Project Review

TITLE: Pear Rootstock and Regulated Deficit Irrigation Plot

PERSONNEL:

Principal Investigator:	Peter G. Sanderson, WSTFRC, Wenatchee, WA
Cooperator:	Randy Smith, Cashmere, WA
Oversight Committee:	Robert Gix, Blue Star Growers, Inc. Raymond Schmitten, Orchardist/Cashmere Fruit Exchange, Cashmere, WA Timothy Smith, WSU Cooperative Extension, Wenatchee, WA Fred Valentine, Dole-Wells and Wade, East Wenatchee, WA

BACKGROUND

This plot was first conceived by George Ing and Fred Valentine in 1993 or earlier as a rootstock plot for the pear industry of Washington. At the time I was hired by the WTFRC, no effective pear horticultural work was in progress in Washington. This plot was to be a first step in revitalizing a pear horticultural research program in the state. From the start, the plot was controversial with strongly voiced support from representatives on the northern growing districts and ambivalent and sometimes strongly negative criticism from the southern growing districts.

When I was assigned the project, I wanted to add a new twist to a rootstock plot since the rootstocks had been grown at other sites previously. The WTFRC sponsored a tour of research in California in 1993 and we visited Dr. Steve Southwick's cherry trials in which he was looking at the Spanish Bush system of tree training. In this system, a regulated irrigation deficit was an integral step for restricting tree size. The pear planting at George Ing's farm in Hood River also had dramatic evidence of the effects of drought on tree size. I researched the literature and proposed the plot as it now stands.

In 1995, George Ing made arrangements with Randy Smith for use of the site. The site was chosen because it was felt that it was representative of the pear growing areas of North Central Washington. George Ing also selected the rootstocks that were to be included in the plot and ordered them for delivery in 1996.

PURPOSE

- determine if RDI can be used to regulate tree size through reduced vigor, and
- enhance precocity in promising OH x F clones with Bartlett, Anjou and Bosc tops.

Other benefits of the plot include:

- a demonstration plot under typical Washington growing conditions of OH x F rootstocks that are not scion rooted,
- the development of a better understanding of pear water use for refining crop coefficients for irrigation scheduling, and
- the set up for studying the response of pear trees to water stress (e.g., postharvest disorders such as cork and alfalfa greening).

PROGRESS:

1996

- Plot laid out
  - Trees planted
  - Irrigation system installed

1997

- Sand filters installed to over come problems with clogging of the micro-sprinklers.
- Excellent tree growth
- Cr10 dataloggers & sensors installed
  - Blocks 1 & 3 - soil moisture and temperature monitoring
  - Block 2 - monitoring & irrigation control
    - Soil moisture and temperature
    - Atmometers
    - Air temp., RH, wind speed, rain

1998

- Tree training (bending, tying and summer water sprout removal)
- Installed and tested datalogger based irrigation control system
- Monitored tree performance
  - Stem water potential
  - Transpiration rates (stomatal conductance)
  - Assessed yield performance of Bartlett and Bosc trees
- Monitored soil water dynamics (i.e., rate of soil moisture depletion and irrigation refilling)

1999

- Monitored soil moisture depletion during spring
- Applied early season water deficit to promote fruiting (2000 season) and control tree size & vigor
- Evaluated performance of selected OH x F rootstocks
  - Shoot growth
  - Secondary bloom
- Monitored stem water potential and transpiration rates as indicators of water stress
  - Water use by pear trees

RESOURCES

In 1999, Marilyn Noll was assigned the task of overseeing collection of data from the plot. She worked exclusively with this project from May to October. In addition, Matthew smith assisted her to collect stem water potential and transpiration data as well as assisting Randy Smith's crews in tree training. Two other time slip workers spent about 7 days each in the orchard. I spent about 4-5 weeks of my time on the plot. I estimate this was at a total cost of about $26,750. This is the barest minimum to collect the data we now have.

The following courses of action could be taken with this plot. All costs can be expected to rise somewhat at crops increase and the labor to assess them will rise proportionately.
Minimum course. The minimum amount of resources that we could put into this plot and get anything out of it would be to only measure yield and let Randy handle all aspects of irrigation (i.e., do away with the water stress aspect of the plot). This would take about 10 man days and cost about $1,000.

Medium course. Continue with the current course, basically using relatively unspecialized labor to collect data. Costs will remain about the same ($27,000).

Maximum course. This plot is laid out to be amenable to different experiments. It was designed for irrigation control. There are many aspects of water use that could be worked studied in this plot, especially stress effects on fruit production and quality. The overall goal of this course of action would be to develop "best management practices" for water use in pears. Ideally, this would require the hiring of a person to oversee the plot who would have a strong background in plant physiology and conducting field experiments. This person would require the use of a field assistant during the growing season and help with a crew at harvest. Estimated costs of this course of action would be about $35,000.