Outreach Message

- The Lunar Greenhouse,
  - Supported by NASA, UA CALS, NSF, Hungry Planets, etc.
  - Not just for the Moon or Mars.

- From the extremes of Earth's arid, hot and polar, frozen deserts and on to the stars, The University of Arizona's Controlled Environment Agriculture Center and its partners respond to global people needs and the world-wide growth in greenhouse food production.

- What CEAC does to make better solutions for people to eat, to breath, to use energy efficiently and have water to drink on the Moon or Mars helps feed the people of the Earth. These approaches will assure that water resources are used wisely, and that energy resources will support the world's most basic needs.

"The road to save the planet lies with the imaginative use of our future. CEAC is uniquely positioned to help feed the world precisely because its work will feed those who will go to the stars."

Tech Frontiers & Sci-Tech Reports, July 15, 2011

Outreach, Collaboration and Interaction*

Demonstrate capabilities of the food production, water and atmosphere revitalization of the LGH

Generate off-campus interest in future off-planet science outpost missions

*Bio-Regenerative Life Support System Development for Lunar/Mars Habitats. Giacomelli, et al. Presented manuscript, ICES 2012, San Diego, CA.

Education Audiences:

- Telepresence technology has been presented to NASA (STEM students), UA-CEAC stakeholders, university-level BLSS education, K-12 STEM students, and to the general public.

- Education Collaborative efforts to date have included 13 professional science or technical investigators (one each, female, Hispanic, Asian, Black), also 7 students in research (one each Asian, Hispanic, Black), 3 USA and 1 Italian faculty, 7 international collaborators from 2 aeropsace companies and 1 USA small business, and one government research facility.

- Live discussions by Internet with the Safford Middle School 7th Grade students and their science teacher about their project on closed ecosystems

- Collaborated with Dr. Madhu Thangavelu, Professor in Department of Astronautical Engineering within the Viterbi School of Engineering at the University of Southern California (USC), to present and review the LGH system to his web-based course, ASTE 527-Space Exploration Architectures Concept Synthesis Studio. Two lectures presented by NASA Steckler grant and CEAC staff in the 2009-2010 fall semesters through the Distance Education Network (DEN) at USC.

- Space agriculture aboard the International Space Station became the topic of choice for a student project that was further developed and presented by the student at the AIAA Space 2010 Conference in Long Beach CA.41 The student used this work as part of her portfolio to gain admission to Stanford Graduate School where she is currently pursuing her doctoral studies while employed part-time at NASA Ames Research Center in Mountainview, CA.

- Middle school educator Maria Catalina is founder of the Astronaut Teacher Alliance (ATA) which is a professional development program that provides access to expeditionary learning through virtual journeys to a global network of middle school educators. Collaborating with ATA on the development of differentiated curriculum and a set of protocols related to the implementation of the Lunar Greenhouse-Outreach and Teaching Module (LGH-OTM), a portable education module of the Lunar Greenhouse for grades 6-12

- With Dr. Alberto Battistelli of the IBAF, Porano, Italy, the Italia –USA bilateral project was developed with close relation to the Lunar Greenhouse project. The MAE Progetti di grande rilevanza ITALIA - USA 2011 project provided for exchange of U.S. Steckler Team to Italy to support the further development of the next generation prototype Space Greenhouse, in collaboration with Aero-Sekur and Thales-Alenia. It also allowed partial support for travel of a Thales-Alenia engineer to UA-CEAC.

