duncan's Multiple Range Test:  $\alpha = 0.05$ ).

**LITERATURE CITED**

- Berchielli-Robertson, D.L., C.H. Gilliam, and D.C. Fare. 1990. Competitive effects of weeds on the growth of container-grown plants. *HortScience* 25:77-79.
- File, S., P. Knight, D. Reynolds, C.H. Gilliam, J. Edwards, and R. Harkess. 1999. Alternative weed control options for large container production. *Southern Nurserymans Assoc.* 44:501-504.
- Gilliam, C.H., W.J. Foster, J.L. Adrain, and R.L. Shumack. 1990. A survey of weed control costs and strategies in container production nurseries. *J. Environ. Hort.* 8:133-135.
- Judge, C.A., J.C. Neal, and J.B. Weber. 2003. Dose and concentration responses of common nursery weeds to Gallery, Surflan and Treflan. *J. Environ. Hort.* 21:43-45.
- Llewellyn, J., K. Osborne, C. Steer-George, and J. West. 2003. Commercially available organic mulches as a weed barrier for container production. *Comb. Proc. Intl. Plant Prop. Soc.* 53:590-593.
-