

## Bullseye Field Trial Factsheet - WSARE WS20-912

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**Research Objective:** assess effects of fresh almond shells and composted shells on soil and plant nutrient dynamics. Do fresh shells and composted shells affect potassium (K) cycling, soil fertility, soil microbial communities, and tree nutrient status differently? Does composting shells offer any nutrient-related or soil microbial advantages?

**Experimental Design:** randomized complete block design. Treatments applied to entire rows.

**Treatments:** (1) control: no amendments  
(2) fresh shells at 5.5 tons/ac  
(3) composted shells & manure at 6 tons/ac

Reponses	Methods	Results
Hull/shell amendments	Nutrients, Decomposition	<ul style="list-style-type: none"><li>• Both fresh shells and composted shells released K rapidly as water was applied.</li><li>• After 8 months, shells decomposed by ~30% and compost decomposed by ~25% by net dry mass.</li></ul>
Soil	Exchangeable K (XK), Fertility (pH, CEC, SOM, etc.) Microbial community (PLFA)	<ul style="list-style-type: none"><li>• Soil XK increased under both materials in the upper 0-10 cm soil and occasionally deeper depths.</li><li>• Both occasionally displaced sodium and magnesium but did not affect other soil fertility components.</li><li>• Shells improved soil microbial community the most: higher total microbial biomass, bacteria, fungi, actinomycetes, saprophytes, arbuscular mycorrhizae than control soil (upper 0-10 cm soil). Compost led to moderate improvements in soil microbes.</li></ul>
Tree	July leaf nutrient status, Yield & Trunk circumferences	<ul style="list-style-type: none"><li>• Shells and compost led to only slightly higher leaf K, no significant differences in any other nutrients tested: N, P, Ca, Mg, S, B, Zn, Mn, Fe, Cu, Na.</li><li>• No effects on yield or trunk circumferences.</li></ul>

### Conclusions & Practical Applications

Fresh shells and composted shells both released K rapidly under water application, increased soil XK in the first 2 months, and slightly increased tree K status after two applications. While the compost slightly improved the soil microbial community, fresh shells significantly increased the microbial biomass of many beneficial functional groups including saprophytes and arbuscular mycorrhizae. After a year, lower soil exchangeable sodium was found under both shells and compost in the upper 0-10 cm soil. Growers can use both materials to improve K cycling and reduce reliance on K fertilizers. Fresh shells can be used to increase soil microbial biomass and promote beneficial microbial groups.

## Pictures



Fresh shells.



Composted shells/manure.