News on Technology for Vertical, Controlled Environment & Urban Farming URBANAGNEWS.COM
Issue 15 | October 2016

URBAN AG NEWS

THE LIGHTING ISSUE!

LEO MARCELIS, DIRECTOR OF HORTICULTURE AT WORLD-LEADING UNIVERSITY is determining the benefits of LEDs on plants **PG 20**

INTERNATIONAL SYMPOSIUM focuses on horticultural lighting research **PG 8**

Food insecurity in **VENEZUELA** **PG 50**

Developing the right light recipes for vegetable crops with **SHALIN KHOSLA** **PG 34**

URBAN AG NEWS

The Urban Ag News Team

Chris Higgins
Editor-in-Chief

David Kuack
Technical Writer

Jim Pantaleo
Director of Business Development

Alicia Morcillo
Graphic & Web Designer

Urban Ag News is an ***information resource*** dedicated to helping the **vertical farming, controlled environment, and urban agriculture industries** ***grow*** and ***change*** through education, collaboration and innovation.
Urban Ag News actively seeks to become a connector for niche agricultural industries, **bringing together growers with growers, growers with manufacturers, growers with suppliers and growers with consumers**.

Urban Ag News is an ***educator*** providing content through a variety of different media. Through its educational efforts, including its online quarterly magazine and blog, Urban Ag News seeks to provide its users with a basic understanding of the industry and to **keep them informed** of the ***latest technologies***.

Stay connected with us

subscribe
TO OUR MONTHLY NEWSLETTER!

Advertise with us!
FOR SPONSORSHIP INFO, CLICK HERE.

Table of Contents

WHO YOU SHOULD BE FOLLOWING

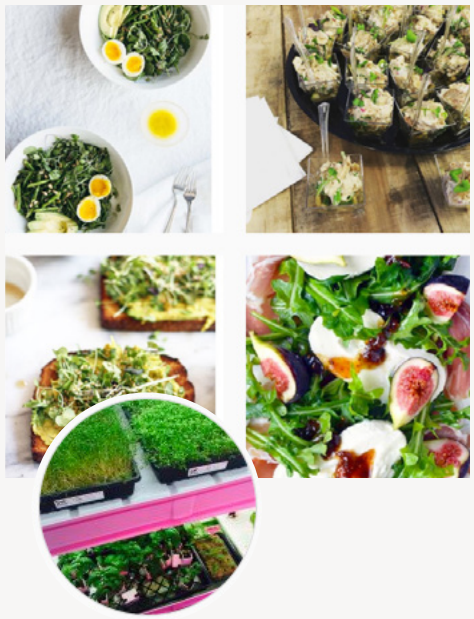
Village Farms

Square Roots

Houweling's Tomatoes

AND DON'T FORGET TO FOLLOW URBAN AG NEWS

Bermy Fresh



Hort Americas

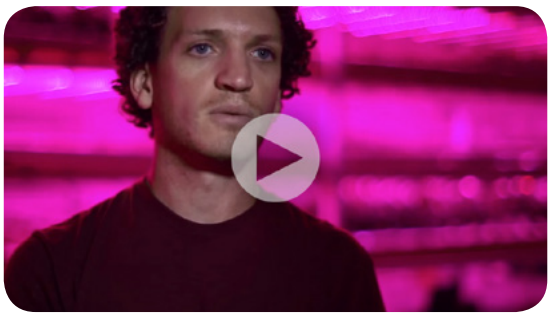
Windset Farms

Greenhouse Peppers & Cucumbers Consulting

Mississippi Greenhouse Tomato Short Course

Ontario Greenhouse Vegetable Growers

URBAN AG NEWS YOUTUBE CHANNEL



Jeffrey Orkin of Greener Roots

Susie Marshall of Grow North Texas

Matt Ruibal of Ruibal's Plants of Texas

Triathlon® BA
Biofungicide/Bactericide

Next Generation Biofungicide

- Bactericide and Fungicide
- Approved for organic and non-organic production
- Foliar and drench applications

OMRI® LISTED
For Organic Use

#triathlon_ba

@OHPSolutions

ohp.com

(800) 356-4647

INSECTICIDES
FUNGICIDES
MITICIDES
PGRS
HERBICIDES

ohp Partners with solutions

URBAN AG NEWS TALKS ORGANIC HYDROPONICS WITH BRETT ELLIOTT, FARM MANAGER AT ELLIOTT GARDENS

FARMER TYLER

International Symposium FOCUSES ON Horticultural Lighting Research

BY DAVID KUACK

Scientists, university researchers, graduate students and industry representatives from 25 countries attended the 8th International Symposium on Light in Horticulture at Michigan State University.

Michigan State University hosted the 8th International Symposium on Light in Horticulture from May 22-26. This was the first time the symposium, which began in 1969, was held in the United States. The symposium was attended by 250 people from 25 countries.

Michigan State horticulture professors Roberto Lopez and Erik Runkle were the organizers and co-conveners of the symposium.

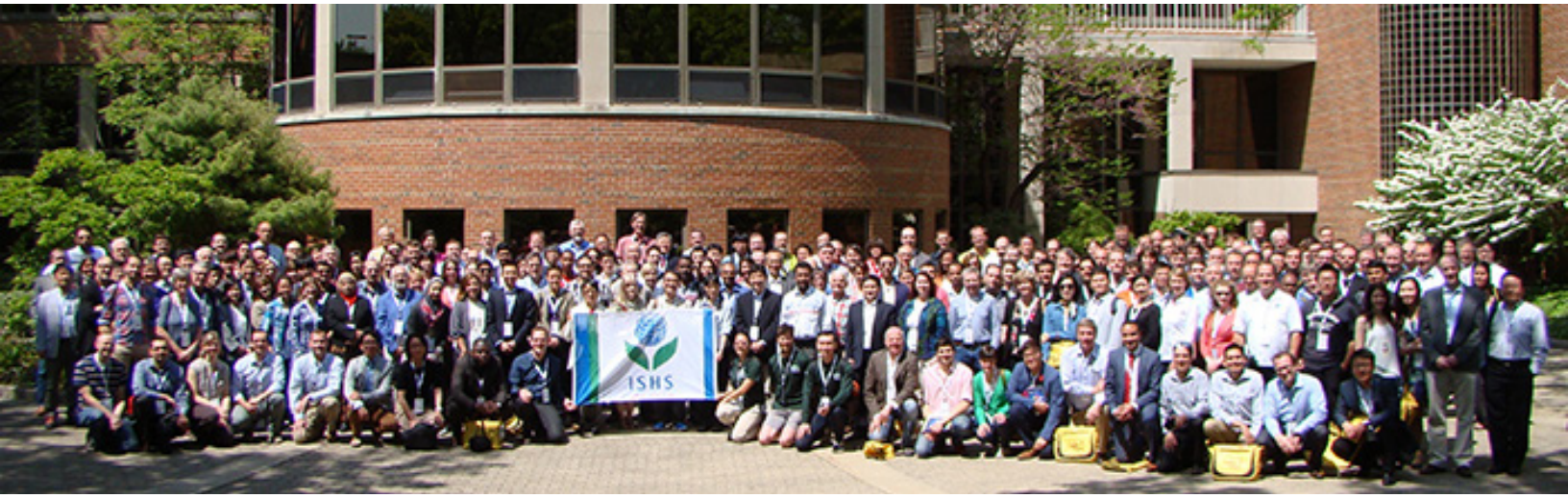
"The symposium is part of the International Society for Horticultural Science," Lopez said. "The light symposium is held every three to five years."

Lopez, who is the chair of the ISHS Workgroup Light in Horticulture, said he and Runkle began working on the symposium three years ago.

