

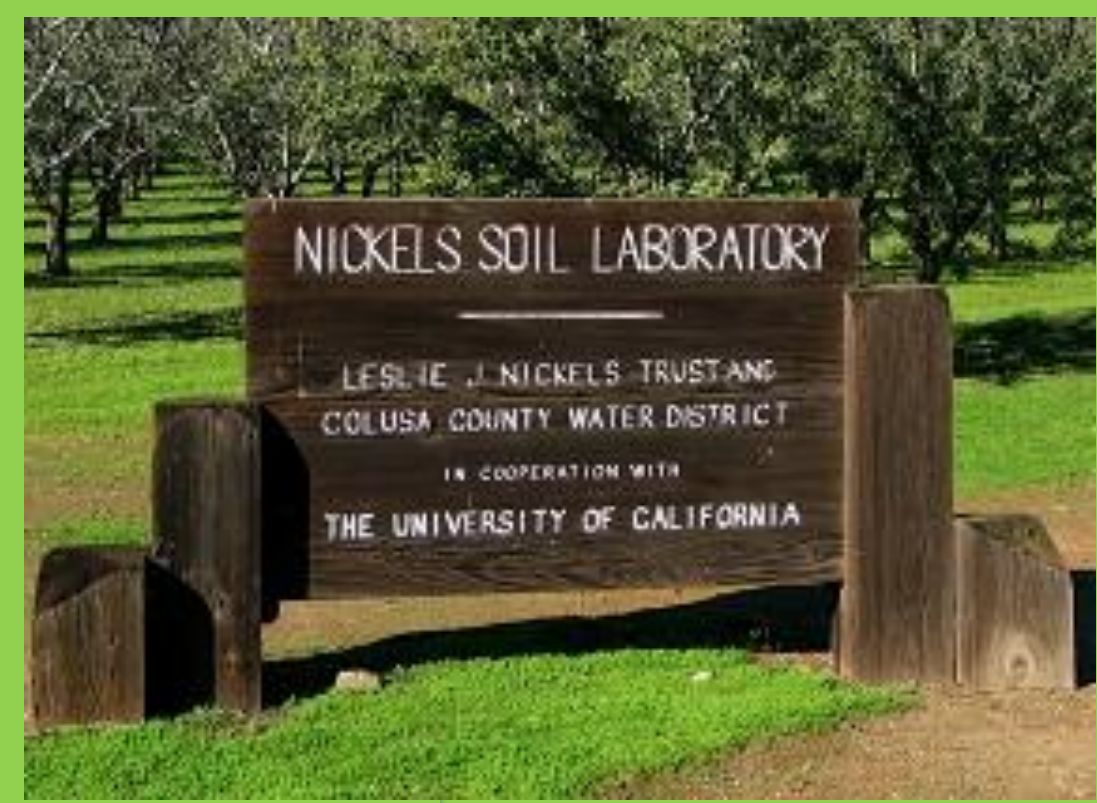


Concealed Damage Field Studies

Nickels Soil Lab/University of California Project

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Objectives: Test the role of different field conditions and management practices on the development of concealed damage (CD) in the Monterey variety. The field work was conducted at the Nickels Soils lab during the 2011 and 2012 harvests and coordinated with ongoing studies led by Alyson Mitchell at Food Science and Technology, UC Davis. The field samples were submitted for drying, roasting and CD analysis to Dr. Mitchell’s lab.

Materials and Methods: 2011.

Windrow Study: Following shaking (Oct 14), two long (1000’) windrows of Monterey nuts were identified in an orchard at the Nickels Soil Lab near Arbuckle, CA. Prior to this date, 1.14” of rain had fallen. Nuts were wet (kernel moisture > 10%). One windrow was conditioned (“drop-chuted”) to remove leaves and other trash from the windrow. The other row was not conditioned. Six 44’ sections of windrow were selected in each conditioned and unconditioned windrows and combined to make one large, 22’ windrow. Three short windrows were randomly selected within each conditioning treatment and on October 21 were treated with a volume of water equivalent to 1.5” over the area of the windrow. The remaining three short windrows in each treatment received no additional water and no rain fell in the next ten days. Temperatures in the windrows at different heights were measured throughout the experiment. Nuts were sampled from the windrows on October 28, transported to Davis, hulled/shelled and delivered to the Mitchell lab for CD evaluation.

In the lab, samples were stored, uncovered for one week. Subsamples were then oven dried and roasted at 120°C (248°F) for 90 minutes and then evaluated for kernel discoloration (CD) one week and four weeks later.

