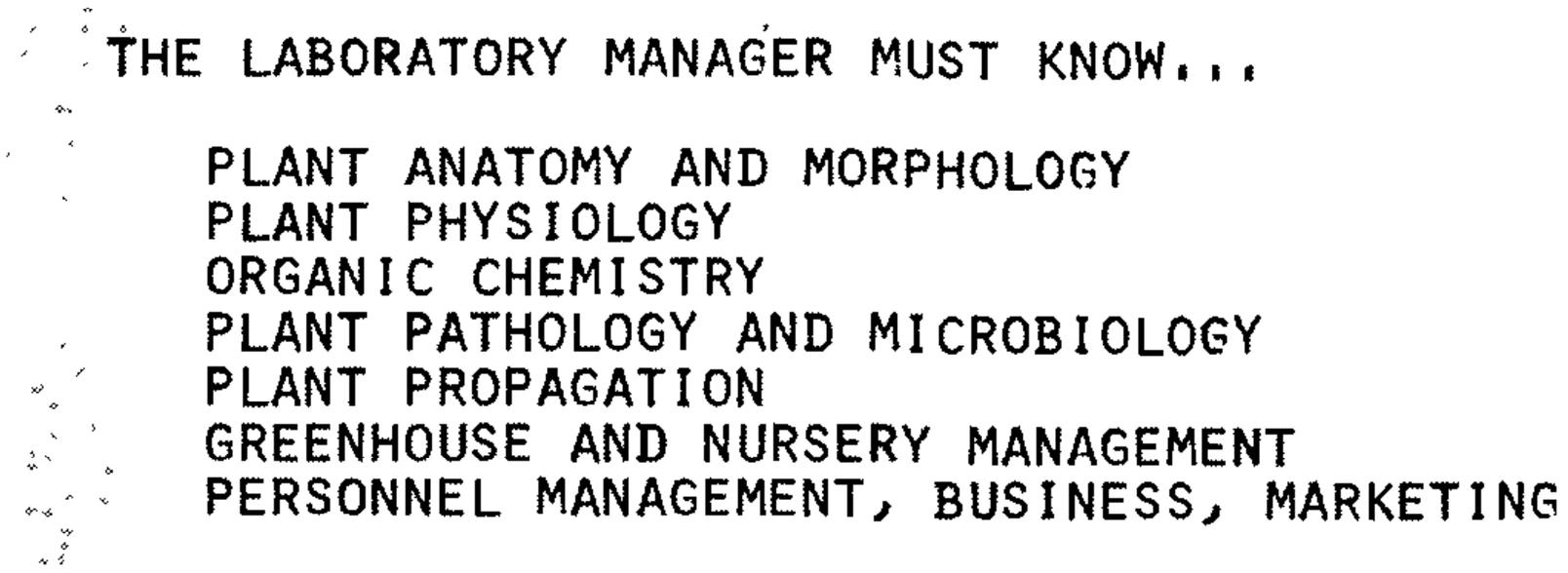

Figure 5. The manager of a tissue culture laboratory must have sound fundamental training in the physical, chemical, and plant sciences

the different levels has led to the following summaries The plant propagation student, after only an abbreviated introduction to tissue culture technology, has grasped the concept of mass propagation but cannot effectively function in the commercial laboratory without on-the-job training. This evaluation may come as no surprise to the members of the industry since they tend to view most college graduates as deficient in practical knowledge of all phases of plant propagation. The commercial tissue culture laboratory must seek a person with advanced training in tissue culture for supervisory and management positions. These individuals may be weak in the areas of business and management, but should have an excellent grasp of the basics of tissue culture technology.

As a final summary, some reiteration should be made of a concept mentioned in introducing this essay. A communication gap between industry and academia resulted in delays in the commercial implementation of tissue culture technology. Unless more efficient communication between the groups in fostered, this gap will also be reflected in the teaching programs in tissue culture and plant propagation.

