Abstracts of the ASHS Western Region Annual Meeting

Corvallis, Ore. 22–25 June 1997

Characteristics of the California Persian Walnut Industry

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The Persian or English walnut (*Juglans regia*) is widely cultivated, with commercial production in France, Italy, Turkey, China, and the United States. Practically all of the U.S. production of Persian walnuts is in the central valley of California, which now has about 169,000 bearing acres with an average yield of around one and one-third short tons per acre. Many orchards produce over two tons, and three tons per acre are common in many modern plantings. Walnuts have two major outlets: the exported in-shell market (about 35% of production) and the domestic shelled market (about 68% of production). A cooperative handles about half the crop, while several independent handlers sell the remainder. Walnuts are sensitive to both low and high temperatures. Temperatures in excess of 90 °F will begin to sunburn nuts. Freezing temperatures will damage tender growth in the spring and fall. Dormant trees can tolerate 15 °F without injury if soils are moist. Dry winter soils and cold temperatures cause winter kill. A minimum of 800 hours of winter chilling are required to avoid delayed bud break and poor crops. Walnuts do best on deep, medium textured, well drained soil. Under these conditions, both rootstocks, the Northern California Black Walnut (*J. hindsii*) and Paradox (*J. regia* x *J. hindsii*), do well. Under less favorable soil conditions, Paradox is the preferred rootstock. A mature walnut orchard requires 4 to 4.5 acre-feet of water per acre per year if the trees are to produce the maximum number of high quality nuts possible. Hartley, preferred for its in-shell quality, is the leading cultivar, with about 30% of the acreage. In recent years, the Chandler variety has accounted for most new plantings. It is known for high kernel quality and yields. Yield factors include: bearing habit, bearing area, flower differentiation, fruit set, nut size, kernel percentage, and kernel quality. Major insect pests of walnut include codling moth, navel orangeworm, and walnut husk fly. The major diseases are walnut blight, deep bark canker, *Phytophthora*, and blackline. Major research efforts include the walnut breeding program, which includes blackline and *Phytophthora* susceptibility of new cultivars and rootstocks, codling moth and walnut husk fly control, epidemiology and control of walnut blight, pruning and planting strategies, and clonal propagation.

Fertilization and Harvest Technique Affect Yield of *Aloe barbadensis* Miller

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Aloe barbadensis (*Aloe vera*) plants remain in production fields for several years, with their lower leaves harvested periodically. A long-term experiment was initiated in November 1993 to determine the effects of fertilization and severeness of harvest on leaf yield. Plants were grown in large pots with or without monthly applications of a 20N–8.6P–16.6K soluble fertilizer from March to October. Beginning in June 1994, the lower leaves were harvested quarterly to have 18, 15, or 12 leaves remaining. Fertilization doubled the number of leaves harvested and tripled the total yield over a 2-year period. The lower leaves on the nonfertilized plants, particularly on plants with 18 leaves remaining, sometimes became dry or partially dry at harvest. The initial quarterly yield and cumulated yield were higher in plants with 12 leaves remaining; however, this trend disappeared over time. The fertilized plants produced an average of 10 kg per plant, while the nonfertilized plants produced only 3.2 kg per plant annually. At several harvests, plants with 18 leaves remaining had higher % dry mass in the inner semi-translucent tissue than those having 12 leaves. Leaves of nonfertilized plants had high % dry mass in the inner leaf tissue when harvested in June and September 1995. Plants with 12 leaves remaining can become unstable and the tops break off in gusty wind.

Characterization of the Pecan Industry in North America with Emphasis in the Southwest

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The pecan is native to North America and is cultured as a major crop in both the United States and Mexico. In the early part of this century, pecans were thought of as a secondary crop grown in the southern geographic section of the United States. Increased demand for use as a nutritious food has resulted in expansion of the industry into the desert Southwest and California. Adaptive cultivars and irrigation coupled with the lack of diseases and insects has been instrumental in industry development in the West. As the industry has matured during the latter part of the century, pecan culture has improved into a strong crop enterprise business. Orchard management technique and orchard development concepts have been refined, resulting in increased production and awareness. In recent years, production in Mexico has impacted the U.S. price structure and pecan industry economy. The alternate-bearing nature of pecans also impacts prices received by growers. The aging of pecan trees has resulted in serious dilemmas, such as increased tree size and shading. This situation requires techniques such as tree thinning or hedge pruning to enhance annual production and improve nut quality. Various ramifications and parameters of these management practices will be discussed.

