

Product: Almond shells fresh (S3-22)

Source: California

Date received: 2/23/2026

Moisture content upon receipt: 12.9%

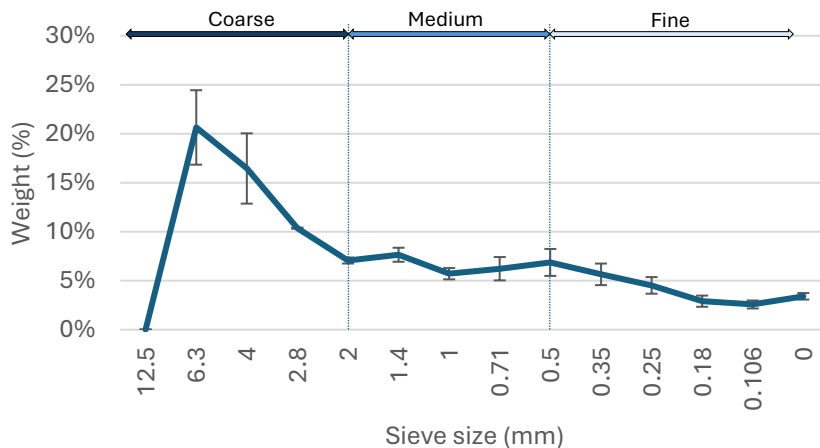
Plant species: *Prunus dulcis*

Processing equipment:

Screened to < 0.375 inches to remove hulls.



Particle size distribution

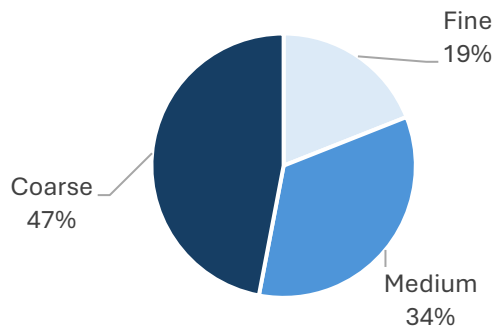


Particle size distribution:

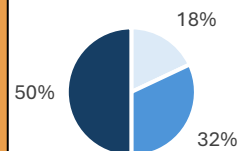
This material skews towards coarse particles even with particles greater than 3/8" (9.5 mm) removed.

When analyzed by particle size class, it has a distribution similar to pine bark used on the east coast (below).

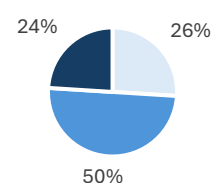
Particle size classification



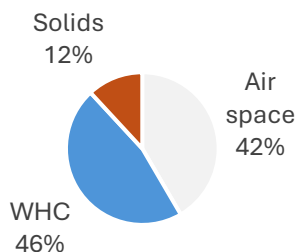
Pine bark



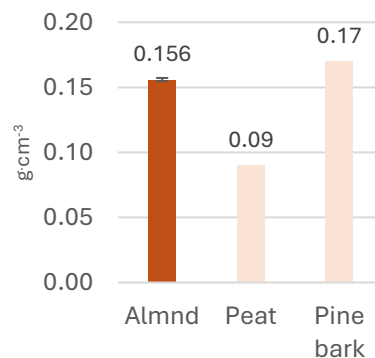
Peat



Physical properties



Bulk density

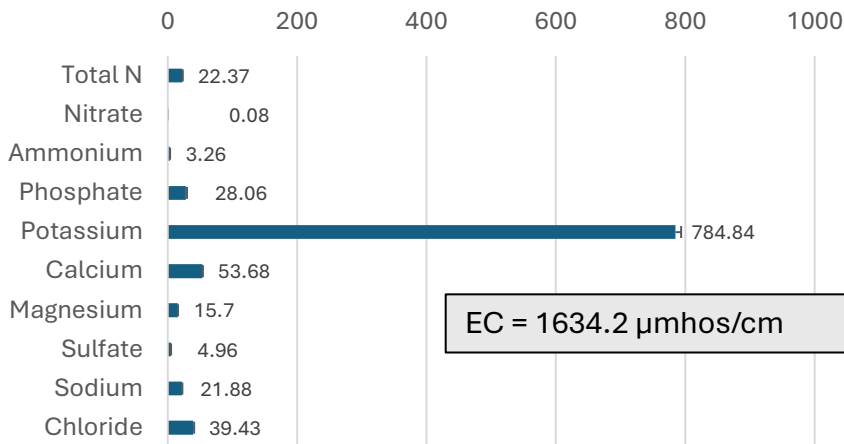


Physical properties:

Total porosity is 88%. Of that, this substrate has high air space. This substrate would be most ideal in crops where drainage is emphasized.

Bulk density is similar to softwood barks.

Water extractable nutrients (mg·L⁻¹)



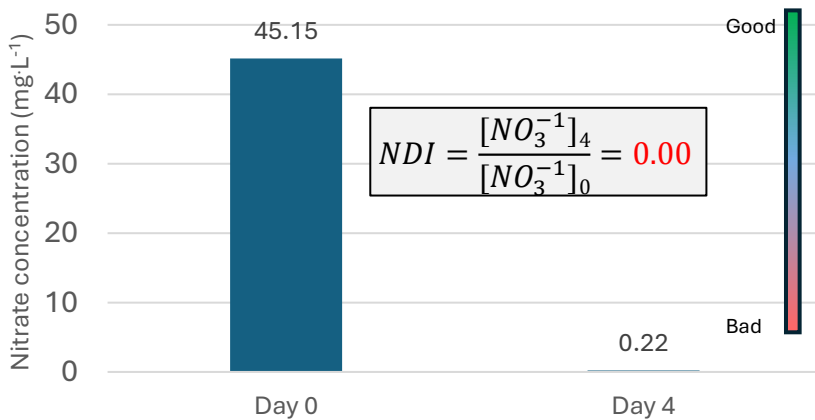
Water extractable nutrients:

Total N and P are high while nitrate is low, suggesting organic N sources. Extractable K is high and dominates cation balance. This is common with nut shells.

