Short-term plant growth trials with Plumas wood fiber at Cal Poly

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We conducted a short-term growth trial using Plumas wood fiber as a substrate component with two plant species, purple coneflower (*Echinacea purpurea* 'Magnus') and laurustinus (*Viburnum tinus* 'Spring Bouquet'). We transplanted liners on September 5, 2025 and harvested October 29, 2025.

Our objectives were to observe plant growth and establishment, as well as see substrate chemical properties.

Trial 1. Laurustinus

We transplanted *Viburnum tinus* 'Spring Bouquet' liners into #1 containers (Nursery Supplies 310). Our control was a commercial nursery growing mix (aged bark, sand), then we created substrates using a base of sphagnum peat moss (Sungro Black) with dolomite (2,000 cm^3/m^3) amended with either coarse perlite (Horticultural Perlite, NorCal) or wood fiber (Plumas Wood Fiber, Summer 2025 Test Batch). We used amendment rates of 20% and 40% (v/v) for both perlite and wood fiber, then a 60% rate for just the wood fiber (Fig. 1). At the time of mixing, samples for each substrate were hydrated and placed in plastic bags.

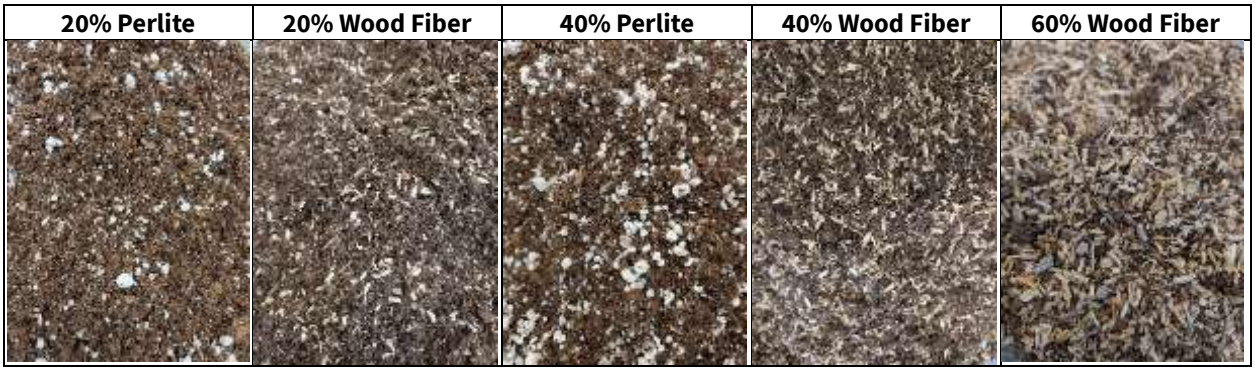

Fig. 1. The customized substrate amendments (v/v), with a base of Sphagnum peat with dolomite (2,000 cm^3/m^3).

We replicated each treatment 5 times in a completely randomized experiment. The containers were placed in a greenhouse with square spacing at 12 inches center-to-center (Fig 2). Every plant received 7.5 g of 14-14-14 controlled release fertilizer (Apex). We irrigated by hand, with plants frequently drying to the point of wilting. Greenhouse conditions were monitored by a weather station on the bench (). We irrigated the plants to container capacity with 21-7-7 at the rate of 300 ppm nitrogen on October 14 and October 21. We collected substrate chemical

property data and photos on October 29, 2025, as well as a growth index (GI). We calculated GI as:

GI = {Stem Height + [(Widest Canopy Diameter + Perpendicular Canopy Diameter)/2]}/2.

Substrate chemical properties were tested via three samples, using the 1:5 dilution method [substrate (20 cm^3):distilled water (100 ml)]. We let samples sit for more than 30 minutes before obtaining readings. All substrates finished the trial in favorable ranges for pH and EC (Table 1).