Hazelnut Production in Oregon

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Hazelnuts in Oregon are grown on 30,000 acres by ≈1000 orchardists in the Willamette Valley. Their annual production accounts for 3% to 5% of the world's hazelnut tonnage. The trees are grown in a single trunk system with an average spacing of 20 feet between trees. Mechanical harvesting is done in October. The industry employs an Integrated Pest Management approach, utilizing combinations of scouting, trapping, and biological control. The main insect pests are filbertworm, filbert leafroller, obliquebanded leafroller, and filbert aphids. The aphid parasite *Trioxys pallidus* was imported from Europe and successfully established in Oregon. Eastern Filbert Blight, *Anisogramma anomala*, a fungus disease, is the most serious disease problem in the industry. Annual applications of nitrogen to the soil and boron applied to the foliage are routine for Oregon's hazelnut growers. OSU research has quantified the importance of good light distribution in the tree canopy for increased nut production. OSU recommends a 5-year rotational pruning program. Some growers use mechanical hedging instead of hand pruning. OSU is home to the world's largest hazelnut breeding program. 'Barcelona' is still the main cultivar

grown, while 'Ennis' is the main in-shell variety. There is growing interest in planting varieties with a high percent kernel, such as 'Casina', 'Willamette', and 'Lewis'.

Evaluation of Grape Rootstocks for Resistance to *Phymatotrichum omnivorum*

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Phymatotrichum omnivorum (P.O.) is a soil-borne fungus ubiquitous to the alkaline soil of Texas, New Mexico, Arizona, and Mexico. This fungus causes serious economic loss to grapevines in Arizona, ranging from high to low desert environments. In order to determine the relative resistance to P.O., rootstocks of various species combinations were planted in a calcareous soil which had a history of P.O.; the primary *Vitis* species included in the trial were *champini*, *candican*, *berlandieri*, *repestris*, and *vinifera*. One-year-old rooted cuttings were planted in a randomized block design with one plant per plot with six replications. Common names of rootstocks planted included Freedom, Dogridge, Oppenheim 4 (SO_4), Harmony, Champanel, and 5BB. The *vinifera* used as the control was 'Sauvignon Blanc'. Vines were allowed to grow and die for two years. All of the rootstocks exhibited greater resistance to P.O. when compared to the *vinifera* control. The rootstock exhibiting the greatest resistance was Harmony, with a low of 18% mortality. Other rootstocks showed a loss of approximately 33% over the duration of the trial.

Effect of Media Volume on Water Uptake of Tomato

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It has been shown that container medium volume affects plant growth and development in conventional production methods. The objective of this study was to investigate the effect of media volume on the growth and yield of the determinate tomato genotype 'Pik Red' in the closed, insulated pallet system (CIPS). The CIPS contains media pouches with wicks extended down into a water reservoir. Three root media volumes were investigated: 3, 6, and 9 L (3L, 6L, and 9L). The root media were placed in pouches that varied in diameter but had constant depth. The surface area of the wicks in contact with the bottom of all pouch sizes remained constant at 110 cm^2. It was hypothesized that increasing the volume of root media would allow sufficient water replenishment during the dark period to meet the plant's need the next day, and thus allow greater growth and fruit yield. Daily water uptake for each individual plant was measured by the principle of atmospheric pressure and water replacement technique. Media volume had no significant effect on water uptake during early stage of plant growth. After 45 days after planting (DAP), water uptake and plant growth were less in 3L media volume. Water uptake was similar in the 6L and 9L treatments between 45–60 DAP. Total water uptake from day 60 to 125 was greatest in the 9L, intermediate for 6L, and least in the 3L treatments. The water uptake from 1–60 DAP was reflected in the fresh shoot weight, and the water uptake was reflected in the fruit weight. Average fruit sizes and the total fruit weights for the 3L were 67.7% and 60.4% those of the 9L treatment, respectively. The 6L treatment fruit yield and fruit size were intermediate between the 3L and 9L.