"ISHS is similar to the American Society for Horticultural Science, but ISHS is for international participation," Lopez said. "ISHS, which has more than 130 working groups, also holds an international congress every four years. It is open to all of its members, making for a very large scientific meeting. The 30th International Horticultural Congress is scheduled for Istanbul, Turkey, in 2018."

Lopez said light symposium attendees made up a very diverse group that included scientists, researchers, graduate students, growers and members of various companies which helped sponsor the event.

"There are two ISHS conferences that I typically attend, this light symposium and the International Symposium on New Ornamental Crops," he said. "The ornamentals symposium attracts more people because ornamentals and floriculture are more general than lighting. Lighting is more specific to certain countries and northern latitudes or to places that are just now starting to produce plants indoors. This would include primarily Europe, the U.S., Canada, Korea and Japan. These were the countries that had the most participants at the light symposium. In terms of the number of oral and poster sessions, there were an equal number of researchers focused on ornamentals and vegetables."



Horticulture industry steps up

Lopez said planning the light symposium and preparing the written proceedings that accompany it are very time consuming.

"There is a lot of speculation as to what the conference is going to cost and how many people are going to attend," he said. "As hosts we take on the financial burden because we really don't know what the attendance will be. Erik and I anticipated 200-300 participants based on the previous symposium that was held in the Netherlands in 2012."

Lopez said they received financial support from 25 industry companies.

"There were different categories of sponsorship, including three prime sponsors for the symposium's opening reception, banquet and tours. There were three additional levels of sponsorship, platinum, gold and silver. Sponsoring companies included many of the leading plant light companies, plant breeding companies, distributors, an industry association and the trade press.

"The sponsors were recognized on the light symposium's website, as well as banners that were hung in different locations during the symposium. The sponsors received a lot of exposure and those at the prime and platinum levels had vendor booths that featured product information and samples. Because of the sponsors' financial support, we were able to lower the cost of the registration fee for attendees. We were also able to subsidize the graduate student registration cost."

There were 35 graduate students who presented both oral and poster sessions. The students came from several different countries.

"We also had a graduate student poster competition," Lopez said. "Three winners were awarded. There were three judges, all representatives from academia in the U.S., Europe and Japan. The poster winners were awarded certificates and monetary awards provided by a sponsor company."

Organizing the presentations

Lopez said he and Runkle began accepting abstracts from potential symposium presenters in Feb. 2015.

"There is a scientific committee that consists of 39 people, most of whom have a PhD. or are working toward a PhD.," he said. "Over 90 percent of the committee members are from academia, but there are also industry members.

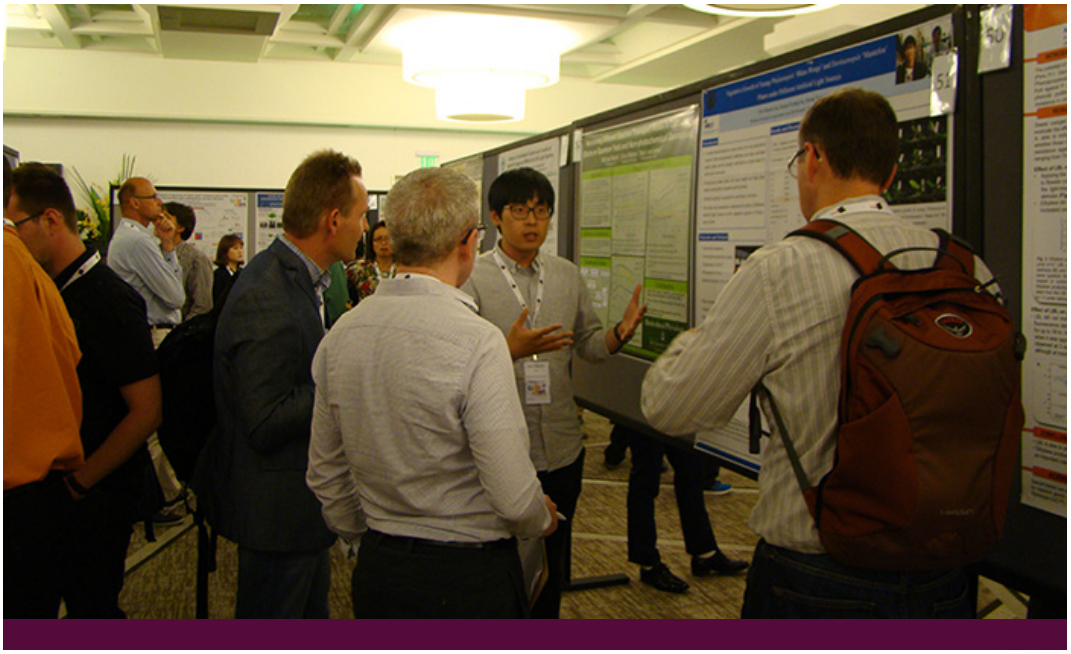
"We had a call for abstracts so people would submit an abstract based on the research they wanted to present. Participants who submitted abstracts indicated whether they wanted to do an oral or poster presentation. The scientific committee members reviewed the abstracts. Often times we had to send them back because there was definitely a language barrier in some cases. Often times some researchers needed help with the English translation. A lot of the researchers wanted to do oral presentations, but unfortunately there wasn't enough time during the symposium."

Lopez said committee members decided that some of the abstracts were more appropriate as posters than as oral presentations. There were 52 oral presentations and 78 poster presentations.

"We created 11 different oral sessions and within those sessions we tried our best to place the presentations appropriately under those titles," he said. "The largest session was on light quality and optimization. There were an equal number of U.S. and European presenters in that session.

"The next largest session was supplemental lighting of vegetable crops. That one had research presenters mostly from Canada and Europe. No U.S. researchers did presentations in that session. Light for ornamental crops and sole-source lighting of vegetable crops were the next largest sessions."

The 8th International Symposium on Light in Horticulture was held at Michigan State University in May and attended by 250 people from 25 countries. *Photos courtesy of Roberto Lopez, Mich. St. Univ.*



There were 52 oral presentations and 78 poster presentations given during the light symposium. Thirty-five graduate students presented both oral and poster sessions.

In addition to organizing the symposium presentations, Lopez and Runkle along with Iowa State University horticulture professor Chris Currey were co-editors of the Acta Horticulturae publication, "Proceedings of the VIII International Symposium on Light in Horticulture".

"The majority of presentations published in the proceedings are the oral ones with a few of the poster presentations," Lopez said. "We did request everyone who was going to do an oral presentation to write a manuscript. There were also some people who were doing posters that also submitted manuscripts. These were peer reviewed by the scientific committee."

The Acta Horticulturae light symposium proceedings are available on the ISHS website for 105 euros.

Along with the researchers who did oral presentations there were four invited speakers, two from the United States, one from the Netherlands and one from New Zealand.

"The invited speaker presentations were longer and spurred a lot of conversation," Lopez said. "The invited speakers started off specific topic sessions. They would give an overview of that session and then the presenters would go into their research talks.

"The invited speakers discussed future approaches to better understanding of light quality on plant growth and development. Others talked about UV light and horticulture. Kevin Folta from the University of Florida, who was one of the invited speakers, discussed how to control the light spectrum to manipulate plant responses such as growth, flavor and pigmentation."

The next ISHS Light Symposium is tentatively scheduled for June 2020 in Alnarp, Sweden, and will be organized by the Swedish University of Agricultural Sciences.

Three winners were awarded during a graduate student poster competition.

From left to right: Mich. St. Univ. horticulture professor Ryan Warner, Purdue Univ. graduate student Garrett Owen (3rd place), Univ. of Ga. graduate student Shuyang Zhen (1st place), Mich. St. Univ. graduate student Qingwu (William) Meng (2nd place), Mich. St. Univ. horticulture professors Erik Runkle and Roberto Lopez.

