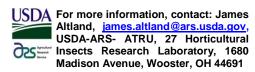
Substituting Pine Wood for Pine Bark Affects Physical Properties of **Nursery Substrates**

bark is included Pine container nursery substrates at 60% to 80% by volume for most substrate blends. Cost of pine bark is dependent on factors such as transportation and processing cost that are tied directly to fuel cost. Alternative sources to pine bark that are regionally abundant and sustainable are needed for nursery substrates. The objective of research was to determine the influence of substituting pine bark at commercial nursery operations with commercially harvested and processed pine wood on substrate physical properties.

Four cooperating nursery sites were recruited to use pine wood as a substitute for 0%, 50%, or 100% of the pine bark fraction in their substrate while using their traditional physical and amendments (Table chemical Physical properties including particle size distribution (PSD), air space (AS), container capacity (CC), total porosity (TP), unavailable water (UAW), bulk density (D_b), and moisture characteristic curves (MCC) were determined for each substrate at each cooperator site. Amendment with pine wood did not have any consistent or predictable effect on AS, CC, TP, or D_b of the resultant substrates (Table 2). Pine wood had little identifiable effect on plotted MCC although it (Figure 1), reduced calculated available water one substrate.

concluded that was substitution of pine bark with pine wood can result in changes to substrate physical properties that might lead to irrigation management changes, but none of these changes were considered negative or drastic enough to cause physical properties to be outside of acceptable ranges.



Altland, J.E., Krause, C.R. Substituting Pine Wood for Pine Bark Affects Physical Properties of Nursery Substrates. 47(10):1499-1503.

Table 1. Description of substrate components and amendments of the standard substrate for each cooperating nursery site.

Site	Substrate components	Fertilizers incorporated	Other amendments
Site 1	100% pine bark	Harrell's 18-2-5 at 6.5 kg⋅m ⁻³	AquaGro 2000 ^z at 0.6 kg·m ⁻¹
Site 2	67% pine bark	Harrell's 18-4-8 at 4.7 kg⋅m ⁻³	Bifenthrin ^y at 3 kg⋅m ⁻³
	20% sphagnum peat	Harrell's 14-7-0 premix at 4.2 kg·m ⁻³	
	13% MSW compost ^x		
Site 3	60% pine bark	Osmocote 15-9-12 at 4.7 kg·m ⁻³	
	30% sphagnum peat	Dolomitic limestone at 4.4 kg·m ⁻³	
	10% sand		
Site 4	65% pine bark	Dolomitic limestone at 5.0 kg·m ⁻³	
	21% sphagnum peat	_	
	7% Regrind compost ^w		
	7% haydite ^v		

^zMedia surfactant.

Table 2. Physical properties of substrates from four cooperating nursery sites.

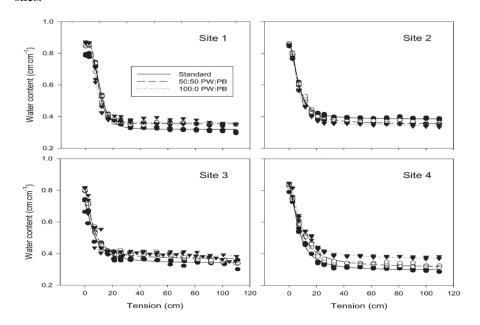
Cooperator	Pine wood substitution (%) ^x	Air space ^w	Container capacity	Total porosity	Unavailable water	Bulk density
sitey		(%)			(g·cm ⁻³)	
Site 1	Standard	31.9 c ^v	45.7 NS	77.6 c	29.9 a	0.194 a
	50:50 PW:PB	40.0 b	45.0	84.6 b	26.4 b	0.179 b
	100:0 PW:PB	48.7 a	42.3	91.6 a	24.2 c	0.161 c
Site 2	Standard	26.9 NS	60.6 NS	87.5 NS	24.7 NS	0.178 a
	50:50 PW:PB	26.3	59.1	85.4	24.2	0.157 c
	100:0 PW:PB	28.8	58.9	87.7	23.7	0.167 b
Site 3	Standard	16.5 b	58.0 a	74.5 b	25.8 a	0.268 a
	50:50 PW:PB	34.0 a	52.3 b	86.3 a	22.5 b	0.244 b
	100:0 PW:PB	36.1 a	50.9 b	87.0 a	19.8 b	0.238 b
Site 4	Standard	21.9 NS	55.8 c	77.7 c	21.4 b	0.225 a
	50:50 PW:PB	20.2	63.5 b	83.6 b	24.4 a	0.200 c
	100:0 PW:PB	20.3	68.2 a	88.5 a	23.8 a	0.215 b

^{*}Sites 1 through 4 substrates consisted of 100%, 67%, 60%, and 65% pine bark, respectively.
"Air space is percent volume of a 7.6 \times 7.6-cm core filled with air after saturation and drainage. Container capacity is percent volume of the same core filled with water after drainage. Total porosity is calculated as the sum of air space and container capacity. Unavailable water is the percent volume of water in a 7.6 \times 2.5-cm core at 1500 kPa.

"Means with different letters within a column and cooperator site are significantly different according to Fisher's protected least significant difference test (α = 0.05).

NS = nonsignificant difference for a group of means within a column and cooperator site.

Figure 1. Moisture characteristic curves for substrates at four cooperating nursery sties.



yInsecticide.

^{*}MSW = municipal solid waste compost.

^{*}Regrind compost is a hammermilled, steam-sterilized, composted product comprised of unsold plants from previous seasons. This material is produced and used exclusively by the cooperating site. Expanded shale lightweight aggregate.