- **Business Collaborations including:**

- Collaborations endure and strengthen with two Italian aerospace companies (Thales Alenia Spazio-Italy (TAS-I) in Torino (3 years), and Aero-Sekur, S.p.A. in Aprilia (7 years), as well as with USA small business (Sadler Machine Co, Arizona)(14 years) and Desert Rain Research & Communication (5 years), a University of Naples Federico II researcher, and Asahi Glass Co. of Japan and North America.
- Thales Alenia Space–Italia (TAS-I)
  - Premier aerospace manufacturer in Italy and has designed and manufactured 50% of the structural modules of the International Space Station (ISS).
  - Supported TAS-I aerospace engineer, Giorgio Boscheri, who worked at UA-CEAC on the LGH BLSS for a two-month period (in 2010
  - Colleagues in Italy supported the energy flow (MEC) modeling with the data obtained from the closure experiments.
- Aero-Sekur is a component manufacturer for the aerospace industry, focused on membrane structures (aircraft fuel bladders), and industrial sewing
  - Supported our LGH efforts with materials development, technical support and engineering assistance
  - Anticipate their assistance in producing prototype membrane components for the LGH units.
- Asahi Glass Co. is a chemical and membrane manufacture, which has provided LGH and LGH-OTM with EFTE membranes.

- **<u>Media Audiences including</u>**:

- National Geographic
- ABC Network
- KUAT (PBS/NPR) Tucson
- BBC World [placed as the most watched video 5 days in science-technology at Huffington Post, hosting 1.5 million readers each day]
- The Martha Stewart Show (Hallmark Channel) [925,000+ total viewers]
- CBS Sunday Morning
- American Scientist
- Popular Science
- Popular Mechanics
- Arizona Alumni Magazine
- Tech Frontiers & Sci-Tech Reports [youtube.com]
- Aglinenews.com
- Arizona Daily Star [240,000]
- Union-Tribune San Diego [680,000]

Arizona Daily Star
Final
AZSTARNET.COM
Tuesday, June 12, 2012
75 cents plus tax • $3 outside Southern Arizona

3 big insurers pledge to keep parts of disputed health law

Say coverage, benefits will stay regardless of how high court rules

By Julie Appleby
KAISER HEALTH NEWS

WASHINGTON — As speculation over the fate of the federal health-care law heightens ahead of the Supreme Court ruling, at least three major insurers promised Monday to continue following some of the rules in the law that already are in effect.

UnitedHealthcare, which covers about 26 million people in plans that could be affected by the regulations, was the first to make the move. The company said it would allow young adults to stay on their parents' policies up to age 26, wouldn't reinstate lifetime limits on coverage and would continue to offer cancer screenings and other preventive services without co-payments. It also would maintain a third-party appeals process for treatment denials and wouldn't cancel policies retroactively.

Later Monday, Humana said it would continue those same provisions.

Aetna, too, said it would retain the young adult provision, the preventive care benefits and a third-party appeals program. Aetna's announcement didn't include a reference to lifetime limits on coverage or retroactive cancellation.

Those consumer provisions score high on public opinion polls, even among people who say they don't like the overall law.

See INSURE, A4

LUNAR GREENHOUSE

MAMTA POPAT / ARIZONA DAILY STAR

Tyler Jensen, left, and Thomas Hillsbrand are putting together the teaching module of the University of Arizona's Lunar Greenhouse, which is headed to San Diego and Chicago to raise awareness about the greenhouse and hydroponic gardening. A prototype greenhouse is at the right.

UA veggie garden for space readied for an earthly trek

By Mark Armao
FOR THE ARIZONA DAILY STAR

A greenhouse designed for extraterrestrial use is taking a more terrestrial trip this summer.

Someday, the University of Arizona's Lunar Greenhouse will provide a life-support system for astronauts on prospective missions to the moon, Mars and beyond. But before it gets to the moon, the Lunar Greenhouse is hitting the road.

Designed by a team at the University of Arizona Controlled Environment Agriculture Center, the greenhouse is being exhibited at the San Diego County Fair, followed by a stopover at the Museum of Science and Industry in Chicago.

"This is for rocket technology, but it's not rocket science," said Lane Patterson, lab manager and researcher for the project.

The goal is to show vegetables can not only be grown in space, but can also supply astronauts with oxygen and clean water, he said.