SEED PROPAGATION LABORATORIES AT PENN STATE UNIVERSITY

CHIKO HARAMAKI AND DAVID BEATTIE
Department of Horticulture, Pennsylvania State University
University Park, Pennsylvania 16802

At The Pennsylvania State University there are three plant propagation courses, each at a different level. The first one is for our two year diploma students and it emphasizes the practical

with some theory. The course for the four year baccalaureate students stresses the principles as well as the practices. the graduate level course is primarily theoretical in which reports are give on specific topics and is followed by discussion.

Students who take these courses are primarily horticulture students but others come from agricultural education, forestry, plant pathology, agronomy, and other plant sciences as well as students who are just interested in the propagation of plants.

The main objectives of the baccalaureate course are to develop an understanding of the basic principles of plant propagation, to develop the ability to propagate plants, to develop the ability to evaluate experiemental results and to determine and apply these techniques. Another important aspect is to encourage their communications skills by requiring extensive reporting of experimental results and to require a formal term report.

Before each laboratory an outline which lists the title, purpose, materials, methods and references is given to the students which explains what they are going to do, how to do it, and what is expected to occur. The students turn in written laboratory reports after completing the exercises. We feel that this is an important aspect of their education. They learn how to make observations and then discuss why they got the results they did, even if in some cases the results may be contrary to what was expected. The students are expected to use the trade and scientific journals, monographs and books to back up their discussion and conclusion. Since most students do not write enough, another important aspect of the laboratory reports is that they learn how to write a logical and concise report.

One of the seed exercises involves the effects of light and chemicals on the internal dormancy of selected seeds. Chemical treatments include GA_3 - 100 ppm, thiourea - 1,000 ppm, KNO_3 - 10,000 ppm, and a control. One replication is placed under 16 hours of light per day and a duplicate set under 24 hours of darkness. The students observe that some seeds germinate under certain chemical and light conditions while others do not. The effects of treatments on subsequent seedling growth after germination are also observed.

Another exercise involves germinating hard coated seeds such as honey-locust, Kentucky coffetree and redbud. The various treatments include placing the seeds in concentrated sulfuric acid for 15, 30, 45, 60 and 90 minutes as well as having a control sample. The instructor sets up parallel experiment in which the seeds are treated with concentrated sulfuric acid for 2, 3, 4, 5, 6, 7 and 8 hours. The students observe the germination rate and percentages as well as the effect of inhibiting seedcoat remnants and any damage which may occur to the embryos.

A comparison of several standard seed viability tests such as rolled paper towel, blotter and soil tests are made to determine the ease and reliability of these tests. These are compared with chemical tests using the same seeds. Seeds are soaked in 0.004% malachite green and the live tissue turns the green stain into colorless leucomalachite while the dead tissues remains green. Other seeds when placed in a colorless 0.25% solution of 2,3,5-triphenyltetrazolium chloride soon turn red in the viable, respiring areas. The chemical is reduced to an insoluble red dye called triphenyl formazan. In dead tissues there is no color change.

Seeding laboratories also occur in other horticultural courses such as nursery production and management where the students determine the seed storage and after-ripening requirments, prepare the seed bed, fumigate the soil, sow and later transplanting the seedlings. In the plant breeding courses students make their own crosses, determine the germination requirements for these seeds and grow these seedlings. In floriculture production courses students may select a seed-grown crop for their project, find out the germination requirements as well as the culture, and then grow the crop.

What we are trying to do in our seed laboratories is to teach the students the principles of seed germination and familiarize them with the various sources of information so that they can prepare schedules for pretreatments and sowing in order to get the required number of normal seedlings when they are needed.

Friday Morning, December 12, 1980

Dr. Leonard R. Stoltz served as moderator of the morning session.

GRAFTING — HOW, WHY, WHEN

GERALD VERKADE

R-13 Lower Boulevard
New London, Connecticut 06320

Today, I would like to talk about "out of the ordinary" grafting techniques. The first technique, grafting a scion onto a root piece, can be used with a plant when you do not have a suitable understock and the plant is difficult to root. We have used this technique with *Sciadopitys verticillata*. Long root pieces are cut into sections and the scion is grafted to a root piece utilizing a side veneer graft. The grafting operation is conducted