Effect of Confined Fertilization on Salinity of Root Media

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When using the closed, insulated pallet system (CIPS), it is desired to apply the fertilizers once at the beginning of planting and last through harvest. When doing so, the electrical conductivity (EC) of the root environment needs to be at a reasonable level. Therefore, the objective of this experiment was to determine the effect of fertilizer conserver placement and increasing rate on the EC of the growth media. When delivering nutrients in such a manner, the fertilizer ions have limited surface area in contact with the root growth media that limits ion diffusion rate. Five fertilization rates, 15, 45, 60, 75, and 105 g per 1.5-L media pouch, were tested in a completely randomized arrangement. In each pouch, two fertilizer conservers were placed in the center of the lower half of media, each containing a different source of fertilizer. Tomato cv. 'Pik Red' was used to test the growth response to treatment. At day 100, the ECs of the middle 5 cm stratum of the growth media for the 15–75 g treatments were not significantly different from each other. Their ECs ranged from 2.52 to 4.51 dS/m. However, middle layer in the 105g treatment was 12.97 dS/m, while EC for the layer immediately below it was 1.18 dS/m. Because there were no differences in shoot and fruit weights among all fertilization treatments, compensation nutrient uptake and water uptake specialization may have occurred in the high salinity and lower salinity, respectively. The data illustrate that delivery of nutrients in small conservers is a feasible approach for the CIPS. Only small amounts of fertilizer are required for a 100-day tomato crop grown in CIPS.

The Internet Forces the Scientific Community to Face its Ethical Problems

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Historically, ethical issues in science have disappeared behind the veil which alleges that science is self-correcting because of its reliance on secret peer review. Unfortunately, that same peer review process has closed scientific journals to scientists holding to different ethical standards, while access to the law and courts has been a prohibitively expensive mechanism to protest unethical actions. Although eager to sensationalize ethical lapses, news media have been ineffective in correcting the problems. As a result, dissension has been left exclusively to lay activists. Against this background, in the 1995 AIBS symposium, "Ethics, Science, and Public Policy," Bella described scientific publications as "propaganda" and Mattson discussed the fact that unbiased science cannot exist within government agencies. However, with the sudden rise of the World Wide Web, scientific societies have lost control of publication, and legal confidentiality has disappeared, because the Web now provides outlets for dissenting views and the opportunity to bring corruption in science to public attention. Thus placed under public scrutiny, the scientific community must confront an urgent need to examine its ethical standards.

Symposium

Electronic Information Systems: All That They Can Be, or Shared Development/Review/Use of Educational Information via the World Wide Web

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In this symposium we will explore the unique capabilities, differences, and requirements of authoring and distributing information as electronic media rather than as the printed page. What is meant by "authoring for the interested learner"? How can the information base be constructed to be "inquiry driven"? Can information be developed as concise answers, chunks, or electronically digitized information packages to be used to support decisions on specific questions? What is meant by "authoring once" for use across alternative media platforms (WWW, CD-ROM, printed page) and for linkage (use) into alternative documents? How can we get groups of educators to collaborate on a "global information system"? Can we establish effective national "peer review" systems for educational information? What can we do with the current electronic information technology? What would we like to be able to do? These and other questions will be discussed by educators from diverse disciplines, ranging through library information science, education, communications, horticulture, and crop and soil science. We invite you to join us in developing this symposium (subjects, speakers) by checking its evolution under the "symposia" link at http:www.forages.css.orst.edu/AAAS-PD/ and sending your ideas by e-mail to the moderators or individual speakers.

HortBase, a Global Electronic Information System for Decision Support

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HortBase, a global electronic information system to support horticultural decisions in classroom, distance education, lifelong learning, and Extension, incorporates three innovative concepts: 1) Three-dimensional team creation of individual electronic information files (subject, communications, and information science authors collaborating from start to finish to create the file). Team-creation respects, utilizes, and develops professional strengths and resources of each team member. 2) Nationwide, or even worldwide, distribution of the workload and costs of creation, review, revision, and distribution of the individual electronic information files rather than redundant individual efforts and expenditures, enables us to do more as a group and to specialize individually. 3) National peer review by each file creator's professional society (ASHS, ACE, and ASIS respectively) enhances information quality, continued professional development of the authors, and wider acceptance and use of the information. Capabilities of electronic information systems facilitate, indeed require, this new approach to information development and delivery. For additional information, http://forages.css.orst.edu/HortBase/.

The Role of Communicators in Agricultural Global Information Systems for Decision Support

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University communicators (writers, editors, designers, videographers, multimedia specialists, etc.) often are asked by a scientist to help her or him redesign a completed, or partially-completed, information package. This may be a rough draft of a publication that will include photos already taken, a plan for a video that will include field work already competed, a CD-ROM that will include photos, video, and sound already in hand. Communicators call these "salvage jobs." It is like being asked to give advice on the most effective design of an experiment—when the experiment is three-fourths done. The emerging world of on-line electronic information offers support in real time to people working in a vast array of fields. It is critically important that communicators and other information professionals collaborate, at the project initiation stage, with scientists in "creation teams" to plan effective information design and delivery. Also, it is important that electronic information packages to be used for decision support be peer reviewed for communication, as well as scientific, integrity. The session's presenters will explain why.