A prototype has been operating at UA's Campus Agriculture Center since 2010. Inside, vegetables climb the walls of the 18-

See GREENHOUSE, A4

IF YOU GO

On StarNet: Find more coverage of science and technology at azstarnet.com/science

SPECIAL ELECTION TODAY FOR GIFFORDS' FORMER SEAT

ELECTION 2012

62 at USAF 'boneyard' accept offer to retire early

By Becky Pallack
ARIZONA DAILY STAR

Sixty-two civil-service employees have accepted early-retirement offers in a plan to cut jobs at the U.S. Air Force 309th Aerospace Maintenance and Regeneration Group, often referred to as the "boneyard."

The group is one of Tucson's largest employers, with 857 full-time-equivalent jobs. Workers maintain or retire old aircraft at Davis-Monthan Air Force Base.

This is the first time the group has seen job cuts in several years. The group added 245 jobs in 2010, and employment held steady since then.

Col. Allan Day and Col. Patrick Nanashiro met with local leaders on Friday to talk about the changes.

"The meeting was held to discuss

See RETIRE, A4

COMING THURSDAY

Make a splash

From towering slides to ultracool pool parties, there's something for everyone in Tucson.

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Lunar Greenhouse scientists to speak

Written by Adrian Vore

3:37 p.m., June 27, 2012

DEL MAR — The fair will play host Friday and Saturday to two of the leading scientists making the Lunar Greenhouse program happen at the University of Arizona.

On Friday, Dr. Gene Giacomelli, director of the Controlled Environment Agriculture Center at the university and principal investigator of the Lunar Greenhouse program, will be at the Farm in the Infield from 11 a.m. to about 4 p.m. to discuss controlled environment agriculture and the Lunar Greenhouse.

Results from science and technology research in the Lunar Greenhouse program at U of A are used to create new approaches for life support systems and to solve real-world problems of feeding people in arid, semi-arid, urban and extreme environments, on Earth and beyond.

Dr. Merle Jensen, professor emeritus of plant science, and founder of the Controlled Environment Agriculture Center, will speak on "Urban Intensive Food Production: From Spaceship Earth To Planet Mars." His talk will be held at the Farm in the Infield at noon and 3 p.m. Saturday.

Jensen is the lead engineer for The Land pavilion at Epcot at Disney World in Orlando, among other projects in controlled environment agriculture over the last half-century.

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Also of interest

Out of this world plants

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Urban growers go high-tech to feed city dwellers

Future of urban farming is soil-free

Workshops & Conferences including:

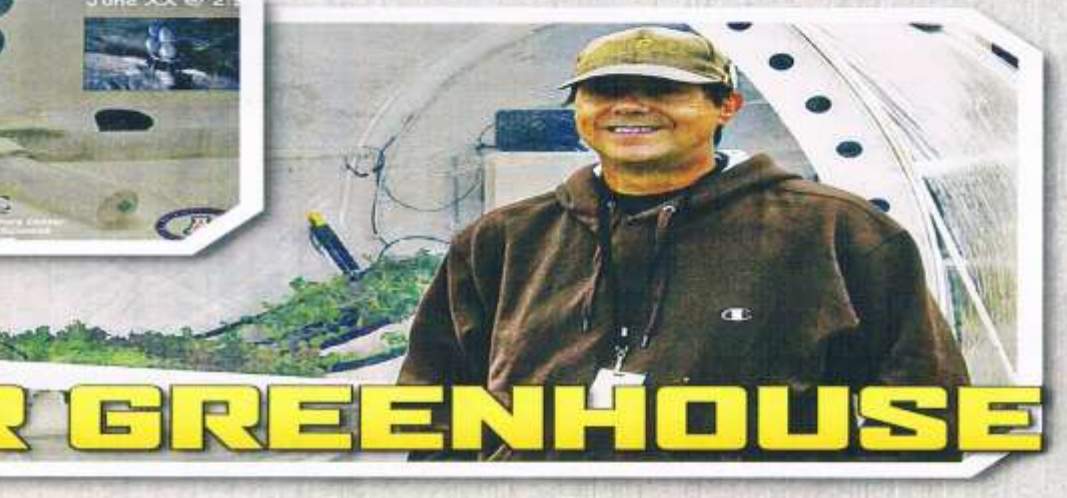
- AgroSpace Workshop 2010 (Italy)
- ICES (International Controlled Environment Systems)
- American Society of Agricultural and Biological Engineers (ASABE)
- Others in Israel and Holland
- Arizona Governor's Conference (2012) in planning.

