

## Horticultural Distance Learning: The How, When and Why of Grafting<sup>®</sup>

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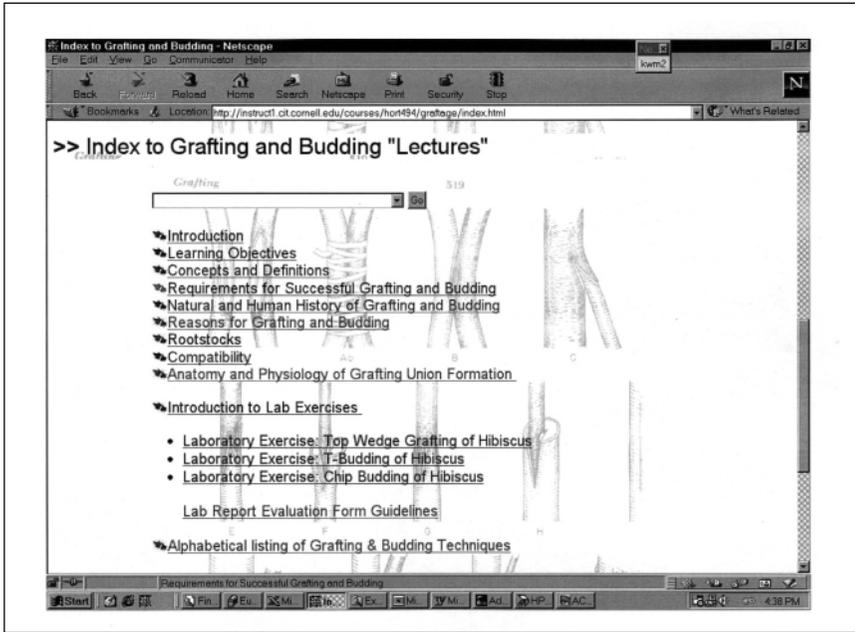
### **THE HOW, WHEN, AND WHY OF GRAFTING, A DISTANCE LEARNING APPROACH**

This is a Web/CD-based asynchronous distance learning course originally designed as a 2-credit course for residential students at Cornell University (<http://instruct1.cit.cornell.edu/courses/hort494/graftage/>). The course is currently being adapted for use as a noncredit distance learning module for nontraditional students, i.e., new horticulture industry employees, amateur gardeners, etc. The noncredit version of this course is being given for the first time during Fall 2000 to a group of amateur gardeners in cooperation with Cornell Cooperative Extension Educators in Chemung, Suffolk, and Washington counties.

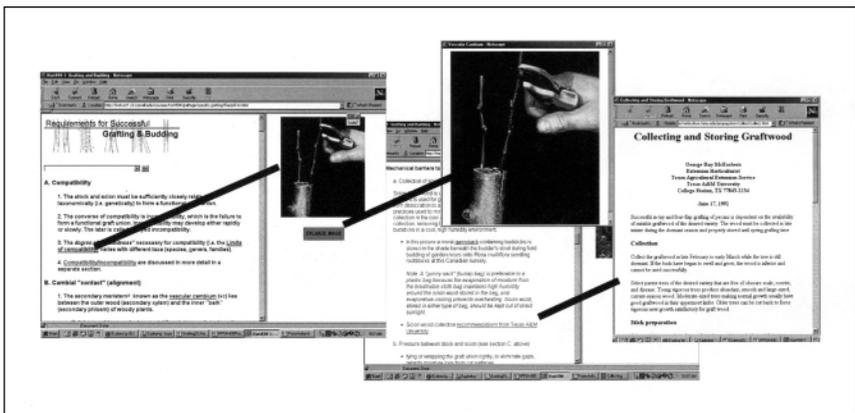
This grafting module is the first of several distance learning modules on plant propagation, that will also include modules on propagation by cuttage, seedage, and micropropagation. The goal of each of these modules, is not only to teach the principles, and the industry and gardening practices associated with propagating plants, but also to give students opportunities to learn hands-on horticultural skills associated with propagation.