The Role of Librarians in Agricultural Global Information Systems for Decision Support

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Anyone who has had an occupation that uses the personal computer can attest to the way the tool affects the fundamental way in which tasks are done. It's this qualitative nature of the changes—not whether the computer makes your work more productive or more efficient—that really is the central finding of the research of information technology and organizations. Of people in all occupations, those who deal with information as the main product and service find themselves in a peculiar position. Because the tool itself is also the product, every change in technology reorders tasks and procedures so that the new system is accommodated. Given enough incremental change in the way information is manipulated, the core skill set of the practitioner must necessarily change. This puts a strain on the legacy systems, both social and technical, they leave behind. Librarianship is one profession whose central skill set is being challenged by the march of progress in information technology. This paper examines the way some librarians have shifted emphasis of their core skill set to meet the challenge of remaining relevant within the new information infrastructure. It will then examine the ramifications of the adaptation on the customers that they serve, the legacy organizational protocol, and the administrative bureaucracies they have been managed by.

Electronic Access, Design Issues, and Publishing Research Information on the World Wide Web

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Traditionally, researchers have obtained published information in the form of journal articles, often using indexing tools like Biological Abstracts to find a particular topic. Articles were indexed, coded, and abstracted so that people could find the information they needed in an organized fashion. Much of what is currently being published on the World Wide Web uses traditional paper publishing techniques overlain with lots of graphics designed to fit the needs of the MTV generation. Should we be publishing quality research information on the web? What research information should be published? What information design criteria do we use? Moreover, how do we design information for effective use and retrieval given the inherent nature of the web and the lack of sophistication in the currently available Internet search retrieval engines? What are the information management issues with which we must deal if we are to make publicly funded research information available to other researchers and to the American public?

Forage Information System as a Model for Development of Agricultural Information Systems for Decision Support

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To demonstrate current electronic communication capabilities, an on-line demonstration of the Forage Information System (http://www.forages.css.orst.edu) is planned. This will include accessing various forage and grassland web sites and exploring available information resources, thereby demonstrating existing global connectivity and cooperatively developed projects. What does the future hold for electronic communications? We've seen some of the tremendous progress that has been made over the course of the last 100 years. Even the changes of the last decade have been astounding. Since 1969 (the year of the manned moon landing), the number of networked servers has grown from 4 to 13 million! How can we even pretend to forecast the future of development? It's probably sheer folly.

HortBase: Providing a Foundation for Distance Education

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Technology allows educators to convey information more flexibly and visually. How to access and make use of technological teaching tools is the challenge facing educators. HortBase provides the framework for educators to create and access educational chunks. How to make use of the information in HortBase in distance teaching is a three-step process. 1) Before assembling the teaching material, the educator must decide on who the target audience is and what information to convey. Audiences on campus have higher expectations of how they learn, as they are used to live teaching and guidance, and often do not have a clear idea of what they want to learn. Off-campus audiences have lower expectations and are more focused on the information they want. 2) The educator then decides how much of the information to convert into digital form individually and how much to draw from elsewhere. Pieces of digitized information can be created by scanning existing images into the computer or created on computer with authoring-illustrating programs. Once digitized, images can be manipulated to get the desired look. This is a very time-consuming step,

so much effort can be saved by taking created "chunks" from HortBase. 3) Finally, what medium and tools to use must be decided. Course content can be presented with slide-show software that incorporates digitized slides, drawings, animations, and video footage with text. Lectures can then be output to videotape or broadcast over an analog rework. Alternatively, the digitized information can be incorporated into interactive packages for CD-ROM or the World Wide Web.

Integrated Pest Management on the Web and on CD-ROM: Two University of California Projects for Helping Farmers and Gardeners Solve Pest Problems