Moreno Valley, who sang "Mereces."

Turf Club, cocktails, and stage-front concert seating. Four outstanding high school seniors who have participated in activities on the Del Mar Fairgrounds will be honored this evening with $5,000 college scholarships. Tickets and sponsorship options are available at **www.dondiegofund.org**.

This year's 4-H scholarship was given to **RaeAnne vanTol**, who resides in Ramona and attends Mountain Valley Academy. She will attend Cal Polytechnic State University in San Luis Obispo in the fall and will major in Animal Science. This year's FFA scholarship was awarded to Lakeside's **Kendall Lynch**, who attends El Capitan High School. She will also attend Cal Poly and major in Animal Science. The Employee scholar for 2012 is **Kirby Challman** of Point Loma High School. Kirby will attend Point Loma Nazarene in the fall majoring in Political Science. The Exhibitor scholarship went to 16-year-old **Meredith Lehmann** from La Jolla High School. Meredith will be attending Stanford University in the fall majoring in physics or classics.

The **Don Diego Fund** has awarded nearly $600,000 in college scholarships since 1985. The **Don Diego Scholarship** was named after Tom Hernandez, who served as the Fair's goodwill ambassador from 1947–1984. The scholarship supports those students who are ambassadors for the county, academically and through their achievements. Funds are raised through the annual gala, the Amigo Club and donations. For more information or to make a donation, go to **www.dondiegofund.org**.



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vapor is released by the plants. Each plant in the **Lunar Greenhouse** can provide the water and oxygen for one astronaut every day.

The Lunar Greenhouse can be adapted for "earth" uses, too. This greenhouse can work in any climate on our planet, and food shortages could be eliminated. Green veggies at the North Pole? The Sahara? Our inner cities? It's possible.

The **Lunar Greenhouse** is the brainchild of the University Of Arizona Controlled Environment Center. San Diego Ag Pals, led by Alex Kallas (pictured above), is providing educational programs for the greenhouse on the Fairgrounds. After the Fair, the **Lunar Greenhouse** is headed for Chicago's prestigious Museum of Science and Industry.

MEDIA RELEASE
Embargoed until May 3, 2012

UA-CEAC SENDS FIRST LUNAR GREENHOUSE TEACHING MODULE TO SAN DIEGO
LGH-OTM LANDS AT FAIRGROUNDS IN DEL MAR JUNE 8

Later this month, and then in June, our Moon and Mars will be seen together in the night sky. If people journey to either for long stays, how will they eat after going those long distances in space?

In little more than a month, answers to those questions will be revealed as the Lunar Greenhouse opens accordion-like, showing its first Outreach and Teaching Module, for earth-folk, smack dab in the middle of the throngs at the San Diego County Fair. Del Mar may never be the same.

But certainly anyone who sees this compact result of more than a decade of research by the Controlled Environment Agriculture Center at the University of Arizona, of what it takes to feed travelers off our home planet, will learn much about what we need to feed ourselves at home, on Earth, as well.

revealed in concentrated focused intenses form as

The Lunar Greenhouse Outreach and Teaching Module –or LGH-OTM – is a concentrated version of the four chamber full-scale LGH version today being assembled at the Controlled Environment Agriculture Center of the University of Arizona. Partially sponsored by the Steckler Grants program of NASA and the National Science Foundation, the LGH is also a project of the LPL through the It's also based on work done from the early years of this century at the SPFGC and with a subsidiary of the Rayhteon Corp.

