

prepared handouts covering the lecture and/or laboratory can help alleviate the problem. The detail of the handouts should be adequate to cover the subject, yet allow the student to concentrate on the subject matter being presented (2,3,5). A second disadvantage is the time needed to plan, prepare, and set up each presentation (1,2,3,5). Artwork, slides, and diagrams need to be planned for each individual presentation. Once the artwork is made and arranged into a sequence, the program can be used over again and the time involved is only that which is required to maintain or add to the presentation.

Generally speaking multi-media methods have been well received by viewers. They are systems that organize and present material more effectively. They provide a means by which the instructor can concentrate on the presentation of material rather than take precious time to draw or illustrate on the blackboard. While it is exhausting; it is fun to do. It is certainly an exciting and challenging method of instruction.

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TEACHING PLANT PROPAGATION BY VIDEO TAPE

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For 1 year now we have had portable color video-tape capability in our teaching program at Purdue. Television has been used in horticulture, food science and landscape architecture courses and has been very well received by the students.

A major problem in the laboratory and field with large groups is that many often cannot satisfactorily observe demonstrations. We have found that with close-up television everyone can see equally well and, in addition, individuals have the op-

portunity to go back and review the technique at the audio visual center. Those who may have missed a laboratory can see the demonstration by simply replaying the tape. With today's classes of upwards of 200 students, field trips are virtually impossible. The best we can do is bring commercial operations to the students on tape. The disadvantage is that students cannot see as much as they would on an actual field trip. They also do not have the opportunity to ask questions. It is up to the instructor, therefore, to ask questions that will bring out information of interest to the students. Closely related to field trips are interviews and discussions with people of interest thereby presenting the student with additional opinions and viewpoints. It is easier and more interesting to interview people in their own environment, and a permanent record is maintained for future use. Perhaps the most important use of television is to present vitally important techniques that cannot be introduced during the course. For example, plant propagation at Purdue is offered in the spring semester which is actually completed before the start of the growing season. We introduce softwood cuttings of deciduous trees and shrubs via television.

The cost is relatively high (Table 1). However, there are often monies available for improvement of teaching programs. A share of the cost of our equipment came from a competitive grant program within Purdue designed specifically for the purpose of teaching improvement. In addition there are often private monies available within States to improve teaching, especially if it will result in greater student exposure to commercial operations and the private horticulture sector. As an alternative, most university telecommunications or audio visual departments have, or will shortly have, portable color taping equipment for use by other departments, often at no cost and with accompanying technical assistance.

Table 1. Representative costs of required equipment and accessories for color video taping capabilities.

Unit	Cost (\$)
Camera (Sony)	\$ 4,600
Recorder (Sony)	2,300
Monitor (RCA 24 inch)	450
Lights	580
Tripod	225
Microphone/Headphones	150
Travel Cases	125
Porta-Cart	270
Total	\$ 8,700

MODERATOR MOSER: We have just heard from three members of the academic area and before we open this up to general discussion, I want to call on Pete Vermeulen for a few comments and observations that he has made from a grower's standpoint. When I was in New Jersey I often took my courses to Vermeulen's nursery because they always have so many interesting things going on there.

PETE VERMEULEN: We always appreciate having the field trips come in, but it does take time out of a busy schedule. Because it does take time we try to get the maximum out of field trips. We try to make all of our facilities and expertise available to the students. When you plan on taking students to a nursery I think it is helpful to apprise the students ahead of time as to the type of nursery they will be visiting. I'm sure this is done in a general way, but I think it ought to be more specific. I think it is also helpful if the instructor will pre-phase some questions and get some interest areas of the students which can then be passed on to the owner or person at the nursery who will be showing the students around. I also think it would be interesting and helpful to have comments made by the students in a follow-up discussion. We are being observed by a "new set of eyes" and such criticisms and comments can be used to help us improve our operation. From this we can also tell how much influence our input has had on the students learning ability and hopefully where we can improve this.

Now I would like to ask a question concerning the video equipment. I was fortunate in being able to steer some grant money to Cook College but it will be available over a 3 year period, can the purchase of this equipment be phased in over a 3 year period? We won't have the nearly \$9000 to spend all in 1 year which you have indicated is the cost of the setup at Purdue.

MODERATOR MOSER: The equipment we have will probably be nearly obsolete in about a year. I think the price will come down drastically in the near future and it will not cost nearly as much to get into the video field. I would also comment that if any of the industry groups are interested in having this type of equipment for use at their university and they would appropriate a sum of money and then approach the Dean of Resident Instruction for the Ag College and ask him if he would match their sum of money I would guess that in almost all instances he would do so. By doing this the industry groups can get much more for the money they appropriate.

PAUL BOSLEY: I'd like to tell you about a system that we have tried in Ohio that doesn't cost a lot of money. A nurseryman who specializes in some particular field is asked if he will

give a 15 or 30 minute talk at a specific time on a specific date indicating that he does not have to leave home to give the talk. Any slides or other visual materials needed for the talk are sent on ahead to the instructor at Ohio State University. At the specified time he places a long distance call and the classroom is set up with microphones to handle this. The visual materials can then be displayed in the classroom as the nurseryman talks on the phone. If it is considered desirable some time can be left at the end of the talk for questions and answers. I think the system works quite well because they come back each year for other talks.