During the trial, the greenhouse had a mean daytime air temperature of 73.7 °F, with a standard deviation of 3.2 °F. The mean night air temperature was 64.0 °F, with a standard deviation of 3.7 °F. The mean daily light integral was 17.6 $M/m^2/d$ with a standard deviation of 4.7 $M/m^2/d$. Two days into the experiment, the greenhouse cooling failed, resulting in a 3-hour period with air temperatures exceeding 100 °F. Due to limited time for experiment maintenance, plants frequently reached the wilting point. At the conclusion of the trial, plants in the five amendment treatments had comparable quality, while the nursery mix control plants showed less growth and chlorosis (Fig. 3).

Fig. 2. The greenhouse experiment with laurustinus in perlite and wood fiber amended peat.

Table 1. Initial and harvest chemical property means and standard deviations for six substrates. The percentage amendments of peat and wood fiber were in Sphagnum peat with dolomite (2000 cm^3/m^3) on a volume basis. Data were obtained via the 1:5 dilution method with a 20 cm^3 substrate sample (n = 3).

	pH		**Electrical Conductivity (mS/cm)**	
Substrate	Initial	Harvest	Initial	Harvest
Nursery Control	4.7 ± 0.1	6.2 ± 0.1	1.23 ± 0.16	0.60 ± 0.18
20% Peat	6.6 ± 0.1	6.3 ± 0.2	0.08 ± 0.01	0.97 ± 0.09
20% Wood Fiber	6.6 ± 0.1	6.2 ± 0.1	0.10 ± 0.00	1.03 ± 0.32
40% Peat	6.6 ± 0.1	6.3 ± 0.6	0.08 ± 0.00	0.53 ± 0.13
40% Wood Fiber	6.6 ± 0.1	6.1 ± 0.1	0.08 ± 0.00	0.53 ± 0.08
60% Wood Fiber	6.5 ± 0.1	6.6 ± 0.3	0.08 ± 0.01	0.34 ± 0.07

Fig. 2. *Viburnum tinus* 'Spring Bouquet' plants at the conclusion of an 8 week growth trial with wood fiber and perlite amendment in Sphagnum peat (v/v).

Laurustinus plants growing in 40% wood fiber and 60% wood fiber had a significantly higher mean GI than the control (Fig. 3).

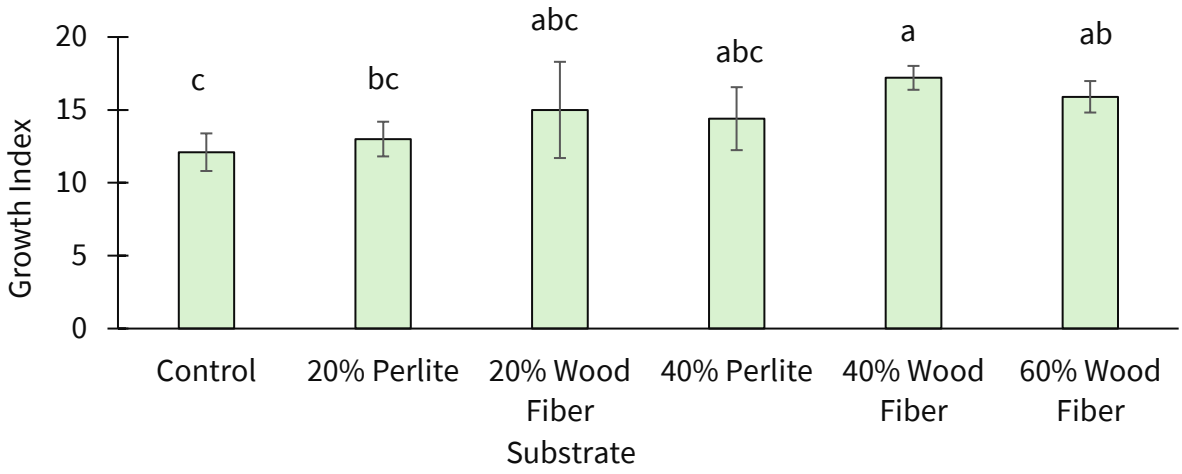

Fig. 3. Growth index means for laurustinus plants in #1 containers in six substrates amended with perlite or wood fiber (v/v). Means that do not share a latter are significantly different according to a Tukey HSD Test ($P \leq 0.05$, n = 5, error bars = SD).

Wood fiber performed very well in this trial, with all treatments that contained wood fiber producing comparable or superior plants. The results of this trial with viburnum are evidence that Plumas wood fiber can serve as an amendment in production substrates.

