Web site: http://aesop.rutgers.edu/~horteng

CCEA Newsletter

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The Center for Controlled Environment Agriculture is a research organization dedicated to the improvement and vitality of the Controlled Environment Agri-culture Industry. CCEA is funded by industrial and grower partners who voluntarily contribute a yearly partnership fee. For more information contact:
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Vision Statement
CCEA, The Center for Controlled Environment Agriculture of NJAES at Rutgers University, a partnership among growers, industry, and researchers, will devote itself to research and transferring information required for an economically viable and environ-mentally aware controlled environment agriculture industry. We will particu-larly strive to identify future trends, critical issues, appropriate emerging technologies and provide leadership for opportunities which challenge world-wide controlled environment agriculture in the 21st century.

In this issue:

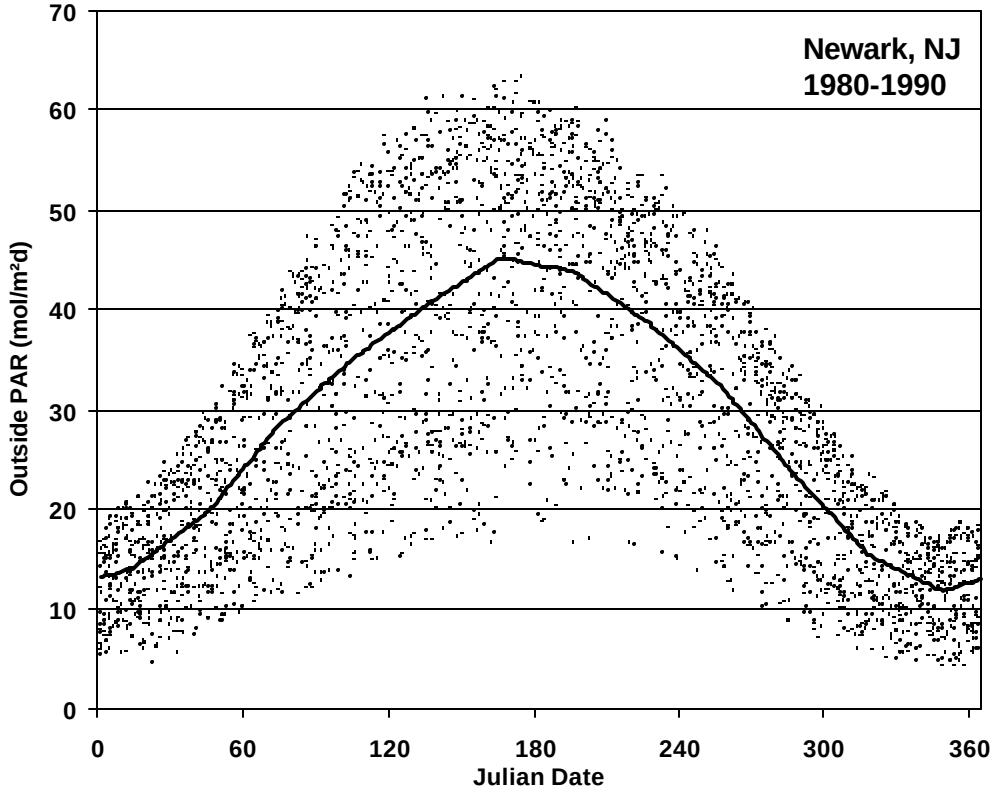
Tomato production in one of the high tunnels at the Rutgers Agricultural Research and Extension Center in Centerton, NJ.