Stockpile Study: To simulate conditions within stockpiles, conditioned, field dried Monterey nuts were picked up (mechanically) and transferred into harvest bins (4’ x 3’ x 3’) and stored, uncovered, for 10 days (Nov 4 -14) before samples were taken for lab analysis by the Mitchell group. Single bins for each of the following treatments were established:

Dry nuts, stored in the shop

- Dry nuts, stored outside in the open
 - Wet nuts, stored outside in the open without turning
 - Wet nuts, stored outside in the open and turned 2x (Day 2 and Day 4)
- Nuts were wetted by spreading dry nuts on a water proof tarp and irrigating with the equivalent of 1.5” of rain using a garden sprinkler that reached all the nuts. Wet nuts were then shoveled into bins.

Temperatures at 6, 18, 30, and 42 inches from the top of the full bins were monitored throughout the study.

After 10 days in the bins, a composite sample of nuts were taken from different areas of each bin, transported to Davis, hulled and shelled and delivered to the Mitchell lab for CD determination.

In the lab, samples were stored, uncovered for one week. Subsamples were then oven dried and roasted at 120°C (248°F) for 90 minutes and then evaluated for kernel discoloration (CD) one week and four weeks later.

Materials and Methods: 2012.

Windrow Study: Monterey variety (7th leaf) trees were shaken (September 28), and dried in the field at the Nickels Soil Lab near Arbuckle, CA. Nuts were then windrowed in preparation for commercial pickup. On October 5, hull moisture = 11.3%; kernel moisture = 5.7%, a portion of the windrowed nuts from a single row of trees were used to fill 30 individual, 1.5 bushel laundry baskets (intended as artificial windrows), which were placed in a tractor aisle in the orchard in six groups of five. Two baskets in each of the six groups of baskets were conditioned by removing soil, leaves and sticks and then the basket was refilled with the conditioned nuts. The three remaining baskets in each group were not conditioned. The amount of water equivalent to 1” of rain was applied with a watering can to all five treatments. Three days later, on October 8, three baskets in each treatment were conditioned by the same methods as those on October 5. Two baskets in each group were not conditioned. See list of treatments in Table 1.

Nut samples for moisture analysis were taken on the days the nuts were turned to simulate conditioning: Oct 5, 8, and 11. Nuts were picked up on October 18, roughly 2 weeks after being placed in the baskets. Nuts were tested for hull and kernel moisture, the nuts were hulled and are being held for roasting. See Table 3 for moisture vs time for all treatments.

Table 1. 2012 windrow trial treatments.

TREATMENT	Conditioned before 1” water	Conditioned after 3 days after 1” rain	Conditioned 5 days after 1” rain	Conditioned 8 days after 1” rain
1	X			
2	X	X		
3		X	X	X
4		X		
5				