For more: Roberto Lopez, Michigan State University, Department of Horticulture, East Lansing, MI 48824;
(517) 353-0342;
rglopez@msu.edu;
http://www.hrt.msu.edu/people/dr_roberto_lopez

Erik Runkle, Michigan State University, Department of Horticulture,
East Lansing, MI 48824;
(517) 353-0350;
runkleer@msu.edu;
http://www.hrt.msu.edu/people/dr_erik_runkle

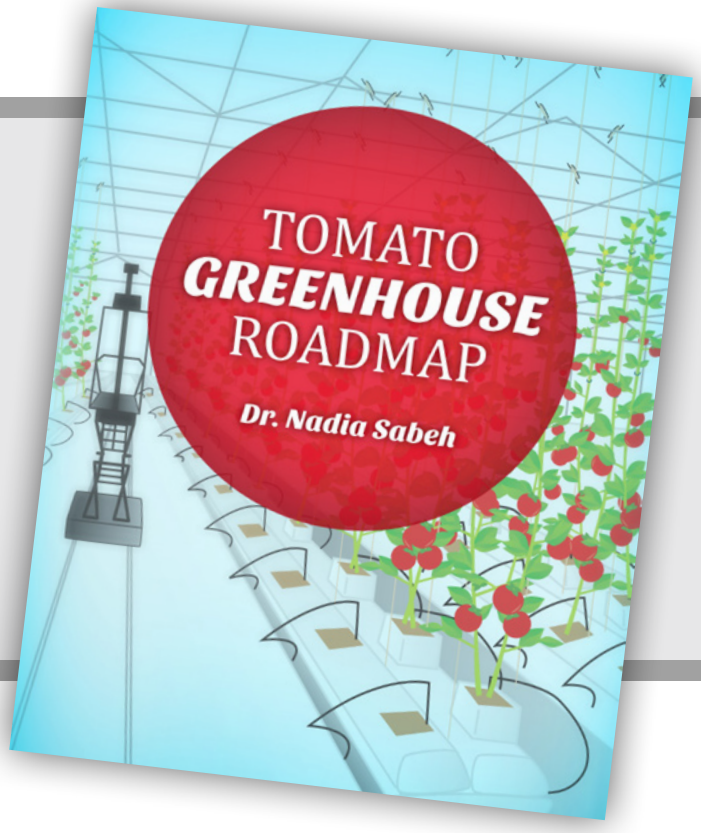
David Kuack is a freelance technical writer in Fort Worth, Texas; dkuack@gmail.com.

GET THE E-BOOK

TOMATO GREENHOUSE ROADMAP

A GUIDE FOR NEW GREENHOUSE GROWERS, FARMERS AND INVESTORS

CLICK HERE FOR MORE INFO!



GROW LOCAL O.C. CONFERENCE 2016

→ The Future of Urban Food Systems

NOVEMBER 10-11, 2016, CALIFORNIA STATE UNIVERSITY

Thursday, November 10 (Conference Day) and Friday, November 11 (Future Farm Field Trip) at California State University, Fullerton, Grow Local OC: The Future of Urban Food Systems Conference presented by Seedstock and the OC Food Access Coalition will focus on the community and economic development potential of urban and local food systems efforts in Orange County – to improve food access and health outcomes, connect people to their food, and create new jobs and business opportunities by employing innovative business models and farming systems of the future.

URBAN AG NEWS FOUNDER CHRIS HIGGINS WILL BE SPEAKING!

The conference will serve to galvanize the citizens, growers, advocates, government officials and other major stakeholders in Orange County around the positive economic and community development outcomes that can result from the creation of healthy and vibrant local food systems in the county and on its fringes.

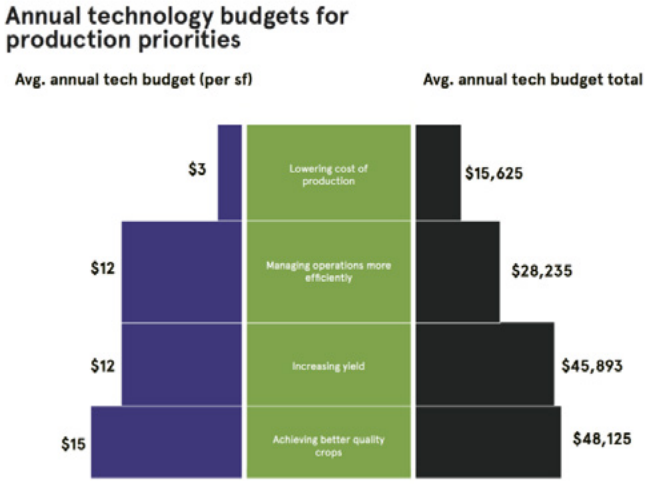
REGISTER NOW!

agrilyst

State of Indoor Farming

2016

There are many unknowns and misconceptions about the indoor farming market. We wanted to provide detailed insight into what indoor growers are doing, what they're challenged by, and how they see the indoor farming industry changing over the next few years. So, we teamed up with Cornell University, Urban Ag News, foodshed.io, the Association for Vertical Farming, and FarmersWeb to survey growers from around the world, receiving over 150 responses. Data from the survey is supplemented by research conducted by our team and others (as linked).



Industry Report — Click here

UF | IFAS Extension
UNIVERSITY of FLORIDA

University of Florida Greenhouse Training Online courses Disease Management

Join over 600 growers who have successfully graduated from Greenhouse Training Online courses offered by the University of Florida IFAS Extension (UF). This new course is designed for growers with some experience and training in the US and other countries. The course is offered in English and Spanish. Learn how plants become infected, what factors contribute to plant disease development, and different options available for diagnosis and control of diseases in greenhouses and nurseries. You will learn about fungicide formulations, how to accurately calculate rates to use, and rules and regulations of handling fungicides.

The course runs for 4 weeks, from September 26 to October 21, 2016. It costs $US 200 per participant, and includes a personalized certificate of completion. Each week there are two streaming video lessons, readings and assignments (about 3-4 hours total commitment per week), which can be accessed at any time of day. Bilingual PhD instructors can be accessed via discussion features. Click here to register.

Are you interested in other courses?

UF online course on management of weeds (starts 10/24) will also offered in 2016. Check out lighting and root zone management courses from Michigan State University, greenhouse plant physiology and technology at the University of Arizona, and greenhouse management at the University of Arkansas.

For more information, go to backpocketgrower.org under "training" and "online courses", or contact Shad Ali, Ph.D., Plant Pathology Dept., or Rosanna Freyre, Ph.D., Environmental Horticulture Dept., University of Florida, USA.
Email: greenhousetraining@ifas.ufl.edu.

Apex-Brinkman Conference 2017

The Apex-Brinkman Conference 2017 will be PCA's 14th biennial event bringing 450+ industry people together over 3 ½ days on 9-12th July 2017. Adelaide was selected as this year's host city due to its accessibility of quality farm tours sites and the brand new first class venue, the Adelaide Convention Centre, West Wing. The state-of-art, hi-tech venue also prides itself on using local, fresh produce – which is our forte too!

ARIZONA | COLLEGE OF AGRICULTURE AND LIFE SCIENCES
CEAC
Controlled Environment Agriculture Center

The 16th Annual Arizona Greenhouse Crop Production and Engineering Design Short Course

April 3 – 7, 2017, Monday noon thru Thursday

We are restructuring, relocating, and renewing its efforts to create the most valuable Greenhouse Short Course in America, offering 2.5 classroom days, 1 workshops day and an optional commercial visit.

Blessed with highly experienced faculty and multiple facilities of the CEAC, the Short Course focuses on the challenges of hydroponic crop production in controlled environments, ranging from greenhouses to growth rooms to indoor Urban Agriculture Farms.

To succeed we need your help, and several champions have already stepped-up, including, Jim Bergantz of AgraTech; Paul Hardej of Illumitex; Ana Reho, Meister Publishing, Patricia Dean of Wadsworth; Chris Higgins of Hort Americas, to support by advertising; sponsoring clients; and supporting scholarships, in addition to hosting a traditional exhibition table.