TOM FRETZ: This system has been used in the plant materials courses at Ohio State University but as yet it has not been used in the plant propagation courses. The system has worked quite effectively and the only cost is that of the long distance phone call.

RON GIROUARD: I'm not sold on the idea of audio-visual material in the classroom. In the past 2 years I have not used a single 35mm slide in my lectures. I believe that an intelligent statement made by a knowledgeable person is preferred by my students. I think it is more important for the professor to learn to communicate effectively. I do use xerox and the students pay for the cost of the xeroxing. This can be taken home by the student for further study; he doesn't have to copy it into his notes while the lecture is being given. The audio systems we've been discussing become obsolete at a rapid rate, often not permitting interchange of pieces of equipment. This requires constantly buying new pieces of equipment. In addition, the professor finds himself spending considerable amounts of time taking pictures, editing audio-visual tapes, etc. Prepared tapes will also become obsolete both because of their content and because of bleaching of their colors. Although these remarks may seem somewhat pessimistic I am still convinced that the professor who can communicate effectively and takes time to talk to his students will never be replaced by a television set.

MODERATOR MOSER: Ron, I thank you for sticking up for the professor, but I think the other speakers would agree with me that these are unique innovations to bring a little something extra to the class. I think these speakers would also agree 100% with you that you don't replace the professor with a television set but rather that they are supplements to bring a new dimension to the course.

BRUCE BRIGGS: I would like to relate some concerns that I have, and have seen, concerning tissue culture labs on the west coast. One nurseryman set up a tissue culture lab and hired college students who had training in this area to do the work. Al-

though this is an exciting area, after a period of time the work becomes monotonous and the students became disenchanted with the work and eventually they left. This nurseryman went out and picked up some of his field hands who were not particularly qualified at tissue culture but he gave them a nice white gown, a nice clean place to work and several other things which they had not previously had and they were quite happy.

Another nurseryman who had no knowledge of tissue culture himself set up a lab and hired a student to run it. When the technician gets up and leaves the nurseryman has a real white elephant on his hands.

I throw these two observations out to you to make you aware of some of the problems which can develop in this new area. How would you as teachers foresee handling this situation without causing some of the problems I have mentioned?

HUDSON HARTMANN: There are a lot of tissue culture labs being set up in California. I think the problems are much like those of any other job and that is you have to fit the right person into the right job. It is necessary to teach tissue culture techniques in plant propagation or else the student would feel short-changed. Whether such students will fit into a tissue culture lab situation I am not prepared to say, but as Bruce has pointed out these problems will materialize.

GUS MEHLQUIST: I think it should be pointed out that although a student in a modern plant propagation course should know tissue culture techniques it does not mean that he will be the one to do the work every day. He should have enough knowledge to be able to train technicians and oversee their work. It is a complicated problem. We should not look to the universities to supply mere technicians but rather supervisors because if they do not get a salary commensurate with other fields they will go to the other fields. Most of the students who graduate from the University of Connecticut are in some form of agricultural sales because that is where the money is.

JIM ETHRIDGE: We have also found that it is the boredom of the job of tissue culture which causes most of the problems. We have found that the situation can be handled by alternating the students skills in other areas to break up the monotony.

VOICE: I think the students need courses in business. Most of the students I've encountered know nothing about business and that is the name of the game. I'd like to see them have some courses in business in place of courses such as poetry writing, etc.

PAT CARPENTER: In talking with some of my colleagues around the country I find there are more and more business

courses being put into the nursery curricula. At the University of Connecticut I have developed a horticultural commerce option in which we recommend about 2 dozen courses from the school of business administration. The business training is coming but perhaps it is a little slow in some areas.

MODERATOR MOSER: Is there any area of plant propagation that you commercial growers would say if you are going to emphasize an area it ought to be this one?

VOICE: They just can't do the work because they haven't used a knife enough. Every student I've ever seen that came out of a university doesn't know how to use a knife which is the basic tool of the plant propagator. They don't know how to sharpen it and they don't know what a good knife is.

VOICE: My students all buy knives but there just isn't enough time in one course for a student to make say 1,000 practices to become adept at making a particular graft.

CHIKO HARRMAKI: There seems to be considerable confusion as to the role of the university as opposed to that of a technical school or vocational school. At the university we are attempting to develop an educated man who is knowledgeable in many areas. The vocational type of school trains the individual in a narrow area and teaches him many of the mechanical skills which the university student can only get by going out on the job and doing them or by serving at least one summer internship at a nursery.

MODERATOR MOSER: One of the real take-home lessons of this session is that instructors in plant propagation and the nurserymen within each state need a better exchange of information. Both groups are working towards the same end, but I'm not sure how we can best get there. I think it is important that we continue to work together to try to reduce some of the problems which have been discussed here this evening.