Objectives: This project conducts research in propagation of pear, to: 1) help the flow of clonal rootstocks, from research programs towards commercial propagation, and 2) improve propagation of these clones.

Significant Findings:
1) East Malling series. Liners of clonal rootstocks 517-9 and 708-13 were sent to Hood River in spring, 2002. Multiplication of these clones is continuing.
2) Horner series.
   ● Softwood cuttings from 294 clones in the Horner collection at Hood River were propagated at Corvallis in July, 2001. Two or more liners of each were sent to Fowler Nursery in February, 2002 for grafting and return to Hood River for testing.
   ● The remainder of the Horner series, 148 clones, were propagated in July, 2002. Liners of about 130 will be sent to Fowler in February, 2003.
3) Russian clones. In February, 2002, we received budwood from three clonal rootstocks, Q29857, Q29858, Q29859, from Russia. These were initiated into tissue culture. Q29859 has multiplied very quickly, whereas the others are progressing slowly.

Methods:
Softwood cuttings. Horner series. Cuttings were collected from the original seedlings growing at Hood River. These trees were pruned hard to induce vigorous shoot growth. All available cuttings from each stock plant were collected on July 2. Cuttings were prepared by removing the expanding shoot tips and then making 10” cuttings, except for dwarf clones for which 6” cuttings were made. The cutting bases were dipped for 5 sec in 100 mM IBA dissolved in 0.25 M KOH and planted in medium (perlite:peat, 3:1) in bands 2 ¼” squares by 5” deep at 22°C. The mist conditions were: 0700-0900 hours, 24 min interval, 0900 to 1000, 16 min interval, 1000 to 1700, 8 min interval, 1700 to 1900, 16 min interval and 1900 to 2000, 24 min interval. All mist applications were 10 sec duration.
   During the last week of August, rooting was evaluated by tugging firmly on each cutting. The rooted cuttings were consolidated and moved directly outdoors to a shade structure.
Micropropagation. Budwood of Q29857, Q29858 and Q29859 was sent from Beltsville, Maryland in February and budded on seedling pear rootstocks in the greenhouse. Vigorous shoot tips were collected in late-April for tissue culture.

The shoots were established in sterile culture by surface sterilizing actively growing shoots in 10% bleach solution and planting the shoots in individual tubes containing DKW medium consisting of 0.8% agar, 3% sucrose plus DKW salts and vitamins. Shoots which were sterile and still actively growing were transferred to a multiplication medium consisting of DKW medium plus 1 ppm benzylaminopurine (BAP). Every 4-6 weeks, shoot clumps were divided into single shoots and re-cultured on multiplication medium.

When liquid medium is used in double-phase culture, enough liquid is added, about 25 ml, to nearly cover shoots that had just been divided and transferred (Figure 1).

When a sufficient number of shoots are available, the surplus is treated with indolebutyric acid (IBA) to stimulate rooting. Rooted shoots are transplanted into clean potting medium, grown under intermittent mist for two weeks and then transferred to the greenhouse. In the greenhouse, the shoots are grown to liner size and transferred to other research programs.

For transfer to commercial micropropagators, shoot cultures are sealed in sterile, plastic pouches containing a small amount of DKW solid medium and mailed to the nursery.

Results and Discussion:

1) Horner series. Gene Mielke is interested in testing production characteristics of this group of over 400 open-pollinated ‘Old Home x Farmingdale’ seedlings. Further testing was warranted when preliminary studies found some promising rootstocks.

In this situation, tissue culture of 400 clones is inappropriate. Because these are seedlings, however, and have been maintained as small, heavily-pruned trees, rooting potential of softwood cuttings of each clone should be near its maximum. Furthermore, since only 2-5 liners of each clone were required for the rootstock trial, low rooting percentage is not a serious obstacle.

In 2001, the two liner minimum was met by 294 of the 304 clones we sampled. In February, 2002, these liners were shipped to Fowler Nursery, Newcastle, CA. They grew very well and were summer budded. John Ireland of Fowler Nursery remarked on how much variation there was among the clones. Two comparisons are pictured in Figure 2. Additional photos will be shown at the research review. The scions will develop this summer, 2003 and the trees shipped to Hood River for planting in 2004.
In 2002, 133 out of 148 clones met the two liner minimum. In late August, the rooted cuttings were moved outdoors to a shade structure and entered dormancy. In January, 2003, 2-5 of each clone will be shipped to Fowler Nursery for growing on and grafting as the previous set were.

2) **East Malling series.** Two years ago, two additional clones, 708-13 and 517-9 were identified from the HRI rootstock breeding program. (Earlier, 708-2, 708-12 and 708-36 were propagated here and are presently being tested.) These were sent to NRSP-5, Bill Howell released them to OSU and we initiated them into tissue culture spring, 2000.

   These clones multiply moderately well, though they are somewhat difficult to root. Liners were sent to Hood River spring, 2002 for testing.

   Preliminary experiments with a chemical called azacytidine (AC) show promise for improved rooting. We will continue to test AC on these difficult-to-root clones.

3) **Russian rootstocks.** Several years ago, three clonal pear rootstocks were imported from Russia by Californians Larry Rogers and Jim LaRue. They are purportedly dwarfing. APHIS was willing to make these available for preliminary propagation. With the assistance of Gene Milbrath of Oregon Department of Agriculture to obtain the necessary paperwork, APHIS sent me budwood in February, 2002. We budded it on seedlings in the greenhouse and initiated cultures in late April, 2002.

   Q29857 and Q29858 are multiplying slowly, but are healthy and clean. Q29859 has multiplied very quickly and we are ready to begin rooting. Liners of this clone would be ready to send to Hood River by fall, 2003. **However, release depends on certification by APHIS.**

Figure 2. Variation in Horner liners. A. Left, Compact H-237, right H-324. B. Left, compact H-87, right, H-234
**Budget:**

**Project Title:** Introduction and propagation of pear rootstocks  
**PI:** Dr. William M. Proebsting  
**Project Duration:** 2000-2003  
**Project total:** $77,702  

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\(^1\) Luigi Meneghelli, Research Assistant  
\(^2\) Undergraduates maintain most of the cultures and field plots  
\(^3\) Tissue culture and greenhouse supplies  
\(^4\) Travel to plots at the Lewis-Brown Farm