To ease the registration burden, special rates will be provided to our Exhibitors and our Attendees:

- Be an Exhibitor, refer your client and they get, a 20% Discount for the ATTENDEE FEE ($795 down to $636);
- Be an Exhibitor and refer another company that becomes an Exhibitor, and you receive a 20% Discount on your EXHIBITOR RATE ($1495 down to $1196)
- Sponsor an Attendee for a $600 Scholarship [for anyone; not required to be referred by an Exhibitor] and you provide $300, CEAC contributes $300, and the Sponsored Attendee pays $195 as their buy-in commitment to the $795 early registration.
- Attendees returning from last year get 10% Discount on ATTENDEE Fee

For information contact Austin Smith at 520-626-9566

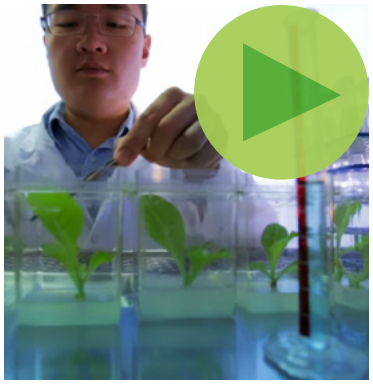
Food From Thought

The University of Guelph has received $76.6 million from the federal government to start a "digital revolution" in food and agriculture.

The government is investing in U of G's Food From Thought research project, which will use high-tech information systems to help produce enough food for a growing human population while sustaining the Earth's ecosystems.

The funding, announced today by Lloyd Longfield, MP for Guelph, on behalf of Kirsty Duncan, minister of science, will come from the Canada First Research Excellence Fund (CFREF), which supports world-leading research at universities and colleges.

It's the largest single federal research investment in U of G history.



UNIVERSITY of GUELPH

INTERNATIONAL CONGRESS ON
CONTROLLED ENVIRONMENT AGRICULTURE
VERTICAL FARMING • GREENHOUSE • AG TECH

ICCEA 2017

Panama City, Rep. of Panama | May 17, 18 and 19

USING SCIENCE AND THE MARKET TO BUILD A SUCCESSFUL CONTROLLED ENVIRONMENT AGRICULTURE BUSINESS

EXPECTING OVER ***600 ATTENDEES AND 60 EXHIBITORS***
MEET AND NETWORK WITH LIKE-MINDED
PROFESSIONALS AND INDUSTRY EXPERTS FROM AROUND THE WORLD

FOR MORE INFORMATION VISIT
icceapanama.org

Organized by FDCEA
FOUNDATION FOR THE DEVELOPMENT OF CONTROLLED ENVIRONMENT AGRICULTURE

HORT AMERICAS

Urban Farms

URBAN AG NEWS

CAF DEVELOPMENT BANK OF LATIN AMERICA

IICA

UTP

SENACYT
SECRETARÍA NACIONAL DE CIENCIA, TECNOLOGÍA E INNOVACIÓN

Nuetech

DETERMINING THE POTENTIAL BENEFITS OF LEDS ON PLANTS

Researchers at **Wageningen University** in the Netherlands are studying the effects of LED lights on the growth, flowering and fruiting of vegetable and ornamental plants in controlled environments.

By David Kuack

Dutch growers who are building new greenhouses or adding new grow lights to their existing operations are comparing high pressure sodium (HPS) and light emitting diodes (LEDs) when making their decision.

"At the moment there aren't as many growers making the switch from HPS to LEDs," said Leo Marcelis, head of chair group horticulture and product physiology at Wageningen University in the Netherlands. "Most growers who have made the investment in HPS lamps, they're not just going to replace HPS with LEDs. It's growers who are starting with a new greenhouse or who are retrofitting an existing greenhouse without lamps who are looking to install LEDs.

"The other growers who are adding LEDs are the ones who already have installed HPS and want to increase the light intensity and are adding LED interlighting. They are combining HPS top lighting with LED interlighting. This is occurring especially with the tall greenhouse vegetable crops like tomatoes. The HPS lamps are installed over the top of the crop and the interlighting LEDs are installed within the canopy."

Many unanswered questions

With the increased grower interest in LEDs, researchers at the university are focusing more of their studies on the effects of single and combined light wavebands on plant growth, flowering and fruiting.

"Most of the research we are doing on lighting is with LEDs," Marcelis said. "High pressure sodium lamps are still the standard for most growers so the lamps are still relevant. But for our research there is not as much being done with HPS as with LEDs. We are focusing more on LEDs. The opportunities created by LEDs, there are so many questions still unanswered about using LEDs. As growers start to put in new lights they are making the switch to LEDs. We expect more of that to occur in the coming years."

Focus on controlled environment crops

Marcelis said greenhouse tomatoes are the largest crop in the Netherlands, even bigger than cut flowers such as roses and potted ornamental crops such as orchids.

"Tomato is the most important crop in our research. In the Netherlands there are about 1,700 hectares of tomatoes in glass houses. About 1/3 of that area is equipped with HPS lamps. There are about 1,200 hectares of sweet peppers in glass houses with only a few hectares equipped with HPS lights. The calculations are such that the economics are not that profitable for sweet pepper and cucumber. It is more economical and profitable to light tomatoes, not sweet peppers and cucumbers. There are more growers starting to grow strawberries in greenhouses who are using LEDs to control the day length. More growers are also using LEDs for assimilation lighting."

Marcelis said lettuce is another crop that is being studied whether it's grown in vertical farming setups in warehouse facilities

or in greenhouse operations. Roses and phalaenopsis orchids are the most important ornamental crops being studied.

"We currently aren't doing any projects with cucumbers or sweet peppers using LEDs," he said. "Since there are not as many growers using lights on these two crops, we are not focusing our research on them, but this could easily change in the coming years."

Focused on issues important to growers

Marcelis said most of the university's lighting research projects are on greenhouse produce because that is the area of most economic activity in the Netherlands.

"Vertical farming is attracting a lot of attention," he said. "We are also conducting research in climate chambers which can have application to vertical farming.

"We are looking at different aspects of lighting, including light spectrum and energy savings. Energy savings is an important issue with the growers so we are doing a lot of research on that. If the light used is more efficient, then there can be energy savings. Talking to the growers, year-round production, fruit quality and energy savings are the issues they're interested in. If growers can increase production with the same amount of light, then there is an energy savings.

"The majority of lights are used for assimilation. They are primarily used from

Photos courtesy of Leo Marcelis, Wageningen University

Breeding researchers at Wageningen University are working in cooperation with commercial breeding companies to screen different genotypes to determine any variation under LED lights.

Most of Wageningen University's lighting research is on greenhouse produce because that is the area of most economic activity in the Netherlands.

September through April. The greenhouses are equipped with climate control and the growers are measuring outside radiation. If the outside radiation falls below a designated level, then the lamps are often turned on. The growers typically choose a time frame during the day. From September through April all of the lights are used. After April then the lights might be used during relatively dark days."

Looking at plant processes

Marcelis said the researchers are doing a lot of studies on photosynthesis and the morphology or architecture of the plants.

"Affecting the morphology impacts the light absorption of plants and the light distribution," he said. "We feel light distribution is a very important issue where improvements can be made. We also do work with three dimensional assimilation models. From light absorption it goes to total growth of the plant as a whole. Another area of research is the distribution of assimilates among the different plant organs."

Marcelis said there is also some preliminary research that indicates plants can be made more resistant to diseases, particularly increasing the resistance of roses to powdery mildew.

"We have done experiments that have indicated that we can improve disease resistance. Flower induction is also very important. It can be done now with controlling photoperiod, but can it be done using different spectra?