Answers to that question have been researched for years by a determined team sponsored now by grants from NASA and the National Science Foundation at University of Arizona's Controlled Environment Agriculture Center.

Quote: We believe that your exhibit could be a favorite for children and families, as well as those enthusiastic about space exploration. Katie Phillips Exhibits Manager, San Diego County Fair

We would like for you to join us June 8 through July 4, as we explore the wonder of the universe and our efforts to explore it. We know you have been working with Alex Kallas and Ag PALS to expedite a plan for the exhibit's display. As we move closer to the date of the Fair, we will need specific information to assure that the exhibit is an exciting and well-received one for San Diego County Fair-goers and for all those involved in your exhibit, working together to educate the Fair-going public on advances in sustaining life in space.

"Food for people can be grown anywhere we go," says agricultural biosystems engineer Dr. Gene Giacomelli. "And that includes across the universe," he adds. Renewed support from NASA and the National Science Foundation is helping Giacomelli and his co-researchers at the Controlled Environment

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From Planet Earth to Spaceship Mars: The Lunar Greenhouse

Released: June 29, 2012

DEL MAR, CA — If astronauts are to undertake lengthy space missions, there has to be a way to keep them nourished without overloading their spacecraft with provisions. Scientists at the University of Arizona are tackling that problem, and their answer can be found at the 2012 San Diego County Fair, presented by Albertsons/Sav-On.

The "Lunar Greenhouse," located in The Infield, will provide a life support system for astronauts – and, at the same time, it can be adapted to feed earthlings! Dr. Merle Jensen, Professor Emeritus of the University of Arizona is one of America's leading agricultural scientists on the subject of controlled environment agriculture. He is the founder of the University's Controlled Environmental Agricultural Center, which developed the Lunar Greenhouse. **Dr. Jensen will speak at the Lunar Greenhouse, at noon and 3:00 p.m. on Saturday, June 30, on the topic of "Growing Food Out Of This World."**

The object of the Lunar Greenhouse is to show that vegetables can be grown in space, and supply astronauts with oxygen and clean water. The greenhouse is able to grow green leafy vegetables and root crops like sweet potatoes, hydroponically – in water, without soil. The plants absorb carbon dioxide, which the astronauts breathe out. Oxygen and water vapor is released by the plants. Each plant in the Lunar Greenhouse can provide the water and oxygen for one astronaut every day. The Lunar Greenhouse can be adapted for "Earth" uses, too. This greenhouse can work in any climate on our planet, and food shortages could be eliminated. Green veggies at the North Pole? The Sahara? Our inner cities? It's possible!

San Diego Ag Pals, led by Alex Kallas, is partnering with the Controlled Environmental Agricultural Center, and is providing educational programs for the Lunar Greenhouse on the Fairgrounds.

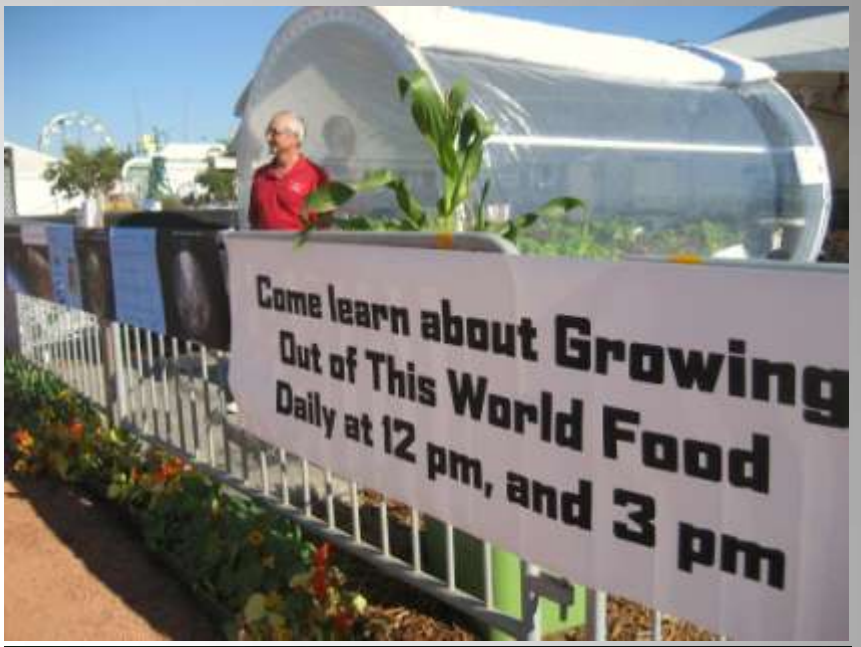
The summer of 2012 is taking San Diego County Fair fans "Out Of This World" to the stars, planets and beyond. Every day at the Fair is filled with discovery and mystery of the outer limits. The Fair will explore man's history and fascination with space and space travel starting with the ancient astronomers, to the NASA program and the future of space exploration.

