Situation: Several people mentioned that customer intolerance for any insects on the plants they purchase make it very difficult for nursery people to implement IPM programs.

Question: Does anyone have good information on IPM of mealybugs and aphids?

Response: Participants described success using IGRs (insect growth regulators) in the winter, at least once a month for aphid and thrips control, and using repellents, especially neem. Again, scouting was brought up due to the propensity of these insects to increase rapidly.

LEAFROLLERS

Question: Are there any good books on identification of leafrollers?

Response: Suggestions to check Idaho Master Gardener information. Check entomology information on the web. Don't be afraid to go internationally. There is a great French website for identification.

FIRE ANTS

Question: Do native ants kill fire ants?

Response: There was limited experience in the room regarding IPM and control of fire ants. It was mentioned that the exotic fire ant did seem to successfully displace the native fire ants.

Discussion Group: Seeds and Seedlings

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During the two discussion groups on seeds and seedlings a diverse range of topics were discussed. The major topics discussed are presented below.

1) How to Control Liverwort, Moss, and Algae in Containers.

The majority of the discussion referred specifically to liverwort. A wide range of methods were suggested, including several cultural approaches, such as applying a thin layer (¼ inch) of pumice or chicken grit (#2 or #8 size) on the surface of the medium, managing irrigation frequency, and copper-infused weed discs. However, the majority of control approaches mentioned were chemical. Chemical methods included 50% vinegar solution applied on a sunny day, liquid iron sulfate (caution: can be phytotoxic, especially with *Erica vagans* 'Mrs. D.F. Maxwell') or granular iron, Zerotol (preventive), Moss Out, Dawn Ultra dishwashing detergent at 1 oz per 32 oz of water when applied on a sunny day and not washed off, constant injection of 3 ppm of copper chelate into the irrigation system inhibits growth, and

Cinnamite works well in the summer (e.g., June, July, and August) when applied at a rate of 1.5 to 2.0 oz gal^{-1} but it has a short shelf life once opened. Of all the products discussed, Mogeton was most frequently mentioned as the best eradicant. It provides about 3 weeks of control. Mogeton is a Japanese product that has been used for many years in Europe. It is not registered in North America, but the company is currently evaluating the returns associated with registering the product in North America.

2) **Seed Germination.**

Stratification Requirements. The location where the seed is collected can give an indication of the stratification treatment required. In general, seed collected at high elevations require a cold stratification treatment, whereas seed from low elevation sites and subtropical areas require warm stratification.

Leaching seeds to remove water soluble germination inhibitors can be performed by placing the seeds in a nylon stocking and hanging it in the toilet tank. This way the seeds are flushed with fresh water every time the toilet is flushed. Seeds are left in the tank for 2 weeks. Seed leaching is used for seed of *Prunus* spp., *Mahonia aquifolium, Elaeagnus* spp., and *Magnolia* spp. to improve the uniformity of seed germination.

***Nandina* spp.** It can take at least 2 years to get a crop to germinate. Cold treatments do not work. Seed quality and maturity is a major reason for growers' poor results.

Romneya coulteri. The biggest problem is poor seed viability. Test viability before treating seeds to encourage germination.

***Eucalyptus* spp.** Seeds are large and have a short life. They are best stored at low temperatures and low RH. They require a cold stratification pretreatment to promote germination.

Mahonia aquifolium. Collect the seed in August when they are purple in color. Clean the seed by mashing in buckets of water, then dry and plant in September. Another way to clean the seed is with a food processor. Use the dough blade or cover the sharp blades with rubber tubing. The pulp and dead seeds will float and therefore can be removed by applying a slow trickle of water to the container. There is an oily film on the seeds that can cause healthy seeds to float, and thereby can be lost when the water is decanted. The cleaned seeds are planted in September.

Legume Seeds. It is important to collect seed from plants in the legume family before they develop a hard seed coat and plant the seed immediately without allowing them to dry. For some seeds with a hard seed coat, such as *Robinia pseudoacacia* and *Cercis* spp., it is best to put the seed in hot water in an insulated container until they expand. Another option is to scarify the seed in sulfuric acid.

3) Seed Storage. Store seed in a humidity and temperature controlled room (e.g., 21°C and 25% RH), which will cause the seed to dry down to 4.5% moisture. Seed can also be dried and stored in silica gel, but they must be sealed in a polyethylene bag to prevent moisture uptake from the air. A grower in southern California stores seed in a house constructed of straw bales that is sealed with plaster and that has no climate control. The structure just moderates the daily temperature fluctuations.

Excessive moisture in this type of facility can lead to seed rot. A final system mentioned was sealing dried seeds in a polyethylene bag and freezing at -3 to -4°C.

4) Mycorrhizal Inoculants. Inoculating seed trays with mycorrhizae can increase the germination and growth of cuttings of native plants. Mycorrhizae show some specificity to the type of plant they will infect. Mycorrhizae can be on seed collected in the wild (e.g., oaks) and thereby naturally inoculate the growing media during the germination period. There is no benefit from using mycorrhizae inoculants on transplants that are going into soil with good biological activity (i.e., not sterilized with methyl bromide). After treatment with methyl bromide, it can be beneficial to treat soil with mycorrhizae. For *Betula papyrifera*, mixing humus collected from underneath a stand of trees into the potting media increased plant growth by 30%. The loss of beneficial microbes from fumigated soils was suggested to be the cause of severe replant losses in some crops. This can be overcome by adding nontreated soil to the site to re-establish the population of soil microbes. Typically, disease-causing organisms are first to re-colonize soil after being fumigated.

5) Mice Control. What control options, other than poison baits, are available to deal with mice problems in the greenhouse? One option is to make the habitat around the greenhouse less attractive to mice. Mice do not like crossing areas where they are exposed, therefore frequent cultivation or mowing and the application of a groundcover apron around the greenhouse can retard mice from entering the structure. Cats and/or live traps were also suggested, although it was noted that small mice can get out of some live traps.

Discussion Group: Budding and Grafting Made Better

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The following is a summary of the questions, answers, and general commentary from the two "Budding and Grafting Made Better" discussion sessions at the I.P.P.S. Western Region meeting on 14 Oct. 1999.

A walnut grower from California reported that the cold spring weather adversely affected their field-grafted walnuts so that graft survival could not be determined until May. This was unacceptable and he asked if anyone in the group had tried using a pipe to provide heat to the graft union in a field setting so that the rootstock could remain in the ground. No one in the group had knowledge of this being done in the field.

Mr. Frank Byles, a grower of Japanese and related maples in Olympia, Washington, described a pipe and shelf system that he developed for hot callusing the graft unions of containerized *Acer palmatum*. Mr. Byles reported observing more than eight hot-callus operations before designing his system. None of the systems he studied were alike, they varied by factors like: (1) provision of heat by different configurations of electrical heating cables or hot water systems; (2) type and size of pipe used; and (3) space utilization of ground and or shelf systems. He found that every hot-pipe-callus system was different and that the designs were