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Over the past decade, the University of California Statewide IPM Project has been extending pest management information electronically to farmers, pest management consultants, landscapers, and home gardeners. During this session we will demonstrate the Project's web site (http://www.ipm.ucdavis.edu) and a CD-ROM developed to assist horticulture advisors, Master Gardeners, retail nursery personnel, and others who help gardeners manage pest problems. We will discuss considerations in using these programs for extending information, keeping the programs up-to-date, and integrating them into educational programs. The CD-ROM covers 40 vegetables and tree fruits, allowing users to specify visual symptoms, describe a situation, or look at color photos, video images, or line drawings to help identify the problem. Twenty-five to 35 different pests are included for each crop, with thousands of photo images. An ornamentals module will be added in 1998. Once the problem is identified, the system provides screens to confirm pest identity, learn about biology and damage, and choose management practices. For instance, users can view several common natural enemies for a pest, look up the relative toxicity of pesticides, or get details on how to prune to avoid stressing a tree. Choices focus on methods to reduce pesticide use. The program is being developed with cooperators at Oregon State University and Washington State University, and with guidance of end users. The UC IPM web site includes information on biology and management of hundreds of insect, pathogen, weed, and nematode pests on 35 crops and in landscapes and gardens with thousands of color photos linked through hypertext. Other databases on the site include weather databases, pesticide use data, and phenology databases for pests.

Simulation of Ecological and Evolutionary Interactions of Darwin's Finches—A Multimedia Learning Tool

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Dr. Quinn is one of a team of six biology professors from six different CSU campuses collaborating on this pilot project. EvolveIT is a web-based method for students to learn the fundamentals of natural selection and speciation by simulating natural processes. The simulation will be modeled on the evolution of Darwin's Finches in the Galapagos Islands. Learners will manipulate variables such as initial population size, variability and heritability of bill morphology, and quantity and quality of seeds, and then observe changes with time in population size and bill morphology. The interactive model will allow variables to be changed and simulations to be repeated, producing results that can be graphed and statistically analyzed. The Integrated Technology Strategy (ITS) of the California State University System (CSU) is using the Internet to create new and more flexible learning opportunities. Recently the ITS brought together biologists from several CSU campuses to explore ways to use technology to improve learning in introductory biology laboratories for non–science students. These laboratories were chosen because they affect large numbers of students at all campuses. Development criteria include applicability across the CSU, improvement in learning quality, accessibility to large numbers of students, and measurable success. We selected evolution as a topic for web-based learning because it is a central concept of biology, and it is relatively difficult to teach in conventional introductory biology laboratories. Our development team will work with multimedia design specialists to insure that the web presentation promotes scientifically sound and efficient learning. We are collaborating via e-mail and occasional video conferences and face-to-face meetings. We will work on the actual teaching materials via a web page. The initial prototype will be ready by early summer 1997 and will be tested, modified, and released for beta testing by summer's end.

On-line Field Guide to Native Plants for Introductory Biology Students

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We are developing an on-line guide to introduce biology students to the native plants of the Cal Poly campus. It will be used prior to field laboratory exercises, and as a reinforcement after field study. It presents reference information in an interactive and nonlinear manner which encourages students to pursue information in the way that is most interesting to them. The guide is organized by a very simple key that divides plants according to habit (trees, shrubs, vines, grasses, forbs). This simple approach is possible because the guide includes only the 30 common species that students must recognize to do plant sampling exercises. Each species has a screen that displays photographs, line drawings, and a nontechnical narrative. This guide displays the appearance of plants in all seasons, and will be available at all times as a web site. It is particularly useful when laboratories meet in inclement weather or at night. As a web site, it displays the native flora of the Cal Poly campus to the world. The guide was relatively easy to construct with common multimedia equipment. The same approach could be readily employed by any educational program that repeatedly uses the same field site.

Design and Development of Interactive Media: Creating Educational Materials for CD-ROM and the Web

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This workshop offers an overview of the production process for CD-ROM and Web materials, as well as pragmatic advice on how to structure effective interactive presentations. Many educators and practitioners consider interactive computer-based education the technology of tomorrow. However, evidence of high-level computer literacy among many young people suggests that a "technology gap" already exists between student computer literacy and the learning modules that instructors can prepare. As with all media presentations, the basis of effective multimedia project structure is instructional design. This includes design of both the content and the navigational interface. Given the relative complexity of these projects, a clear and logical design is essential to effective conveyance of content. The presentation of content via computer differs from "traditional" media presentations in terms of how content is structured; interactive elements; user selectivity; user motivation, and immediate, response-specific performance assessment (among other things). There are a number of differences in the production process as well. Computer-based instruction requires early definition of end-use platforms, software requirements, use of communication, testing, and grading tools, and more. Content is organized on a flowchart which, along with the design document (which contains the script/text, graphic descriptions, and programming directions), becomes the blueprint for project production. Early project prototypes are tested for ease of use, logical flow, and structure, with "typical end-user" representatives. The final project is alpha- and beta-tested prior to distribution. Although preparing computer-based media materials is time-consuming, the resulting product can greatly enhance teaching by enabling self-paced, asynchronous, active learning and accommodating different learning styles.