

RESEARCH NOTE

Observations on Rodent Feeding Damage to Pear Germplasm in Cold Storage

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Abstract

Fall-dug nursery trees stored in a cold storage were damaged by rodent feeding over the winter of 2004-2005. Damage to pear (*Pyrus communis* L.) scion cultivars was confined to the lower trunk region with little damage to the Bartlett seedling rootstocks. Damage ranged from nibbling of some buds to complete girdling and bark removal of a considerable length of the trunk. Position of the tree bundle in the storage appeared to have no effect on severity of damage. An arbitrary 7-point scale was used to rate the severity of damage on 22 cultivars. The least damaged cultivars were 'Moonglow', 'Giffard' and 'Butirra Precoce Morettini', whilst 'Thornless Seckel', 'Conference' and 'AC Harrow Gold' were severely damaged. In late spring 2005, all trees were replanted into nursery rows to allow trees to recover. Only trees with damage ratings in the slight to moderate range showed signs of recovery during the 2005 growing season.

Girdling of trees by rodent feeding in Ontario orchards is typically caused by meadow voles (*Microtus pennsylvanicus* Ord), with most damage occurring during the winter when alternate food sources are scarce. There may be migration of rodent populations into protected environments (e.g. barns, tree storages) for winter survival. The use of bait stations containing rodenticide [e.g. zinc phosphide-treated corn, diphacinone, chlorophacinone (2)] can provide some control and reduce rodent populations in orchards and tree storages (3).

Evidence of rodent preference for cultivars of tree fruit species is limited and largely anecdotal, and we have been unable to find published reports to verify anecdotal evidence. Here we report on feeding damage that occurred on pear trees (*Pyrus communis* L.) during the winter of 2004-2005 in a tree storage barn which provides some data in support of preferential feeding by a rodent population.

Pear trees of 22 cultivars budded onto Bartlett open-pollinated seedling were dug in November 2004, labeled, and loosely bundled (5-10 trees/bundle, 2-5 bundles per cultivar).

Most trees were whips, with some limited feathering, and root systems that were sufficiently developed to prevent tight bundling. Bundles were placed horizontally, 2-3 bundles high in no particular order, on pallets in a tree storage at ~4 °C with high humidity. Tree roots were kept moist by periodic spraying with water. Bait stations containing zinc phosphide-treated corn were placed at numerous locations throughout the storage. In spring 2005, when trees were taken out of storage for sorting and grading prior to planting, considerable rodent feeding damage was noticed. An arbitrary 7-point scale (Table 1) was used to evaluate rodent feeding damage, then trees were replanted into nursery rows and re-evaluated in spring 2006, in order to assess regrowth and repair of the rodent feeding damage.

Rodent feeding injury was restricted primarily to the lower part of the trunk, although there was also slight damage to the rootstock just below the graft union and occasionally to the upper portion of the trunk and/or lateral branches; there was no feeding damage to the exposed bare roots. The observed damage was typical of that caused by meadow voles

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rather than the below-ground feeding damage caused by pine voles (*M. pinetorum* Leconte) (1). Feeding injury was observed on some trees of all 22 cultivars (Table 1). For 11 of the cultivars, feeding injury was present on every tree, although in some cases the damage was minimal. 'Giffard' and 'Moonglow' had the fewest trees showing damage, with only 7% and 13%, respectively. 'Butirra Precoce

Morettini' also had low feeding damage ratings, in spite of the discovery of a rodent nest in one of the bundles; unfortunately we did not record if the trees of this cultivar that showed feeding damage came from this particular bundle, and, as the nest was unoccupied, we were also unable to verify the rodent species involved.

A total of eight trees (three each of 'Aurora'

Table 1. Severity of rodent damage on 22 cultivars of fall-dug pear nursery trees during cold storage. All trees were propagated on 'Bartlett' seedling rootstock.

Pear scion cultivar	Total trees	Damage rating class ^z						RPI ^y	
		0	1	2	3	4	5		6
Moonglow	15	14	1						0.07
Giffard	16	14	2						0.13
Butirra Precoce Morettini	13	8	4	1					0.46
Williams Bon Chrétien	16		16						1.00
Swiss Bartlett	14		12	1	1				1.21
Bosc	13		9	4					1.31
Clairgeau	13	6	3		2	2			1.31
Bartlett virus free	15	1	9	4	1				1.33
Hardy	12		8	4					1.33
AC Harrow Crisp	29	3	18	4		4			1.45
Comice	15	4	5	2	3	1			1.47
Harrow Delight	27		6	11	4	6			2.37
Old Home	14		5	2	4	2	1		2.43
Harrow Sweet	26		5	8	8	5	5		2.50
Harvest Queen	29		9	4	6	5	5		2.76
Aurora	13	1	4	2	1	2		3	3.31
Magness	15		5		3	6	1		3.53
Seckel	13	3				7	3		3.31
Highland	15		2		3	8	2		3.53
AC Harrow Gold	30	1	4	2	3	7	12	1	3.70
Conference	16	2	2			2	9	1	3.81
Thornless Seckel	15					2	10	3	5.07

^z rating system: 0 = no visible damage; 1 = nibbling of bud area (max 1 cm²). No girdling of tree trunk; 2 = some nibbling of bark (patches <5 cm²), trunk up to 25% girdled; 3 = bark nibbled on trunk, patches up to 10 cm long, trunk up to 50% girdled; 4 = bark nibbled on trunk, patches up to 20 cm long, trunk up to 90% girdled; 5 = bark on trunk mostly gone, trunk >90% girdled; 6 = bare wood on trunk, 100% girdled.

^y rodent preference index (RPI)

$$RPI = \frac{(N_0 \cdot H_0) + (N_1 \cdot H_1) + (N_2 \cdot H_2) + (N_3 \cdot H_3) + (N_4 \cdot H_4) + (N_5 \cdot H_5) + (N_6 \cdot H_6)}{N_0 + N_1 + N_2 + N_3 + N_4 + N_5 + N_6}$$

where N₀ ... N₆ are the numbers of trees in each damage rating class from 0 to 6

and ‘Thornless Seckel’, and one each of ‘Conference’ and ‘AC Harrow Gold’) had severe damage, being completely girdled, with much of the bark on most of the lower trunk having been removed.

The rodent preference index (RPI) was developed as an attempt to classify cultivars according to observed feeding damage. Under this system, the most preferred cultivars were ‘Thornless Seckel’, ‘Conference’ and ‘AC Harrow Gold’, whilst the least preferred cultivars were ‘Moonglow’, ‘Giffard’ and ‘Butirra Precoce Morettini’ (Table 1).

Trees with >25% girdling close to the graft union did not survive in the nursery until the end of the 2005 growing season. The most severely damaged trees (class 5 and 6) did not leaf out, while less severely damaged trees (class 3 and 4) initiated growth but were unable to sustain that growth through the heat of the summer. Where the trunk close to the union was relatively undamaged by rodent feeding, a latent bud could develop into a replacement trunk. Trees with relatively minor (class 2) or minimal (class 1) damage made reasonable recovery, and were generally suitable for planting out into an orchard in spring 2006.

It is recognized that this report is based on data from a single event of a natural infestation by rodents. Although 12 to 30 trees per cultivar were evaluated, and tree bundles had been placed in the tree barn in a somewhat

random (rather than randomized) manner, there was insufficient replication and inadequate randomization for statistical analysis of the data. It is hoped that there will not be a replication in time.

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