"There is also some work being done on the quality of the plants. Is it possible to focus the light on the tomato fruit in order to increase the vitamin C content? Some of the same things can be done with lettuce. We are also starting to look at post-harvest qualities. So we are looking at not only what can be done during cultivation, but also can the post-harvest quality of the fruit be improved. This also includes lengthening the shelf life of lettuce and cut flowers."

Marcelis said studies are also being conducted in cooperation with commercial breeding companies and breeding researchers at the university.

"One of the projects is screening 40 different genotypes, including commercial cultivars," he said. "One study is looking at the variation between genotypes under LEDs. The breeders will look at the variation between genotypes and try to determine why the variation is occurring. What parts of the plant are affected? Can breeders predict if varieties will do well or not so well under certain wavebands?

"There are all of these different genotypes. Some do better under white light than a mixture of red and blue. Some genotypes are showing better results under red and blue light. They all don't respond similarly. For breeders it means there is a lot of opportunity and room for improvement. Since the focus is on using LEDs with tomatoes that is where most of the breeding research is being done."

For more: Leo Marcelis,
Wageningen University,
Horticulture and Product Physiology Group,
Wageningen, The Netherlands;
(31) 317-485-675;
leo.marcelis@wur.nl;
http://www.hpp.wur.nl

David Kuack is a freelance technical writer in Fort Worth, Texas; dkuack@gmail.com.

SUBSCRIBE TO OUR EMAGAZINE

SUBSCRIBE
TO GET OUR LATEST
UPDATES SENT
STRAIGHT TO YOUR
INBOX

INTERESTED IN BEING AN URBAN AG NEWS INTERN?

CONTACT US IF YOU'D LIKE TO INTERN
WITH URBAN AG NEWS.
SEVERAL TYPES OF OPPORTUNITIES AVAILABLE.

END OF THE LINE FOR HUNDREDS OF ORGANIC GROWERS?

COALITION FOR SUSTAINABLE ORGANICS OPPOSES RECOMMENDATION TO REVOKE CERTIFICATIONS FOR GREENHOUSES AND OTHER CONTAINERIZED GROWING FACILITIES

The Crops Subcommittee of the National Organic Standards Board has submitted a recommendation that crops using hydroponic, aquaponic, aeroponic and other containerized growing methods—commonly used for products like living lettuce, herbs, sprouts and leafy greens—should no longer be eligible for organic certification. In addition, the Crops Subcommittee recommended new restrictions on the growing media for producers of other crops that use containers in their farming practices. This would have the greatest impact on the production of organic berries, tomatoes, cucumbers and peppers. The U.S. Department of Agriculture recently published these proposals from the Crops Subcommittee for consideration at the Board's November 2016 meeting.

"The Coalition for Sustainable Organics believes that we should be making it easier, not harder, for people to access organic produce," stated Lee Frankel, executive director for the Coalition.

"The proposals being presented by a subcommittee of the National Organic Standards Board go against the original principles of organic farming. It was stunning to see their statement that the conservation of natural resources, such as clean water, is not a valid concern for organic production systems.[1]"

Karen Archipley, co-owner of Archi's Acres, a certified organic greenhouse operation headquartered in Escondido, California, expressed her concerns about the proposal. "The proposal will cause undue harm to our business and discourage farmers and consumers from choosing organics that are truly sustainable," stated Archipley. "The consumers of our living basil, kale, other herbs and produce embrace the fact that we are conserving water and delivering a product of the highest quality and flavor through our production methods, which are truly organic."

Martin Gramckow, founding member of the Coalition for Sustainable Organics and a certified organic grower of blueberries, raspberries and blackberries for Southland Sod Farms in the Oxnard, California area, was also troubled by the recommendation. "While I appreciate the hard work of the members of the National Organic Standards Board, I disagree with the direction taken by the Crops Subcommittee. We need to maintain the sensible current standards for organic production using containers rather than insisting on requirements that are wasteful and counter to the environmentally conscious ethos that "Organic" represents. My container production results in higher productivity through healthier plants, by optimizing the root zone environment and its associated biological processes. Making arbitrary changes to existing organic rules will limit future innovation and needlessly restrict people's access to domestic organic supplies."

Click here for the full story

coalition for sustainable ORGANICS

[1] Statement of Crops Subcommittee at page 143 of Proposals: "While production of the crop in a bioponic system can require less water to grow the crop than field growing, this ignores the earth's water cycle, where "excess" water is not lost or wasted, but is continually recycled either by recharging the ground water resource or evaporating into vapor to produce rain, snow or fog." The subcommittee's approach ignores the serious water shortages being faced by America's farmers as documented by USDA's Economic Research Service (http://www.ers.usda.gov/media/1951520/err201_summary.pdf).

Green Bronx Machine is back to school and has hit the ground running! Here is their Back to School Video highlighting the completed National Health Wellness and Learning Center classroom and their May 10th Celebration with NYS Education Chancellor Dr. Betty Rosa and our Bronx Borough President Ruben Diaz Jr.

Green Bronx Machine builds healthy, equitable, and resilient communities through inspired education, local food systems, and 21st Century workforce development. Dedicated to cultivating minds and harvesting hope, our school-based model using urban agriculture aligned to key school performance indicators grows healthy students and healthy schools to transform communities that are fragmented and marginalized into neighborhoods that are inclusive and thriving.

Helping school children to eat healthy

Chris Higgins, general manager at Hort Americas, talks about why he and his company are involved with Tour de Fresh.

By Jim Pantaleo

I recently had the opportunity to sit down with Chris Higgins, general manager at Hort Americas, to discuss his recent philanthropic activities, most specifically regarding his important work with Tour de Fresh. Tour de Fresh, presented by The California Giant Foundation, is the first-of-its-kind, collaborative event that unites the most significant brands and influencers in the fresh produce industry for a four-day cycling event that raises funds to benefit the Let's Move Salad Bars to Schools campaign.

The goal of the 2016 Tour de Fresh and its participants is to privately finance 100+ new salad bars in school districts across the country. At a cost of $3,100 per salad bar per school, sponsors and participants alike strongly believe that providing healthy eating opportunities for school children should be a requirement. We have raised enough money to buy multiple salad bars for multiple schools.

JP: How did you become aware of and associated with Tour de Fresh?

CH: I was introduced to the Tour de Fresh by a close friend and industry mentor, Ron Cramer. Ron saw a press release for the first event in the spring of 2014. Ron rode in the first year's Tour de Fresh with me. He was the oldest rider on the tour. I won't mention his age!

JP: How many rides have you been on?

