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REPORT FOR THE NCR-101 MEETING, APRIL 6-9, 2002, Durham, NC

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1. New facilities planned or installed

● A new 10'x12'x8' **growth chamber** is under construction at the CEAC for better control and monitoring of hydroponic crops. The chamber will be used by Dr. Chris Choi (Dept. Agric. Biosystems Engineering) for microbial food safety research projects.

● Construction of a **new CEA (Controlled Environment Agriculture) building** (5000 ft^2) was completed. The building has a large multimedia "Smart Classroom", two plant physiology & engineering laboratories, and several offices for the CEAC faculty and staff. The building will be the center for instruction, research, and extension activities of the CEA program. The dedication of the building is broadcast on the CEAC web site (http://ag.arizona.edu/ceac/news/dedication.htm).

2. New control systems and instruments

● **A computer controlled fertigation system** (Qcom Co.) is installed in hydroponic tomato production greenhouse. This system enables alteration of EC, pH and fertigation timing/duration according to the environmental conditions. [Steve Kania, Dept. Agric. Biosystems Engineering]

● A "**Tomato Live!**" web-based, real-time greenhouse environment monitoring system has been developed (http://ag.arizona.edu/ceac/tomlive/index.htm). This is a part of the project for developing "**virtual learning center for controlled environment agriculture**". [Dr. Chris Choi, Dept. Agric. Biosystems Engineering]

● A new **Lamp Test Chamber** was designed and developed to measure a test lamp's 3D spectral output; 3D radiant power distribution; electrical conversion efficiency; and total thermal load. The Lamp Test Chamber is currently being used to test water-cooled HPS lamps and LED arrays. [Dr. Joel Cuello, Dept. Agric. Biosystems Engineering]

3. Cooperative/interdisciplinary projects

● Aeroponics of medicinal plants [Dr. Teena Hayden, Native American Botanics]
● Tomato heat tolerance variety trials (2000-2001 and 2001-2002) [Dr. Pat Rorabaugh, Dept. Plant Sciences]
● Sweet pepper plant production and variety trial [Dr. Merle Jensen, Dept. Plant Sciences]
● Effects of greenhouse environmental conditions on tomato growth yield and fruit quality [Paula Costa, Dept. Agric. Biosystems Engineering]
● Development of a compact and robust HID water-jacketed plant lighting system [Dr. Gene Giacomelli, Dept. Agric. Biosystems Engineering]
● Virtual learning center for controlled environment agriculture [Dr. Chris Choi, Dept. Agric. Biosystems Engineering]
● Production of high sugar tomatoes under semiarid climate [Dr. Chieri Kubota, Dept. Plant Sciences]
● Controlled environment somatic embryogenesis [Dr. Chieri Kubota]
● Monitoring of nutrient (ammonium, nitrate, potassium, magnesium, etc.) dynamics in sweetpotato hydroponic solutions [Dr. Joel Cuello, Dept. Agric. Biosystems Engineering]
● Hybrid solar and electric lighting for plant biomass production [Dr. Joel Cuello]

4. Workshops/colloquia/symposia

● A **Greenhouse Crop Production and Engineering Design Short Course** was held for January 20 to 23, 2002, as a continuing professional education short course from the University of Arizona. The course programs can be viewed at http://ag.arizona.edu/ceac/extension/cpesJan02.htm. The meeting included a tour to EuroFresh Co. (Wilcox, AZ).

● **NE164 annual meeting** was held at and hosted by the University of Arizona for March 8 to 9, 2002. The meeting included a tour to Biosphere 2 (Oracle, AZ).

5. Recent Publications

Cuello, J.L. 2001. Composite Lighting for Controlled-Environment Plant Factories. In Handbook of Plant and Crop Physiology. 2nd ed. M. Pessarakli (ed.). New York: Marcel Dekker, Inc., pp. 915-924.

Cuello, J.L. 2001. Hybrid Lighting: Designing an Energy-Saving Strategy for Bioregenerative Space Life Support. Proceedings of the 2001 American Society of Mechanical Engineers (ASME) International Solar Energy Conference. 8 pp.

Cuello, J.L., Y.Yang, S. Kuwahara, E. Ono, K. Jordan, T. Nakamura and H. Watanabe. 2001. Plant

Giacomelli, G.A., 2001. Controlled Environment Agriculture Center (CEAC) 'Program of High Technology Agriculture in the Desert Southwest U.S.' Proceedings of the 30th National Agricultural Plastics Congress, San Diego, CA, American Society for Plasticulture, February 23 – 26, 2002. pps. 34-39. Paper # P-125933-11-01.

