

How elevated screens, weed cloth or bare soil affects kernel mold and other nut defects, 2014.

The objective of this trial was to determine if kernel mold and other nut defects are affected by nuts falling onto bare soil, weed cloth or elevated screens. Another objective was to determine if kernel mold and other nut defects change after post harvest drying. A block of 4 hazelnut selections (379.050, 380.057, 385.013, and 391.001) planted in 1994 on a 10 x 20 ft spacing at the Botany and Plant Pathology Field Laboratory, Corvallis, OR was selected for this trial due to a consistent high production of moldy kernels. Treatments were arranged in a randomized complete block design. Each nut location treatment was applied to 4 single-trees on each of 2 hazelnut selections (379.050 and 385.013). The orchard floor under trees was cleared and prepared for nut drop by blowing old nuts and debris with a leaf blower into the grass strip between trees, mowing weeds and using an herbicide to prevent new weed emergence during the summer. Weeds were sprayed with Makaze (32 oz/A) plus Reckon (64 oz/A) on 24 Mar and 22 May. There was no application for management of big bud mite or filbert worm. Trees were fertilized at a rate of 2 lb/tree on 16 Apr. Suckers were cut by hand on 7 Jul. Nuts were allowed to fall onto bare soil, weed cloth or screens suspended 6 inches off the ground with cinder blocks. Weed cloth and screens were placed in the orchard on 20 to 22 Aug. A total of 400 nuts were collected from under each 385.013 tree on 28 Oct and from under each 379.050 tree on 4 Nov. A set of 200 nuts from each tree was cracked open and evaluated for kernel defects. Another set of 200 nuts from each tree were dried at 40°C for 72 hours (until nut moisture was >10%), cracked open and evaluated for kernel defects. Scoreable “mold” included any kernel with visible mycelial growth. Scoreable discoloration included kernels with only black areas on the kernel. Total tip discoloration included any kernel with black or red discoloration of the distal end of the kernel. Data were analyzed as a complete factorial design for each hazelnut selection with drying (cracked open green or after drying) as one factor and location of nuts (soil, weed cloth or screens) as another factor. Nut moisture was accessed with either a Steinlite Moisture Meter SB900 and/or a differential between weight at time of collection and weight after being dried at 70 to 80°C for 48 to 72 hours.

A similar trial was set up in a commercial ‘Lewis’ orchard near Canby, OR. Weed cloth and screens were placed in this orchard on 8 Sep. A total of 200 nuts were collected from under each tree on 6 Oct. A set of 100 nuts from each tree was cracked open and evaluated for kernel defects. Another set of 100 nuts from each tree were dried at 40°C for 30 hours (until nut moisture was >10%), cracked open and evaluated for kernel defects.

Weather conditions during flowering was very cold with record cold temperatures recorded on 6 Feb 2014. Early spring growth had normal rainfall but warmer temperatures. Summer growing conditions were normally dry with extended periods of temperatures into the 90’s. Fall rains returned on 14 Oct. Both selections had similar levels of “Mold” while selection 385.013 generally had more total tip discoloration than selection 379.050. Both selections had higher levels of “Mold” than Lewis. Nuts caught on wire screens had significantly less moisture and less mold (Table 1) than nuts on bare soil although moisture was not significant for nuts under selection 385.013. Nuts caught on wire screens under selection 385.013 had significantly less total tip discoloration (Tables 3) than nuts that were harvested off the ground. Nuts caught on weed cloth were more variable. Nuts harvested from weed cloth had significantly more mold than from screens under selection 379.050 (Table 2) but significantly less mold than from soil under selection 385.013 (Table 3). There was no significant difference in mold or total tip discoloration when cracking open nuts at harvest or waiting until after drying (Tables 2 and 3). ‘Lewis’ nuts caught on wire screens or weed cloth had significantly less mold (Table 4) than nuts on bare soil.

Table 1. Nut moisture level and mold when caught on wire screens, weed cloth or laying on bare soil.

Hazelnut Selection and Time of Harvest	% Moisture*	Mold (% kernels)*
Hazelnut Selection 379.050		
Nuts on bare soil.....	31.6 a	32.8 a
Nuts on weed cloth.....	29.8 ab	31.9 a
Nuts on suspended screens.	28.6 b	27.4 b
Hazelnut Selection 385.013		
Nuts on bare soil.....	33.5 a	33.8 a
Nuts on weed cloth.....	28.6 b	30.3 b
Nuts on suspended screens. ...	31.8 ab	30.1 b

* Means followed by the same letter do not differ significantly based on Fisher's protected LSD ($P=0.05$).

Table 2. Nut location and drying effect on kernel defects of hazelnut selection 379.050.

Treatment	Mold (% kernels)*	Discoloration (%)*	Blanks (%)*	Black Tips (%)**	Red Tips (%)**	Total Tip Discoloration (%)*
Nuts on bare soil.....	32.8 a	1.0	0.9	(13.4)	(10.6)	24.1
Nuts on weed cloth.....	31.9 a	0.8	0.7	(12.6)	(11.9)	24.5
Nuts on suspended screens.	27.4 b	0.6	0.8	(8.4)	(13.1)	21.5
Nuts cracked open at harvest...	29.9	1.0	0.6	(10.0)	(13.5)	23.5
Nuts cracked open after drying	31.5	0.7	1.0	(13.0)	(10.2)	23.2

* Means followed by the same letter do not differ significantly based on Fisher's protected LSD ($P=0.05$). Means without letters are not significantly different.

** Numbers in parenthesis are accurate but interactions were detected between factors, which will not allow analysis of main effects of either set of treatments.

Table 3. Nut location and drying effect on kernel defects of hazelnut selection 385.013.

Treatment	Mold (% kernels)*	Discoloration (%)*	Blanks (%)*	Black Tips (%)**	Red Tips (%)*	Total Tip Discoloration (%)*
Nuts on bare soil.....	33.8 a	7.6	3.8	21.4 a	15.6	37.1 a
Nuts on weed cloth.....	30.3 b	7.4	4.7	20.5 a	14.1	34.6 ab
Nuts on suspended screens.	30.1 b	7.3	4.6	15.8 b	16.6	32.4 b
Nuts cracked open at harvest...	31.3	7.0	5.4 a	18.6	16.6	35.2
Nuts cracked open after drying	31.5	7.8	3.3 b	19.9	14.3	34.2

* Means followed by the same letter do not differ significantly based on Fisher's protected LSD ($P=0.05$). Means without letters are not significantly different.

Table 4. Nut location and drying effect on kernel defects of 'Lewis' hazelnut.

Treatment	Mold (% kernels)*	Discoloration (%)*
Nuts on bare soil.....	6.5 a	1.5
Nuts on weed cloth.....	3.3 b	1.1
Nuts on suspended screens. ...	2.3 b	1.1
Nuts cracked open at harvest...	4.8 a	1.7
Nuts cracked open after drying	3.3 b	0.8

* Means followed by the same letter do not differ significantly based on Fisher's protected LSD ($P=0.05$). Means without letters are not significantly different.