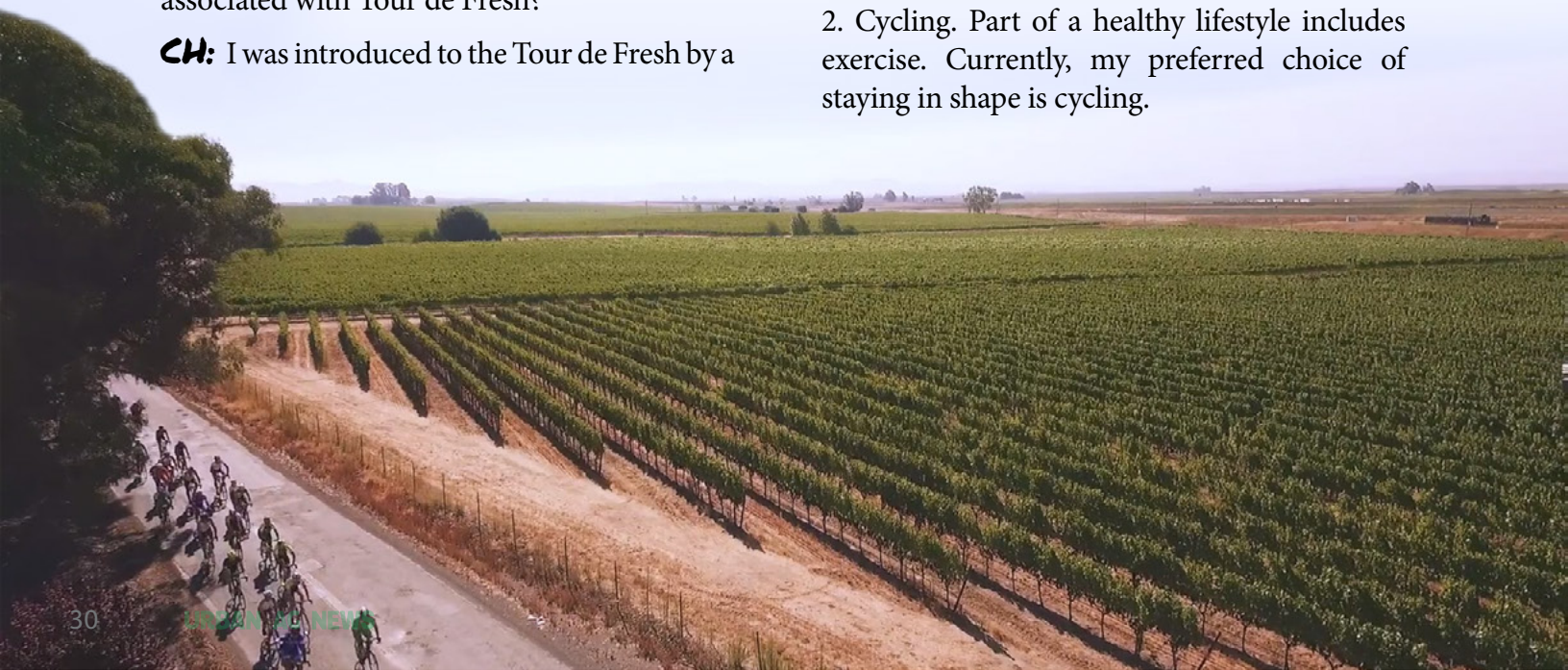
CH: This year was my third year. The first year, we rode the California coast from Monterey to Anaheim. The second year, we rode the Great Smoky Mountains from Hickory, N.C., to Atlanta, Ga. This year it was back to California, from Napa to Monterey.

JP: What's the most rewarding part for you?

CH: First I would say "the cause" followed by "the accomplishment." The ride is a great opportunity for me to combine many of my passions.

1. Healthy living through a healthy diet. And salad bars are a great way to do this. Salad bars are an even better way to do this for children as it allows them to make good decisions about eating on their own terms.

2. Cycling. Part of a healthy lifestyle includes exercise. Currently, my preferred choice of staying in shape is cycling.



3. Agriculture. Farming, regardless of the technology used, is the backbone of our community and society. We are stronger because our farmers keep us well-fed. We can be stronger if we focus on improving our diets to include more of the fresh produce our farming system puts in front of us every day.

JP: What would you like those who are not aware of Tour de Fresh to know?

CH: I want them to know that they should not take the diets of the children in their community for granted. Healthy, happy, well-fed children make for better students. These children will become the employees, the entrepreneurs, the leaders and the innovators of tomorrow as well as the parents and neighbors in their communities.

So let's work together to make them stronger. Let's work together to give them all an equal chance to take advantage of the education put in front of them. Let's teach them to see healthy diets as the norm and discourage them from developing habits that will plague them tomorrow.

JP: Have you seen tangible, positive results from your efforts?

CH: I have. For example, Mattawan Later Elementary School in Mattawan, Mich., from last year (see photos top right).

JP: When is the next Tour de Fresh ride?

CH: The next ride is Oct. 1, 2016, in Fort Worth, Texas, and I'll be there!

Jim Pantaleo, Director of Business Development
at Urban Ag News, jim@urbanagnews.com

MATTAWAN LATER ELEMENTARY SCHOOL THANKS TOUR DE FRESH IN 2015 FOR THEIR TWO WONDERFUL NEW SALAD BARS

THANK YOU TO OUR SPONSORS!

FOR HYDROPONIC CLASSROOM EDUCATOR, INNOVATION IS A WAY OF LIFE

BY SIDSEL ROBARDS

Not many teachers can come back to school telling students that their summer vacation included a visit to The White House to pick up a Presidential Award. But Shakira Provasoli, resident science teacher at The Sun Works Center at PS333 in New York City, did exactly that after an August ceremony where she received a presidential honor from the EPA for her outstanding work as an environmental educator.

Established in 2011, the Presidential Innovation Award for Environmental Educators recognizes teachers who employ innovative approaches to environmental education and use the environment as a context for learning for their students. The award comes with a cash prize toward further professional development and is matched with a grant for the teacher's school to further fund environmental educational activities and programs.

Rooftop greenhouse classroom

Shakira has been an educator for 16 years, and was part of the first cohort of the NASA Endeavor program. In the past five years she has been a science cluster teacher at The Sun Works Center at PS333. Her classroom is a 1,450-square-foot rooftop hydroponic greenhouse built by NY Sun Works. During the week she works with about 660 kindergarten to 5th grade students, who learn about everything from systems and cycles, environmental interaction, sustainable solutions, and sustainable cities – all through the lens of urban agriculture.

When Shakira was a classroom teacher, she strived to know the whole person in her students. But she says teaching all K to 5th grades as the greenhouse teacher gives her the opportunity to know them on a much deeper level. She learns not only if a child can read on grade level; she knows who shares highly coveted aquaponics tools, who gently transplants seedlings, who has enough stamina to power all four light bulbs on the energy bike and who can always spot the hidden frogs.

Hands-on, project-based science

Outside the classroom, Shakira's contribution to the NY Sun Works program goes much deeper. She was one of the first teachers to join the team led by NY Sun Works' Executive Director Manuela Zamora, to develop the extensive K through 12th grade curriculum Discovering Sustainability Science. The curriculum goes hand-in-hand with the organization's hydroponic science labs and offers a new way of teaching hands-on, project-based science while covering state-mandated standards. The in-depth curriculum is being used in NY Sun Works' partner schools throughout New

NY Sun Works is a non-profit organization that builds innovative science labs in urban schools. Through their Greenhouse Project Initiative they use hydroponic farming technology to educate students and teachers about the science of sustainability. www.nysunworks.org

THE GREENHOUSE PROJECT NY SUN WORKS

"It is an honor to be recognized by the EPA and the White House for my commitment to environmental education. I want to thank NY Sun Works for giving me the opportunity to create curriculum in such an inspiring science laboratory!"

—Shakira Provasoli

York City and the state and is featured in an eponymous annual youth conference.

In 2012, NY Sun Works launched a teacher training program. There was no question that Shakira would be the ideal candidate to lead the 36-hour course, "Water, Waste and Energy: integrating themes of sustainability into the classroom." Since the course was implemented, it has been offered through the N.Y. Department of Education 16 times and has trained more than 150 teachers from both public and private schools in New York.

With her Presidential Innovation Award, Shakira hopes to show other educators how critical environmental education is to students and to our planet. School age children today need to have the tools to spark creative ideas for solutions that will lessen the effects of climate change in the future.

Sidsel Robards, Director, Development and Events, NY SunWorks

"I feel incredibly lucky to have students who eagerly race into my hydroponic classroom, determined to be the first ones to spot the ladybug eggs, power the energy bike, spray the seedlings, harvest kale, test the pH, monitor water quality, construct their own hydroponic system or correctly identify a pest."

—Shakira Provasoli

DEVELOPING THE RIGHT LIGHT RECIPES FOR GREENHOUSE VEGETABLE CROPS

Canadian researchers at the Harrow Research and Development Centre are working with growers to determine which horticultural lights are the most effective and efficient for producing tall greenhouse vegetable crops.