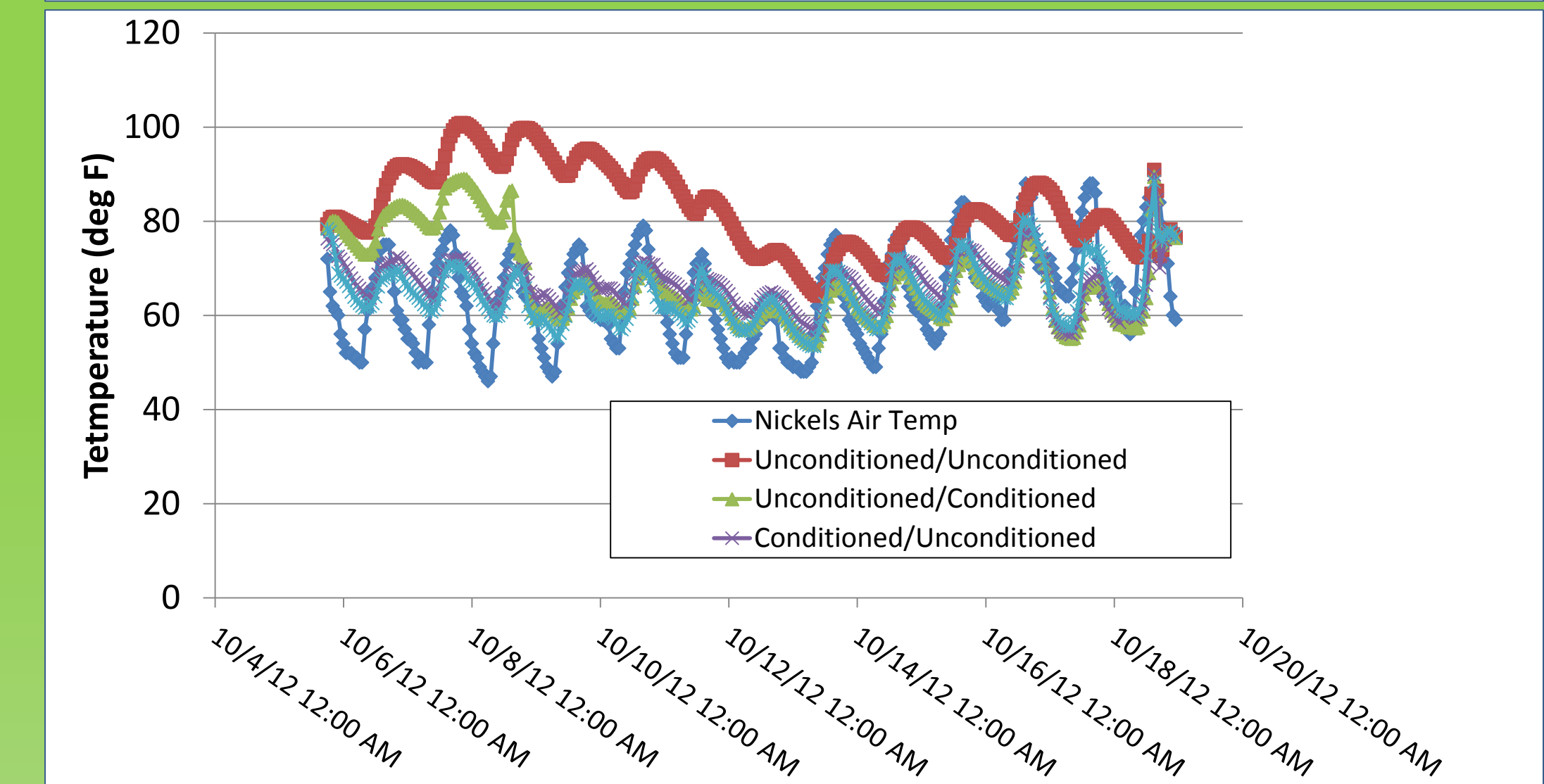
Table 2: Percent kernel moisture and interior discoloration (plus/minus one standard error) after roasting following one or four weeks of lab storage following pickup (WAPU). 2011 study*After a week in the lab, mold growth it impossible to evaluate CD at D14

Treatments	% Moisture on Oct 28	% Discoloration 1 WAPU	% Discoloration 4 WAPU
Dry, conditioned	11.9	1.7 ± 2.9	2.3 ± 4.2
Wet nuts, conditioned	12.9	5.0 ± 5.8	1.9 ± 4.2
Dry, unconditioned	17.1	10.8 ± 7.9	4.2 ± 3.4
Wet nuts, unconditioned	19.8	23.8 ± 10.6	---*

Table 3: Percent kernel and hull moisture over time for each treatment in 2012 study. Artificial rain (1”) applied on Oct 5.

Treatments	Hull-Oct 5	Kernel - Oct 5	Hull-Oct 8	Kernel Oct 8	Hull-Oct 11	Kernel-Oct 11	Hull-Oct 18	Kernel-Oct 18
Conditioned/unconditioned	11.3	5.7	31.6	8.4	28.9	8.0	27.2	7.8
Conditioned/conditioned 1x	11.3	5.7	31.6	8.4	33.9	8.4	9.1	6.0
Unconditioned/conditioned 1x	11.3	5.7	46.3	8.7	49.5	9.9	14.7	7.4
Unconditioned/conditioned 3x	11.3	5.7	46.3	8.7	49.5	9.9	10.4	6.8
Unconditioned/unconditioned	11.3	5.7	46.3	8.7	52.7	12.4	52.5	12.2

Figure 1. Example of hourly temperatures for four of the treatments in 2012 “windrow” experiments following 1” artificial rain



Results: In 2011 study, the highest mean value for discoloration after a week in the lab came from the unconditioned nuts – wet and dry.

Conditioned nuts were drier at pickup than unconditioned nuts, regardless of added water or not. There was no elevation in temperature in the windrows with added water (Data not presented).

In 2012, the wet, unconditioned nuts increase in temperature during the first week in the “windrows” was 20-30°F. This elevation in temperature disappeared when the nuts were conditioned (Figure 1).

In 2012, nut drying weather was excellent, so conditioned nuts, regardless of pre-wetting treatment (conditioned vs unconditioned), dried rapidly. Unconditioned nuts lagged behind in drying. (Table 3).

The rise in temp in the 2012 “windrow” compared to the lack of temp change in 2011 in the windrows may have been due to the prewetting of the 2011 nuts and the reduction in dust/soil moved into the windrows as a result.