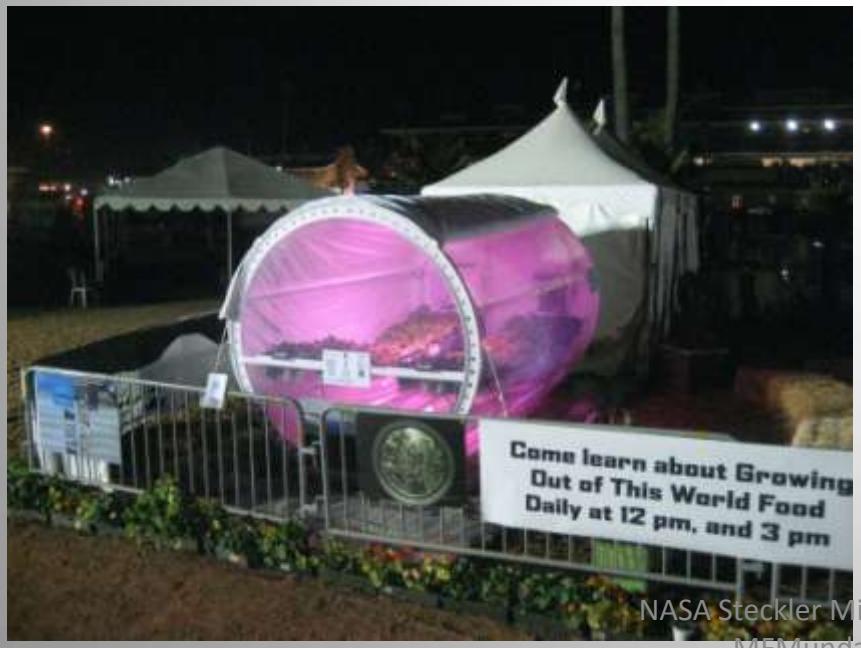
The 2012 San Diego County Fair is open every day, now through Wednesday, July 4.

Gates open daily at Midday, weekdays at 2 and 10 a.m., Saturdays, Sundays, and July 4. Admission is $13 for adults; $7 for ages 6-12 and 62 and older; free for ages 5 and

- **Multi-Channel & Cross Audience Venues using an LGH-OTM:**

- San Diego County Fair, June 1 – July 4, 2012, Del Mar, CA [1.5 Million Attendees] –
  - Outdoor Exhibition
  - Daily Presentations in collaboration with AgPals , a science based education nonprofit focusing on sustainable agriculture
  - Print Materials
  - Banners.
- Museum of Science & Industry, Chicago, July 25, 2012 – January 31, 2013, Chicago, IL [Antipated Attendees- 850,000] –
  - Fully Curated Indoor Exhibit Installation
  - Exhibit Book Presentation
  - Multi-Media Presence
  - Venue for Media & Classroom visits and presentations
  - Special Arrangements in planning for
    - South Pole Interactive Telepresence Class Presentations
    - UA-CEAC Interactive Telepresence Class Presentations