By David Kuack

When it comes to the collecting data on using LEDs on tall greenhouse vegetable crops, there isn't a clear picture on how well they perform. Shalin Khosla, greenhouse vegetable specialist at Ontario Ministry of Agriculture, Food and Rural Affairs, said much of the early research that has been done with LEDs has been on ornamental flowering crops and leafy green vegetables.

"Not a lot of research has been done on tall-growing vegetable crops like tomatoes, cucumbers and peppers," Khosla said. "Growers need a light recipe for growing tall vegetable crops. Another factor as to why more of these tall vegetable crop growers haven't made the switch to LEDs is the cost of the fixtures compared to high pressure sodium lamps."

Comparing HPS to LED lights

Khosla said the latest LED light fixtures have a better electricity to light conversion factor than the best HPS light fixture.

"Some LED light fixtures are better than others," he said. "Some are more efficient than others. The efficiency of the latest LEDs is better than the best HPS, in terms of converting electricity to light.

"The best HPS lights produce 10 percent convective heat, 50 percent radiation heat and 40 percent light. With the best LED fixtures there is 35 percent convective heat, 15 percent radiation heat and 50 percent light. Comparing the two lights, the LED fixtures can be placed closer to the plants without harming them. Whereas with the HPS light, which is generating more heat, it needs to be placed further away from the plants. That is why LED lights can be used for interlighting. The HPS light would be too hot for interlighting and would burn the plants."

Khosla said light manufacturers are working on designing HPS lights that don't give off as much heat. They are also looking for ways to remove some of that heat.

"Manufacturers of HPS lights are working on the conversion factor so that more electricity is going to produce light rather than heat," he said. "They are improving the efficiency so more light is given off than heat. If I want to put a light fixture in a small space like a growth room or vertical farm, a LED light would be used because there is not as much heat given off. In a tall greenhouse, HPS lights can be used for top lighting because there isn't as much of a concern of damage with the amount of heat given off. In fact this heat will offset some of the heat requirements to grow the crop in the winter."

Khosla said the newer larger LED fixtures are more efficient and are suitable to use similarly as overhead HPS lamps.

"Light manufacturers have not yet achieved a one-to-one replacement LED for HPS, but they are getting closer," he said. "HPS bulbs emit light in all directions so it has to be bounced back down towards the crop. The reflector has a huge influence on how good the light reception level is. LED light is more direct and it may be focused to specific parts of the plant."

Developing light recipes

Khosla said HPS lights emit a broad spectrum of light with peaks in the blue and red range. With LED lights, which produce specific wavebands, researchers are able to study the impact these specific wavebands can have on plant growth, flowering and fruiting.

Khosla along with Dr. Xiuming Hao at the Harrow Research and Development Centre are studying the effects of HPS and LED light on tomatoes, cucumbers and peppers. They are comparing the growth of crops under HPS and LEDs separately as well as combining HPS top lighting with LED interlighting.

"There are three groups, Agriculture and Agri-Food Canada, OMAFRA, and Ontario Greenhouse Vegetable Growers Association, working together on this lighting project," Khosla said. "We are conducting research with HPS top lighting and LED interlighting on tall vegetable crops. We've studied mini-cucumbers for three years. We began lighting a newly planted crop in September and continued through April. We were able

Greenhouse vegetable specialist Shalin Khosla (left) and research scientist Dr. Xiuming Hao at the Harrow Research and Development Centre are studying the effects of HPS and LED light on tomatoes, cucumbers and peppers.

Photos courtesy of Shalin Khosla, Ontario Ministry of Agriculture, Food and Rural Affairs

to produce 60 kilograms per square meter. That is a very decent yield for a single mini-cucumber crop grown during the winter months under Ontario's climatic conditions.

"We are also conducting studies to compare the difference between growing these three crops under the HPS and LED lights separately as well as using the two types of lights together. There is a difference in light intensity from the top of the plant to the bottom of the plant. We need a working light profile. We can alter the spectrum of the light within the crop itself by using different color LED lights.

Khosla said preliminary results have shown there is an improved yield when HPS lights and LEDs are combined.

"We have been able to increase the fruit dry matter content," he said. "We also had slightly better quality fruit when we combined the two kinds of light than when we used HPS lights by themselves.

"All three crops showed improved responses, but at different levels. Cucumbers showed the best results. For peppers and tomatoes the results were not as dramatic. We still have to do more studies on both of these crops."

Determining payback

Khosla said it's very hard to determine the difference in payback between HPS and LED fixtures because their efficiency and prices are constantly changing.

"We are still working on what the payback would be," he said. "We are working with some growers who have installed LEDs, but are still collecting the data.

"Most of the growers we are working with have had the lights installed for about a year. For this pilot project, we are only looking at a section of the greenhouse, not the whole operation. Growers are waiting to see the full results before they invest in the lights. The

growers are using the lights on tomatoes, cucumbers and peppers. They are looking at the cost of electricity, the cost of the fixtures and the yields to determine how viable this is. We are expecting to have this part of the study completed by next year."

Khosla said each of the Canadian provinces has its own energy rebate program.

"In Ontario, Hydro One offers a rebate program for greenhouse lighting for retrofits and new builds," he said. "As long as growers can prove they are using less electricity with the lights or whatever equipment improvement they make they can qualify for a rebate."

Khosla advises growers considering purchasing any type of horticultural lighting to look at how efficiently are the lights converting electricity to light.

"If growers are interested in LEDs they need to be sure the light waveband combinations are correct for the crops they're growing," he said. "Growers should also work with a lighting company that can supply information about the light fixtures as well as providing reliable fixtures. Growers should contact other growers who are using the fixtures to find out their experience with them. Just like any other equipment purchase, growers need to do their homework before buying any type of lights, HPS or LED."

Shalin Khosla said preliminary research results have shown there is an improved yield with tall greenhouse vegetable crops when HPS lights and LEDs are combined.

For more: Shalin Khosla, Ontario Ministry of Agriculture, Food and Rural Affairs, Harrow Research Centre, 2585 County Road 20, Harrow, Ontario N0R 1G0; (519) 738-1257; shalin.khosla@ontario.ca.

This research study is sponsored by Ontario Greenhouse Vegetable Growers, Agriculture Agri-Food Canada, Ontario Ministry of Agriculture Food and Rural Affairs and Growing Forward 2.

David Kuack is a freelance technical writer in Fort Worth, Texas; dkuack@gmail.com.

Canadian researchers are conducting studies to compare the difference between growing tomatoes, cucumbers and peppers under HPS and LED lights separately as well as using the two types of lights together.

new hydroponic indoor park opens in easthampton

Global forum
for innovations
in agriculture

2017 | ABU DHABI | UAE
20-21 March: Abu Dhabi National Exhibition Centre

SELL YOUR SOLUTIONS AT

THE WORLD'S LARGEST DEDICATED EXPO

OF SUSTAINABLE AGRICULTURE INNOVATIONS

Discover more: innovationsinagriculture.com

Strategic Partner

Global **forum**
for **innovations**
in **agriculture**

2017 | UTRECHT | THE NETHERLANDS
9-10 May: Jaarbeurs Expo Centre

In cooperation with

Proagrica

WELCOME TO THE FUTURE OF AGRICULTURE **IN EUROPE**

Held in cooperation with Proagrica and supported by an international network of 40+ partners, the Global Forum for Innovations in Agriculture is the world's largest dedicated expo of sustainable agriculture innovations - and in 2017 it's coming to Europe.

Request an information pack today at www.gfiaeurope.com/info

Tell us your story!