Ca and Mg are within an acceptable range with a reasonable Ca:Mg ratio.

Na and Cl are sufficiently low.

Nitrogen draw-down



Nitrogen draw down index:

Nitrogen draw-down index (NDI) is 0.00, indicating a high rate of N immobilization. This substrate will require additional N for optimum plant growth.

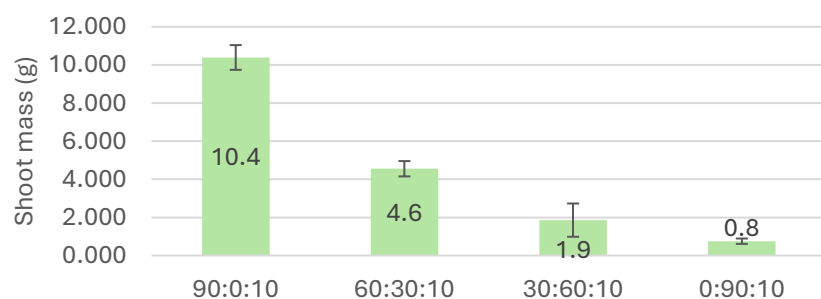
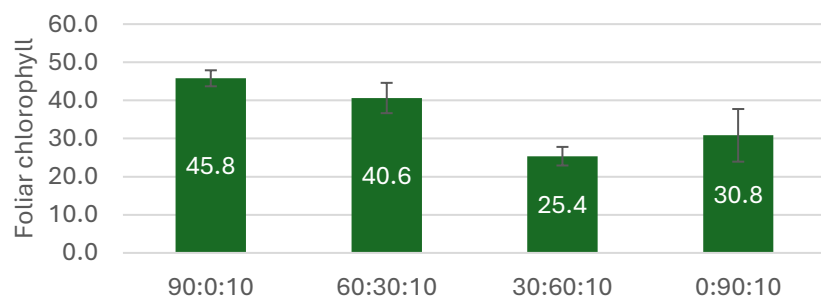
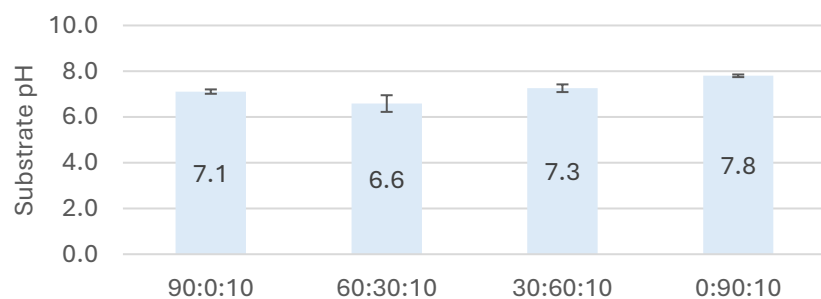
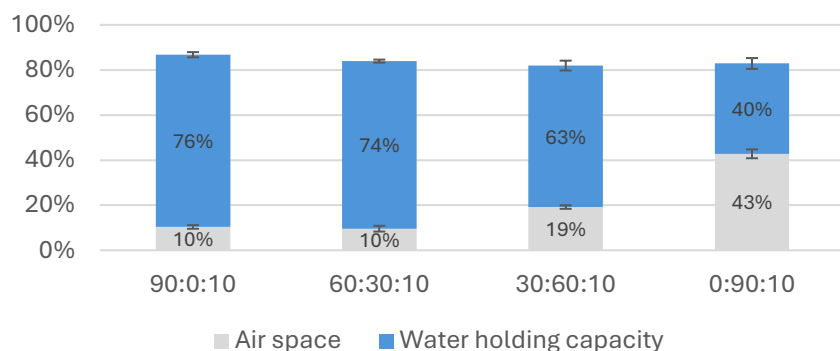
This value is based on 54.3 g dry mass and 0.156 g·cm⁻³ bulk density.

pH = 8.7

Lime rate titration:

The pH of this material was found to be 8.7 in a 1:1 extract. For this reason, a lime calibration curve was deemed unnecessary. If a significant proportion of this material is used as a substrate, it could increase overall substrate pH and thus lime rates of the blends will need to be adjusted.

Peat : shell : perlite



Substrate blend physical properties:

With increasing almond shells (from left to right), air space increases and water holding capacity decreases. Total porosity (sum of AS and WHC) remains stable. AS greater than 20% is unacceptable for most crops.

Substrate pH increased with increasing almond shell rate (despite not adding lime to these blends). Substrate pH greater than 6.5 is generally unacceptable for most crops.

Foliar chlorophyll (greenness) decreased with increasing almond shells, likely due to extreme N deficiency.

Shoot mass decreased with increasing proportion of the almond shells. Even with 30% almond shells (second from the left), shoot growth was severely stunted. This was likely due to severe N immobilization from the almond shells.

Almond shells should not be used as a component without substantial modification, possibly composting or some form of thermal decomposition.