



Orchard Replant Problems

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A very faint, blurry background image of a person standing in a field of tall grass or crops. The person appears to be wearing a hat and a light-colored shirt. The background is a soft, out-of-focus yellowish-green.

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Orchard Replant Problems

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Land on which fruit trees have produced profitable yields will frequently not support adequate growth when replanted. Fortunately replant problems can be controlled with considerable success even though their causes are not completely understood. Control measures are expensive, but essential for long-term orchard investments. This publication explains the concept of orchard replant problems, and presents a detailed procedure for their control.

Replant problems can be persistent and specific. They can persist for at least 5 years in the absence of their host. Usually they occur only when the same or closely related species are replanted. Peaches, apples, and cherries are most severely affected; while plums, pears, and quince are affected to a lesser extent. Peaches are more likely to be affected if they are replanted following peaches than following apples or plums, whereas apricots and sour cherries often grow normally after peaches. Apples are more likely to grow well after cherries than after apples.

SYMPTOMS

Poor growth of replanted trees is the most striking symptom. The above-ground portions of affected plants are small and have short internodes and small leaves. Root systems are small and discolored and have few fine roots. Growth retardation is most severe during the first year after planting. If the trees survive the first year they usually improve with time, but are not likely to be as large or productive as healthy trees.

CAUSES

The cause of orchard replant problems is considered to be a disease complex. Many of the complicating factors in this complex have been studied in detail. Soil structure, fertility, acidity, toxins, fungi, bacteria, nematodes, and weeds play important roles in the retardation of growth, and any of these may cause a specific replant problem. Generally, however, replant problems are caused by a combination of several of these factors.

Plant parasitic nematodes are of particular concern to orchardists. Some species live and feed in the roots of orchard trees, while other species live in orchard soil and feed only on the surface of the roots. Both types migrate through the soil from root to root. They can be moved longer distances on cultivation equipment, in rootstocks, or in irrigation water. Root-lesion, dagger, ring, and pin nematodes are often found in orchards that have replant problems.

CONTROL

Remove all old trees from the orchard site so that potential problems can be solved before replanting. Carefully remove as many of the old roots as possible. After old trees have been removed it is advisable to wait at least 18 months for the biotic factors to reduce to a tolerable level and for the soil condition to be suitable for replanting. Make complete analyses of soil acidity, fertility, structure, and nematode populations. Plant a cover crop to condition the soil, and allow time for old roots to decompose and for populations of microorganisms involved in the disease complex to reduce.

Preplant soil fumigation is an important aspect of the control of replant problems. Steam treatments and the use of chloropicrin have frequently given the best results, as shown by plant growth responses. DD, Telone, Vidden D, and Vorlex are acceptable alternatives, and are cheaper and safer to use. Follow closely all directions on the fumigant label. Sometimes, methyl isothiocyanate and fumigants containing bromine have given erratic and disappointing results compared with DD or Telone. The reasons for success or failure of various soil fumigants are not known.

Postplant soil fumigation may be helpful in the control of some replant problems. If growth retardation occurs several years after planting, and if soil and root examinations show that nematodes are a cause of the problem, soil fumigation with Nemagon or Fumazone may be beneficial. However, before an entire established orchard is fumigated, it is best to try the treatment in a small area.

PROCEDURE FOR CONTROL OF ORCHARD REPLANT PROBLEMS

First Summer

Before removing an old orchard, determine the severity of the potential replant problem as follows:

Examine the general top vigor and root condition of the trees.

Examine the soil structure for problems such as faulty drainage and hardpans.

Make a complete chemical analysis of the soil to serve as a basis for adjusting soil pH and fertility (refer to your Fruit Extension Specialist for procedure). Send samples to the Department of Soil Science, University of Guelph, Guelph, Ontario.

Examine the soil and roots of old trees for plant-parasitic nematodes (refer to your Fruit Extension Specialist for procedures). Send samples to the Nematode Diagnostic and Advisory Service, Canada Department of Agriculture, Research Station, Vineland, Ontario.

First Fall

In the late summer or early fall remove all the trees and as many roots as possible.

Next Spring

Plow and remove as many of the remaining roots as possible. Apply lime as needed and work it well into the soil. If required, add fertilizer, and plant a cover crop. Sudan grass is the best cover crop for controlling orchard replant problems.

Second Fall

In early September, plow the soil and remove any roots that remain.

In late September, cultivate the soil and work it into seedbed condition.

When soil is moist but not wet and is above 50° F, apply DD, Telone, Vidden D, or Vorlex as a preplant soil fumigant. Immediately after the chemical is applied, seal the soil by compressing the top layer with a cultipacker.

Second Spring

Cultivate the soil thoroughly to release the fumigant.

Plant with certified trees produced in fumigated nursery soils.

Plant a cover crop between the rows.

Cultivate in the rows to prevent competition for soil moisture and nutrients during the first year.

Third Spring

To suppress growth of weeds in the row, apply a recommended herbicide. Weeds compete with trees for water and nutrients. They can also be alternate hosts for organisms involved in replant problems.

CAUTION

Soil fumigants are dangerous, and prolonged breathing of vapors is harmful. Wash contaminated skin immediately with soap and water and remove contaminated clothes or shoes. If a fumigant contacts your eye, flush it out with water and call a doctor immediately. Store soil fumigants in plainly labeled, closed containers and keep them out of reach of children and animals. Keep storage areas dry, well ventilated, and locked.

**TRADE NAMES, CHEMICAL NAMES, AND MANUFACTURERS OF
PESTICIDES REFERRED TO IN THIS PUBLICATION**

<i>Trade name</i>	<i>Chemical name</i>	<i>Manufacturer</i>
DD	1,3-dichloropropene, 1,2-dichloropropane, and other related chlorinated C ₃ hydrocarbons	Shell Canada Limited, Toronto, Ontario
Fumazone	1,2-dibromo-3-chloropropane and other halogenated C ₃ hydrocarbons	Dow Chemicals of Canada Limited, Sarnia, Ontario
Nemagon	1,2-dibromo-3-chloropropane and other halogenated C ₃ hydrocarbons	Shell Canada Limited, Toronto, Ontario; British American Chemical Company, Vancouver, British Columbia; Pfizer Company Limited, Sarnia, Ontario; and Stauffer Chemical Company of Canada Limited, Vancouver, British Columbia
Telone	1,3-dichloropropene and other related chlorinated C ₃ hydrocarbons	Dow Chemicals of Canada Limited, Sarnia, Ontario
Vidden D	1,3-dichloropropene, 1,2-dichloropropane, and other related chlorinated C ₃ hydrocarbons	Dow Chemicals of Canada Limited, Sarnia, Ontario
Vorlex	Methyl isothiocyanate and chlorinated C ₃ hydrocarbons including dichloropropanes, and related chlorinated hydrocarbons	Morton Chemical of Canada Limited, Winnipeg, Manitoba

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