Giacomelli, G.A., 2001. Manuscript of Spotlight on University of Arizona to Laura Henne, Associate Editor, Greenhouse Grower Magazine Greenhouse Grower 19(10):82-86. Paper #M-125933-17-01.

Hardware Equipped with Hybrid Lighting: Combining Solar Irradiance with Xenon_Metal Halide Lamps and Light-Emitting Diodes for Life Support in Space. *Proceedings of the 31st* International Conference on Environmental Systems. SAE:Engineering Society for Advanced *Mobility in Land, Sea, Air and Space*. 2001-01-2423. 9 pp.

Jensen, M.H., 2001. Deep Flow Hydroponics - Past, Present and Future. Proceedings of the 30th National Agricultural Plastics Congress, San Diego, CA, American Society for Plasticulture, February 23 – 26, 2002. pps. 40-46. Paper # P-125933-12-01.

Kania, S.T. and G.A. Giacomelli, 2001. Solar Radiation Availability for Plant Growth in Arizona Controlled Environment Agriculture Systems. Proceedings of the 30th National Agricultural Plastics Congress, San Diego, CA, American Society for Plasticulture, February 23 – 26, 2002. pps. 66-71. Paper #P-125933-08-01

Kubota, C. 2001. Concepts and background of photoautotrophic micropropagation. P.325-334. In: N. Morohoshi and A. Komamine (eds.) Molecular Breeding of Woody Plants, Elsevier Science B.V.

Ono, E., K. Jordan and J.L. Cuello. 2001. Dynamic Monitoring of Nutrient Species in Hydroponic

Pagliarulo, C.L. and A.L. Hayden, 2001. Potential for Greenhouse Aeroponic Cultivation of Medicinal Root Crops Proceedings of the 30th National Agricultural Plastics Congress, San Diego, CA, American Society for Plasticulture, February 23 – 26, 2002. pps. 47-53. Paper # P-125933-09-01.

Rorabaugh, P.A., M.H. Jensen and G.A. Giacomelli, 2001. Production Procedures for Greenhouse Tomatoes in Arizona With a Focus on Nutrition in Hot Climates. Proceedings of the 30th National Agricultural Plastics Congress, San Diego, CA, American Society for Plasticulture, February 23 – 26, 2002. pps. 54-59. Paper # P-125933-10-01

Solutions for Advanced Life Support. *Proceedings of the* 31st International Conference on Environmental Systems. SAE:Engineering Society for Advanced *Mobility in Land, Sea, Air and Space*. 2001-01-2276. 7 pp.

Giacomelli, G.A., 2002. Automated Environmental Control: Thermostats to Computers. Proceedings of the Greenhouse Crop Production and Engineering Design Short Course, The University of Arizona, Controlled Environment Agriculture Center, January 20-23, 2002. Paper #E-125933-06-02

Giacomelli, G.A., 2002. Introduction to Greenhouse Glazing. Written for Chris Beytes of GrowerTalks Magazine for Ball Redbook. Paper #M-125933-01-02.

Jensen, M.H., 2002. Hydroponics Worldwide - A Technical overview. Proceedings of the Greenhouse Crop Production and Engineering Design Short Course, The University of Arizona, Controlled Environment Agriculture Center, January 20-23, 2002. Paper #E-125933-03-02

Jensen, M.H., 2002. Steering Your Tomatoes. Proceedings of the Greenhouse Crop Production and Engineering Design Short Course, The University of Arizona, Controlled Environment Agriculture Center, January 20-23, 2002. Paper #E-125933-05-02

Kozai, T. and C. Kubota. 2002. Developing a photoautotrophic (sugar-free medium) micropropagation system for woody plants. J. Plant Research. (*in press*)

Kubota, C. and S. Seiyama. 2002. Manipulation of photoperiod and light intensity for low-temperature storage of eggplant seedlings. Scientia Hort. (*in press*)

Rorabaugh , P.A., 2002. From Seed to Harvest: Cultural Practices of Tomato Production on Rockwool with Drip Irrigation. Proceedings of the Greenhouse Crop Production and Engineering Design Short Course, The University of Arizona, Controlled Environment Agriculture Center, January 20-23, 2002. Paper #E-125933-04-02

6. Internet Sites

- The University of Arizona Controlled Environment Agriculture Center home page: http://ag.arizona.edu/ceac
- Tomato Live! Website: http://ag.arizona.edu/ceac/tomlive/index.htm