

1. New facilities planned or installed

_ **A 60'x180' Retractable Roof Greenhouse** has been installed at the CEAC by Dr. Ursula Schuch, Plant Sciences. Studies in progress include evaluation of bedding, potted and ornamental nursery crops, as well as, hydroponic basil, pepper & tomato crops (in cooperation with Drs. Jensen, Plant Sciences & Giacomelli, Engineering), and the development of climate control strategies for the RRGH.

_ Two insulated **environmental chambers** 10'x12'x8' have been completed at the CEAC for use by Dr. Chieri Kubota for **Post-Harvest Storage Environment** studies.

_ Three reach-in **environmental chambers** have been installed at the CEAC for use by Dr. Kubota for **Transplants Transportation Environment** studies.

_ Construction of a **new CEA (Controlled Environment Agriculture) Greenhouse Research facility** (6000 ft²) has begun. The facility will consist of 2 environmental zones and include natural ventilation, fog and pad/fan evaporative cooling systems, computer-based control within a double polyethylene covered structure, and it will be used for water use studies.

2. New control systems and instruments

_ **A 30'x80' greenhouse was renovated to create 3 computer-controlled environmental zones** providing high/low levels of VPD, EC and day/night air temperature differences, through a **computer-based, process-control software** developed by Stephen Kania, CEAC Horticultural Engineer. Tomato crop physiological response (water use, fruit yield and quality), and morphological response (vegetative/reproductive) to the environments will be determined within an interdisciplinary team study among engineering, plant sciences and soil, water and environmental sciences faculty.

_ A 450 ft² **Food Growth Chamber for the Amundson-Scott South Pole Research Station** is under construction as part of a program with Raytheon Polar Services Corporation. In addition to hydroponic production of vegetable crops (leafy greens & fruits), there will be an **Environmental Room** for Station employees to view the lush **Plant Production Room**.

3. Cooperative/interdisciplinary projects

_ 'A Day in the Life of a Plant', Learner-Centered, Web-based Education CEA Website and Simulation Modules [Chris Pagliarulo, Agric. Biosystems Engineering]

_ Aeroponics of medicinal plants [Chris Pagliarulo, Plant Sciences]

_ Controlled environment somatic embryogenesis [Dr. Chieri Kubota, Plant Sciences]

_ Development of a compact and robust HID water-jacketed plant lighting system [Dr. Gene Giacomelli, Agric. Biosystems Engineering]

_ Effects of greenhouse environmental conditions on tomato growth yield and fruit quality [Paula Costa, Agric. Biosystems Engineering]

_ Evaluation of retractable roof greenhouse for vegetable production [Armando Suarez, Agric. Biosystems Engineering]

_ Hybrid solar and electric lighting for plant biomass production [Dr. Joel Cuello, Agric. Biosystems Engineering]

_ Monitoring of nutrient (ammonium, nitrate, potassium, magnesium, etc.) dynamics in sweetpotato hydroponic solutions [Dr. Joel Cuello]

_ Optimization of transplants transportation environments [Dr. Chieri Kubota, Plant Sciences]

_ Physiology of grafted plants of hydroponic tomato [Mark Kroggel, Dept. Plant Sciences]

_ Production of high quality cherry tomatoes under semiarid climate [Johann Buck, Plant Sciences]

_ Production of high quality tomatoes under semiarid climate [Min Wu, Plant Sciences]

_ Tomato grafted plants and variety trials [Dr. Pat Rorabaugh, Plant Sciences]

_ Water Use by Greenhouse Tomato Plants [Dr. Allan Mattias, Soil Water Environ. Science]

4. Workshops/colloquia/symposia

_ A **Greenhouse Crop Production and Engineering Design Short Course** was held for January 19 to 22, 2003, 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).

_ Curso Internacional de Invernaderos (**International Greenhouse Course**) May 27 – 31, 2002 at Universidad Autonoma Chapingo Ingeniera Mecanica Agricola in Chapingo, Mexico was coordinated with Dr. Raquel Salazar Moreno, and Drs. Giacomelli, Jensen and Waller as part of an interchange agreement between Chapingo Autonomous University and The University of Arizona.

5. Recent Publications

- Fleisher, D.H., K.C. Ting and **G.A. Giacomelli**, 2002. Decision Support Software for Phytoremediation Systems Using Rhizofiltration Processes. *Transactions of the Chinese Society of Agricultural Engineering* 18(5):210-215
- Choi, C.Y., E. Fitz-Rodriguez, **G. Giacomelli**. 2002. Web Based Monitoring in Controlled Environment Agriculture. ASAE -CIGR Congress Annual International Meeting, July 29-31, Chicago IL, USA
- Hayden, A.L., T.N. Yokelson, **G.A. Giacomelli** and J.J. Hoffmann, 2002. Aeroponics: An Alternative Production System for High-Value Root Crops. Presentation at the ISHS Congress, Toronto, Canada, August. (ACTA paper submitted)
- Sadler, P.D., **G.A. Giacomelli**. 2002. Mars Inflatable Greenhouse Analog, Life Support and Biosphere Science, volume 8, Number 2, pg. 115-123
- Giacomelli, G.A.** 2002. Controlled Environment Agriculture Center (CEAC) 'Program of High Technology agriculture in the Desert Southwest U.S.' AERGC Newsletter.
- Giacomelli, G.A.**, 2002. Considerations for Energy Management of Greenhouse Heating and Cooling. Presentation to the Southern Greenhouse Vegetable Growers Association Conference. July 19 - 20, 2002, Shreveport, LA. Paper # E-125933-16-01.
- Giacomelli, G.A.**, 2002. Introduction to Greenhouse Glazing. Written for Chris Beytes of GrowerTalks Magazine for Ball Redbook. Paper #M-125933-01-02.
- Giacomelli, G.A.**, S. Newman and K. Panter, 2002. View from 50,000 feet: Greenhouse Issues of Today with Impact for the Future. Presentation at the Fall 2002 NGMA Meeting, Phoenix, AZ, October 17-18.
- Kubota, C.**, M. Ezawa, T. Kozai, and S.B. Wilson. 2002. In Situ Estimation of Carbon Balance of In Vitro Sweetpotato and Tomato Plantlets Cultured with Varying Initial Sucrose Concentrations in the Medium. *J. Americ. Soc. Hort. Sci.* 127: 963-970.
- Kozai, T. and **C. Kubota**. 2002. Developing a photoautotrophic (sugar-free medium) micropropagation system for woody plants. *J. Plant Research.* 114:525-537.
- Kubota, C.** and S. Seiyama. 2002. Manipulation of photoperiod and light intensity for low-temperature storage of eggplant seedlings. *Scientia Hort.* 94:13-20
- Islam, A.F.M.S., **C. Kubota**, M. Takagaki, and T. Kozai. 2002. Sweetpotato growth and yield from plug transplants of different volumes, planted intact or without roots. *Crop Sci.* 42:822-826.
- Chintakovid, W., **C. Kubota**, W.M. Bostick, and T. Kozai. 2002. Effect of air current speed on evapotranspiration rate of transplant canopy under artificial light. *J. of Society of High Technology in Agriculture.* 14(1):25-31.
- Uno, A., K. Ohyama, T. Kozai, and **C. Kubota**. Photoautotrophic culture with CO₂ enrichment for improving micropropagation of *Coffea arabusta* using somatic embryos. *Acta Horticulturae* (peer-reviewed edition) (submitted)

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>

7. Video

Greenhouse Hydroponics From Seed to Harvest, CEAC, College of Agriculture and Life Sciences, The University of Arizona (Available for sale online at <http://ag.arizona.edu/cal-smart>)