The course is presented asynchronously, via the Web and a course CD which each student receives. An advantage of the asynchronous as contrasted to synchronous (traditional classroom or video conference) mode of delivery is that it allowed students to study at their own pace, when ever they chose, i.e., "any time/any place". In fact, due to inevitable scheduling conflicts associated with a traditional synchronous courses, some of the residential Cornell undergraduate students who took this course asynchronously for credit, as part of their regular academic curriculum, indicated that they would not have taken it otherwise because of scheduling conflicts. The course consists of three sections: lectures, laboratory exercises, and asynchronous discussion. Students are presented with learning objectives at the start of the course which included learning: (a) to perform several hands-on grafting techniques, (b) what grafting technique is appropriate for a given woody plants species and horticultural objective, (c) environmental and seasonal constraints, and (d) an understanding of the processes of graft union formation and the nature and limits of graft compatibility.

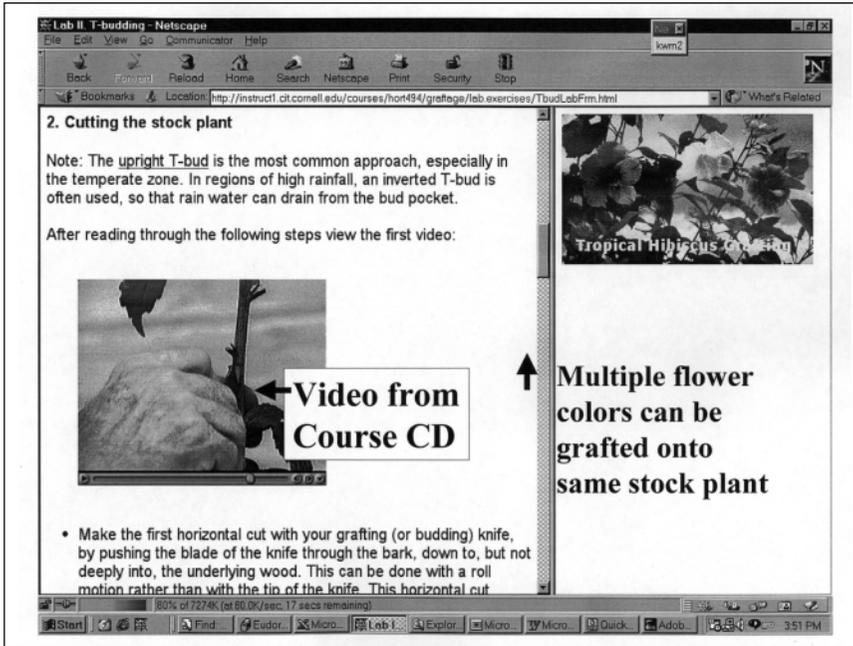
**Lectures.** The nine Web-based “lectures”, listed on the home page, are delivered asynchronously via the course Web site. Blue hyperlinks in the text link to images in the right frame, which may be enlarged for viewing or printing. Red links in the text are links to external web sites from other universities, horticultural businesses, and government web sites.



