Factors Affecting the Incidence of Fungi Infecting Walnut Fruits

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We have focussed our investigation on areas which seemed to have potential due to the information obtained from the studies conducted in 1977. Areas of investigation included:

INJURY The phenomenon of increased mold in nuts with hulls which were severely injured during development was confirmed. This had suggested an infection court was being provided for entrance of fungi which subsequently caused mold. Expanding on the treatments, nuts which were injured and nuts which were sound were sprayed with spore suspensions of two fungi previously isolated from walnuts, Alternaria sp. and Aspergillus sp. (A. niger group). The suspensions were applied at the time of wounding or one month after the injuries were made. At harvest, the inoculated nuts were not significantly more moldy than the controls. The infection court hypothesis does not seem to apply under conditions early in the season. Indications from the samples of walnuts plated throughout the season (discussed below) tend to support this conclusion.

ISOLATIONS The period covered was expanded to include samples taken from early June through early October. Colonization of the blossom and stem ends of the hulls was recorded throughout the summer. Colonies were observed growing from the blossom end of the hull in 31% of the nuts. From the stem end, colonies were recorded from 22% of the nuts. When inoculated with the Aspergillus isolate, colonization of the blossom end was increased to 57%. However, the blossom end of those nuts inoculated with Alternaria sp. were colonized at the same level as the uninoculated nuts.

Sections were also removed from hull tissue around the circumference of the nut, and from tissue at the margin of the wounds. Hulls were classified as hard, somewhat soft, very soft with superficial lines of dehiscence forming, and dehiscent. The % infestation of the hull tissue increased with the progression from hard to dehiscent.

After the hull sections were removed, the nuts were split open and the kernel and packing tissue was aseptically removed and plated. Infestation of the inner tissues remained at a low level throughout the season. However, the last sample, collected on October 5, showed an increase in the number of nuts infested, to 82%. A similar phenomenon was observed last year. This suggests that factors at the time of harvest (such as hull senescence) are responsible for colonization of the inner tissues by fungi.

ON THE GROUND vs. IN THE TREE We once again compared the effect of leaving nuts on the ground, in the hull and hulled, for one and two weeks. Nuts were also randomly tagged while still on the tree, and then harvested from the tree concurrently. Results identical to those of last year were obtained with the Hartley variety: only those nuts left on the ground in the hull for two weeks were statistically different from the controls. The results with the Ashley were somewhat different: all treatments harvested after two weeks were significantly more moldy than the controls. Nuts left on the ground in the shell (10%) were less moldy than those in the tree (25%). The increase in mold in nuts on the tree was checked by comparing four varieties (Hartley, Ashley, Serr, and Tehama) over a three week period. All but the Hartley showed an increase in mold on the last sample date, October 5.

The work indicates that factors at the time of harvest contribute to colonization of the kernel and packing tissue by fungi. The colonization of the hull early in the season, while it may provide inoculum, does not in itself lead to mold. Next year's study will include experiments on protecting the nut from colonization by fungi during the preharvest & harvest period.