Trial 2. Purple Coneflower

We transplanted *Echinacea purpurea* 'Magnus' liners into #1 containers (Nursery Supplies 310). Our control was a commercial growing mix (Sungro MM 380SC RSi), then we created substates using a base of sphagnum peat moss (Sungro Black) with dolomite (2,000 cm^3/m^3) amended with either coarse perlite (Horticultural Perlite, NorCal) or wood fiber (Plumas Wood Fiber, Summer 2025 Test Batch). We used amendment rates of 20% and 40% (v/v). Each treatment was replicated 4 times. The containers were placed in a greenhouse with square spacing at 12 inches center-to-center. Every plant received 7.5 g of 14-14-14 controlled release fertilizer (Apex). We irrigated by hand, with plants frequently drying to the point of wilting. We irrigated the plants to container capacity with 21-7-7 at the rate of 300 ppm nitrogen on October 14 and October 21. We collected substrate chemical property data and photos on October 29, 2025.

The purple coneflowers were strongly affected by drying out during this trial. The foliage was damaged, resulting in plants that had low quality as a horticultural crop (Fig. 4).

Fig. 4. *Echinacea purpurea* 'Magnus' plants at the conclusion of an 8 week growth trial with wood fiber and perlite amendment in Sphagnum peat (v/v).

When we observed the roots of the plants, we saw exceptional root growth in substrates containing wood fiber (Fig. 5).

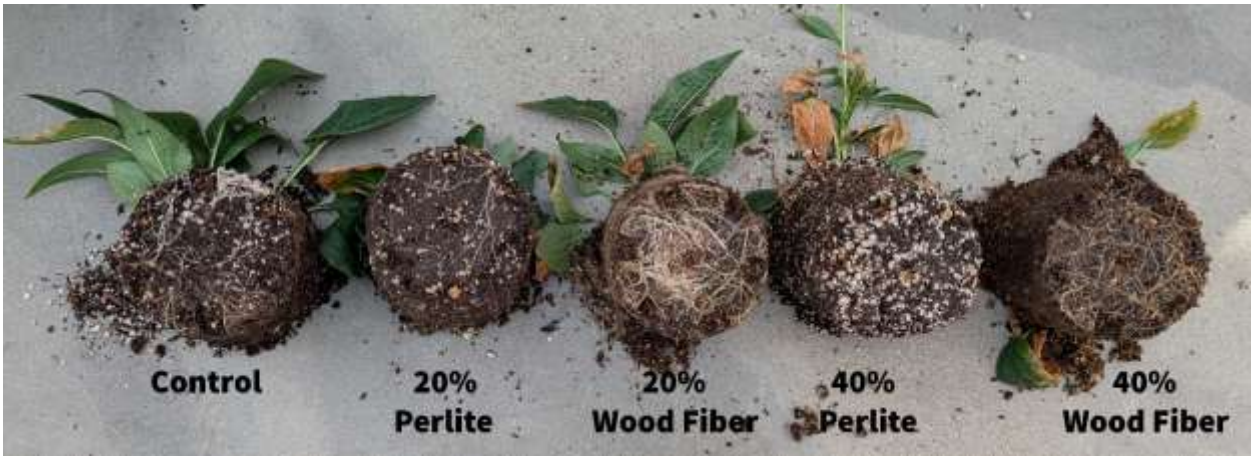

Fig. 5. *Echinacea purpurea* 'Magnus' roots at the conclusion of an 8 week growth trial with wood fiber and perlite amendment in Sphagnum peat (v/v).

Conclusions

We found wood fiber to be a promising horticultural substrate amendment, when used at rates between 20 to 60% by volume. The growth of laurustinus in wood fiber amended substrates was superior to the nursey mix control, and comparable to a peat and perlite mix. The root growth of purple coneflower was observed to be prolific in wood fiber amended substrates, appearing greater than in perlite amended substrates (Fig 6.).

Fig. 6. Healthy laurustinus leaves on a plant growing in 60% wood fiber (left), and purple coneflower roots in wood fiber (right, bottom) compared to perlite (right,top).