**Figure 1.** Index to grafting and budding “lectures”.



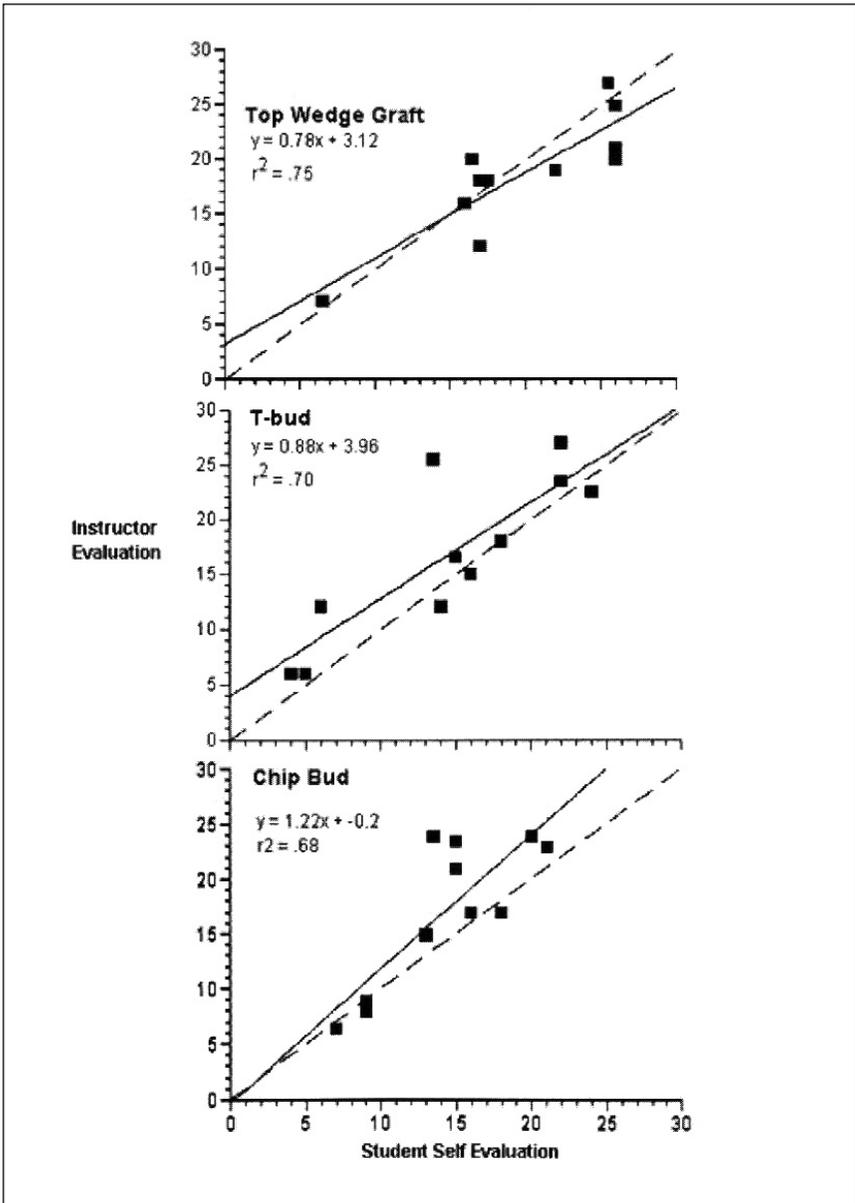
**Figure 2.** Requirements for successful budding and grafting.



**Figure 3.** T-bud cutting the stock plant.

**Laboratory Exercises.** Hands-on laboratory exercises are designed to teach three different grafting methods including top wedge grafting, T-budding, and chip budding. *Hibiscus* (*H. rosa-sinensis*) was selected for student grafting exercises because of its ease of grafting for students, and ease of growing by us for the students. Rootstocks and scion donor plants are easily rooted from cuttings in our greenhouse, grown in 6-inch pots to about 24 to 36 inches in height, for student use at any time of year. These are available for on-campus students to use, without direct supervision, in our greenhouse, or they can be mailed to students at a distance. Students prepare for the lab exercises by studying the web tutorial which includes not only text and still images, but also high resolution QuickTime videos of actual grafting. Video sequences, from the course CD, are integrated directly into the Web page. Based on instructor evaluation of student-grafted plants during the first and second offerings of the course, we concluded that students really did learn to graft successfully. Student self-evaluation (numerical rating), based on clearly defined criteria for success, was well correlated with instructor-evaluation of the same grafts (Mudge and Way, 1998). These results suggest that student self-evaluation is a reliable indicator of learning outcome at a distance, as long as students have been explicitly trained in the essential requirements for success.

**Discussion Board.** Students interact with the instructor and with other students via an email-like, asynchronous Discussion Board, which is part of a web-based course management utility known as CourseInfo™ (BlackBoard, Inc.). A high level of participation in the Discussion Board over a wide range of topics encourages students to think beyond the facts presented in the course. For example, one student "invented" his own modified budding knife.



**Figure 4.** Student self-evaluation and instructor evaluation.

**LITERATURE CITED**

**Mudge, K.W. and D.G. Way.** 1999. Web-based distance learning for university level instruction in horticulture with emphasis on psychomotor skill development. pp 327-332. In: Proceedings of the 15th annual Conference on Distance Teaching and Learning, August 4-6. Madison, Wisconsin.