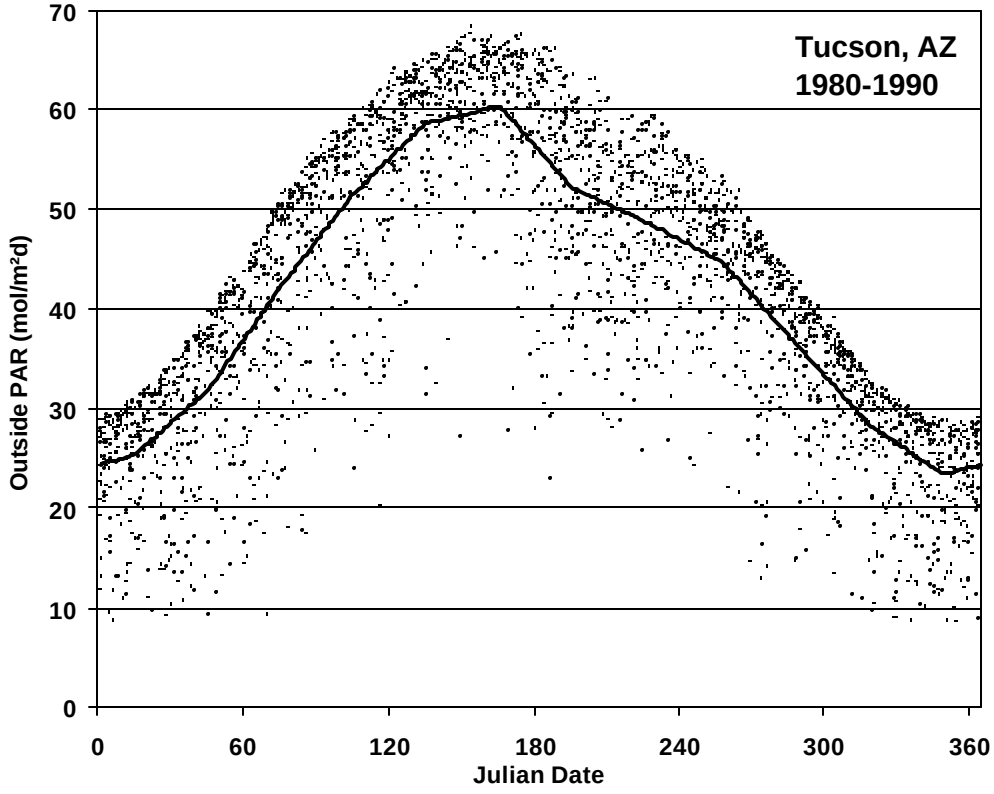
High Tunnel Construction Completed

The construction of six high tunnels (each measuring 17 wide by 36 feet long), two on Hort Farm #3 near the Cook College Campus, and four at the Rutgers Agricultural Research and Extension Center (approximately 100 miles South of Campus), was recently completed. At each site, one of the tunnels is outfitted with thermostatically controlled side vents (requiring electricity to operate electrical relays and the tube motors), while the remaining tunnels are vented by manually operating the side vents. Since it is not practical to have a person adjust the side vents multiple times per day, the manually operated vents are usually opened at the start of the workday and closed at the end of the day. The thermostatically controlled side vents are opened when the inside temperature exceeds 75°, and closed when the inside temperature drops below 65°F.
Before planting tomatoes in the high tunnels, the soil was tilled and raised beds were made with a special bed making attachment that covered each bed with a plastic film mulch and simultaneously installed a drip tape for crop irrigation. The large hinged end wall sections (doors) in each tunnel were placed in the open, horizontal position, allowing a small tractor to drive through the tunnels. The small end-wall sections to the left and right of the large hinged doors were temporarily removed during soil and bed preparation. Three of the four beds were covered with a colored plastic film mulch (red, dark green, and black), while the remaining bed was left uncovered. The drip tape was connected to a water supply using a pressure reducing valve (the drip tape is operated at approximately 10 psi) and a

fertilizer injector. Tensiometers inserted in the soil between the plants are used to measure the soil water tension so that the plants can be irrigated when the soil tension exceeds 40 kPa. The tomato plants are staked to support their heavy fruit weight. The plants are scouted regularly for insects and, if necessary, will be treated similarly as conventional outdoor tomato crops following IPM practices. Sensors and a data acquisition system were installed at both research locations. The temperature, relative humidity, and photosynthetically active radiation are measured and recorded both inside and outside the tunnels. In addition, soil temperatures are measured in each bed as well as outside the tunnels.

These photographs show some of the processes and stages we went through to prepare the tunnels and plant and grow a crop of tomatoes. The first harvest is expected in early July.





Comparing the daily light sums in Newark, NJ and Tucson, AZ. Data provided by the National Renewable Energy Laboratory, Golden, CO (http://www.nrel.gov). The solid lines connect the monthly averages for the 11-year measuring period. Note that on average only 50-70% of the light received outside is available to crops inside a greenhouse due to shading and reflection.

David Fleisher

Dr. David Fleisher has left Rutgers University and the Bioresource Engineering Group for a new position at the Alternative Crops and Systems Laboratory at the USDA-ARS in Beltsville, MD. David completed a B.A. in philosophy at Rutgers University and received his B.S., M.S., and (multidisciplinary) Ph.D. from Bioresource Engineering. He was appointed assistant professor in September 2001 focusing on applied instrumentation and control for controlled environment crop production systems. David was associated with Bioresource Engineering since 1990, so it is no surprise that his departure left a significant void. We wish David and Jen the very best for all their new adventures in Maryland!

Recently Completed Thesis Projects

Goudarzi, S. 2003. Dynamic crew performance model for long-duration space missions. M.S. Thesis. Rutgers University Libraries, New Brunswick, NJ 08901. 78 pp.

Kumasaka, K. 2003. Canopy gas-exchange of soybean [Glycine Max (L.) Merr., cv. Hoyt] in response to air temperature, light intensity, and aerial CO_2 concentration in controlled hydroponic environments. M.S. Thesis. Rutgers University Libraries, New Brunswick, NJ 08901. 138 pp.

NCR-101 Meetings

This year, the NCR-101 Committee on Controlled Environment Technology and Use met in late April in Guelph, Ontario, Canada. Next year's meeting is scheduled for Brisbane, Australia (March 14-19, 2004). This year's meeting included a tour of the Controlled Environment Systems Research Facility (CESRF). At CESRF, researchers are measuring all aspects of plant growth, gas exchange, volatile organic compound (VOC) evolution, and nutrient remediation in precisely controlled plant growth environments. The facility consists of 24 sealed environmental chambers including 9 variable pressure plant growth hypobaric chambers capable of maintaining a vacuum (See picture below, 0.45 m diameter, 1.6 m high, approximately 250 liter in volume). CESRF and its Space and Advanced Life Support Agriculture program are an essential part of Canada's contributions to plant research and development for space and closed environment applications. The relatively high priority for advanced life support research objectives in the Canadian Space Agency's Long Term Space Plan and the strong support of NASA's Advanced Life Support (ALS) community provide a variety of opportunities to make use of the facility's unique capabilities in this area. For more information visit: http://www.ces.uoguelph.ca/index.shtml