Come learn about Growing
Out of This World Food
Daily at 12 pm, and 3 pm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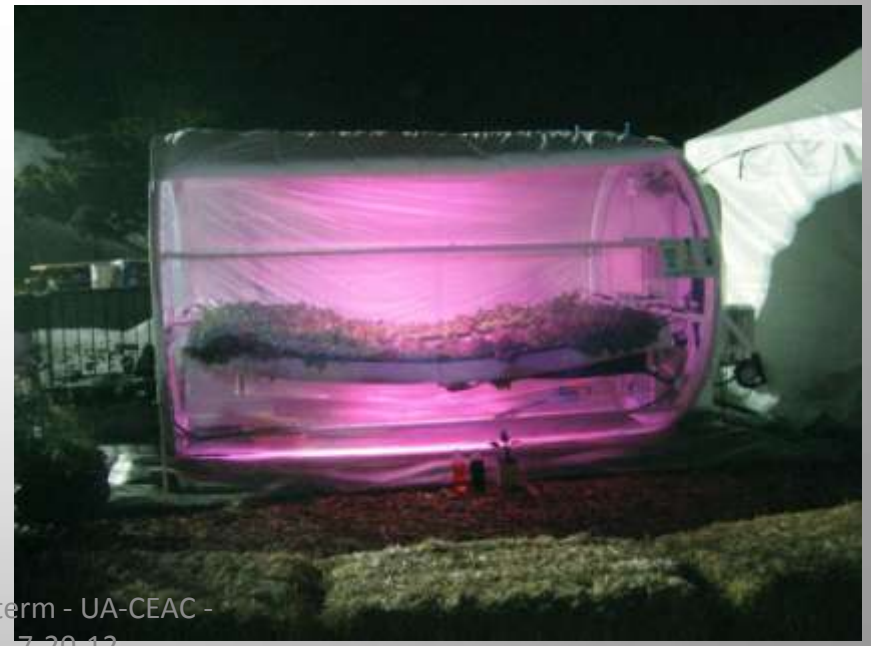

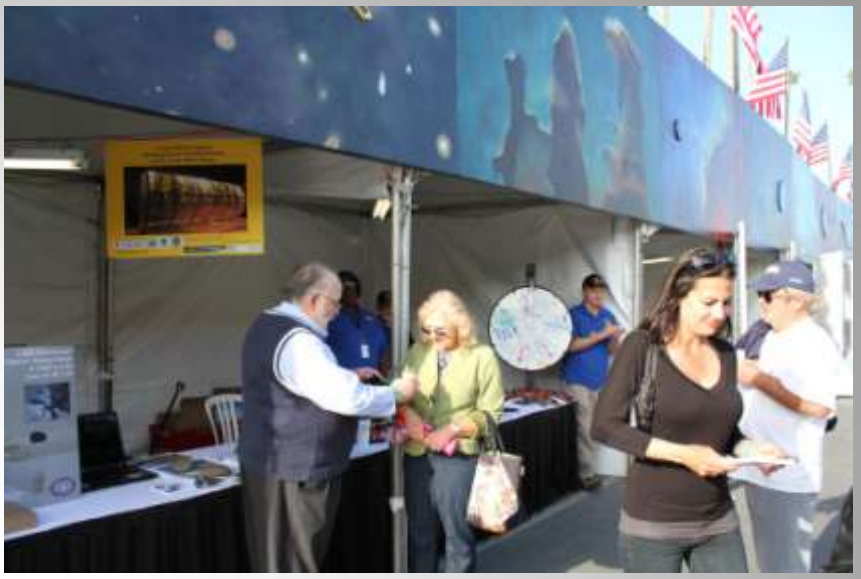

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NASA Steckler Midterm - UA-CEAC -
MFMunday - 7-20-12