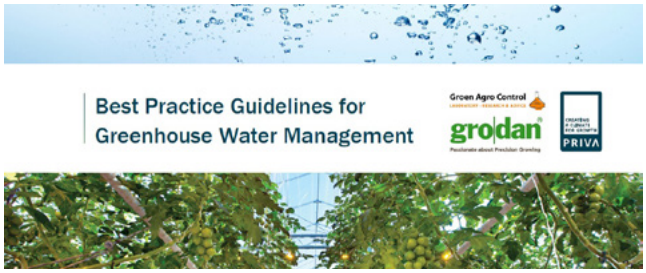
CLICK HERE TO CONTACT US WITH A PRESS RELEASE

INDUSTRY NEWS

COLLABORATIVE APPROACH RESULTS IN BEST PRACTICE GUIDELINES FOR GREENHOUSE WATER MANAGEMENT

Consumers are increasingly looking for quality food which is healthy, safe and at the same time cultivated sustainably. Greenhouse hydroponic cultivation already uses water more efficiently than field based production systems. However large amounts of water are still lost in so called 'open' systems. Water use efficiency can be significantly improved by collecting drain water and reapplying it to the crop. GRODAN, Priva and Groen Agro Control have collaborated to produce The Best Practice Guidelines for Greenhouse Water Management.

>> Click for more >>



URBAN AG NEWS PARTNERS WITH PONIC JOBS

As the hydroponics industry continues to grow at an exponential rate, ponicjobs.com seeks to bridge the gap between industry employers and job seekers. The website's founder, Kyle Barnett, designed the site in response to the difficulties he faced while trying to find a job with a commercial hydroponic grower.

>> Click for more >>

EXPANDING POSSIBILITIES WITH E-GRO®

GRODAN, a global leader in stone wool substrate solutions introduces e-Gro: an easy to use, mobile app that gives real-time substrate information. e-Gro is a new service from GRODAN developed to support customers with a GroSens® MultiSensor system. Customers who need to have real-time reporting on their substrate, now have the opportunity to link their GroSens system to the e-Gro app.

>> Click for more >>

JAPANESE FOOD PRODUCERS HARVEST THE BENEFITS OF VERTICAL FARMING WITH SPECIAL LED LIGHTING

Philips Lighting, a global leader in lighting, today announced results from trials of crops of lettuces and herbs grown at two Japanese vertical farm customers equipped with horticultural LED lighting. Consumers in Tokyo have welcomed pesticide-free, wash-free lettuce grown with horticultural LED lighting by Innovatus Inc., one of the world's largest vertical farms.

>> Click for more >>

INUAG AWARDS 2016 AWARD WINNERS

Urban farming provides at-risk communities access to the fresh food essential to good health, community development, social justice and, ultimately, equality. These projects are all working to bring fresh, local food to our cities. Thank you for sharing your work through INUAg's Awards! >> Click for more >>

ECOBAIN GARDENS IS GROWING WITH PHILIPS

Learn how Philips Lighting and Brian Bain, founder and CEO of Ecobain Gardens, collaborated on a lighting solution to bring fresh, tasty and sustainably grown micro greens and herbs to the local Saskatoon community and beyond.

RED SUN FARMS ACHIEVES RECOGNITION AS ONE OF CANADA'S FASTEST GROWING COMPANIES

Canadian Business and PROFIT today ranked Red Sun Farms as one of Canada's fastest-growing companies in the 28th annual PROFIT 500 List. Published in the October issue of Canadian Business and at PROFITguide.com, the PROFIT 500 ranks Canadian businesses by their five-year revenue growth. >> Click for more >>

URBAN PRODUCE LOOKS TO HIRE EXPERIENCED GROWERS FOR EXPANSION INTO OTHER COUNTRIES

Urban Produce, Orange County's CEA indoor organic vertical farm has entered into phase two of its expansion program and is now looking to hire experienced CEA vertical growers to support its licensees worldwide. Prospective growers will attend Urban Produce University in Irvine, CA in preparation to deploy and work for one of our prospective licensees in China, Canada, Mexico and Japan in 2017. >> Click for more >>

VILLAGE FARMS TO HOST GREENHOUSE GURU MARKETPLACE AT 2016 EPCOT INTERNATIONAL FOOD AND WINE FESTIVAL

Village Farms is pleased to announce the company will be participating in the 2016 Epcot International Food & Wine Festival at Walt Disney World Resort. The new Greenhouse Guru marketplace will feature a food and beverage kiosk serving up a number of tasty dish offerings made with Village Farms exclusive tomato varieties.

>> Click for more >>

ORGANIC FARMERS SHOULD BE ALLOWED TO GROW ORGANIC PRODUCE IN CONTAINERS, CONSUMERS OVERWHELMINGLY AGREE

More than 91 percent of consumers that purchase organic produce favor the current U.S. Department of Agriculture (USDA) policy that allows organic farmers to grow organic produce in containers, according to a survey conducted on behalf of The Coalition for Sustainable Organics. This November, the National Organic Standards Board, the body that recommends changes to the USDA National Organic Program, is scheduled to consider proposals that will restrict or prohibit container-production methods from organic certification. These survey results demonstrate the negative impact that a program ban on organic container-grown food could have on consumer perceptions of the USDA.

>> Click for more >>

INDUSTRY NEWS

ADVANCED LED LIGHTING FOR PLANT HEALTH AND PROTECTION IN CONTROLLED ENVIRONMENT AGRICULTURE

By Dr. Jaimin S. Patel, Research Scientist at the Lighting Research Center, Rensselaer Polytechnic Institute

Every year several new diseases are reported on different crops and disease-causing organisms are responsible for significantly decreased crop production. Moreover, farmers who want to grow organic crops often find that it is especially difficult to manage plant diseases in controlled environments using organic practices.

>> Click for more >>

GREEN SENSE FARMS BREAKS EQUITY CROWDFUNDING RECORD

Hits 106% in less than 24 hours.

Green Sense Farms is one of the first 100 companies to take advantage of the recent change in SEC regulations that allow for Equity Crowdfunding. They launched on Thursday, September 1st and broke records by reaching 106% of their funding goal within 24 hours.

>> Click for more >>

HORT AMERICAS OFFERS EXPANDED VARIETY OF HORTICULTURAL LED LIGHTS

Hort Americas, a horticultural distributor in Bedford, Texas, offers a variety of LED and high pressure sodium light fixtures for both propagation and production applications. Hort Americas can provide its customers with a custom plan to meet their lighting needs.

>> Click for more >>

AQUAPLANET EXECUTIVE TEAM BRINGING AQUAPONICS TO FARMERS AND VETERANS IN GEORGIA

Demand for local food today is increasing and there are many ideas about the future of agriculture and technologies for growing. Atlanta's Aquaplanet is bringing this global discussion to Georgia in late October with a series of events featuring a new team which represents a cross-section of aquatic systems technologies and how they can be harnessed for economic development on a local level. >> Click for more >>

SPANISH PHARMACEUTICAL GIANT PUTS GROWTAINER INTO OPERATION

After installing the first international Growtainer in the UK last year, GreenTech Agro is expanding its presence in Europe with the recent installation of another Growtainer at Spanish biotechnological giant Bioibérica.

>> Click for more >>

NATUREFRESH FARMS MOBILE GREENHOUSE VISITS MANSFIELD

NatureFresh Farms Mobile Greenhouse Education Center appeared outside Krogers at 1500 Lexington Ave., Mansfield, Ohio. The organization answered questions on how greenhouse vegetables are grown, fresh produce, and more. The Greenhouse Educational Center travels to retail stores, summer camps, and schools throughout eastern North America informing consumers about how greenhouse vegetables are grown.

>> Click for more >>

green sense RADIO SHOW

Green Sense Radio invites Urban Ag News to talk about the latest in sustainable agriculture

Robert Colangelo, founder and host of the nationally sindicated Green Sense Radio Show, invites Chris Higgins, owner and editor of Urban Ag News, to discuss the hottest topics in innovations in agriculture

- Container Farms
- Getting Salad Bars in Public Schools
- Growing Green

ADVERTISE WITH US

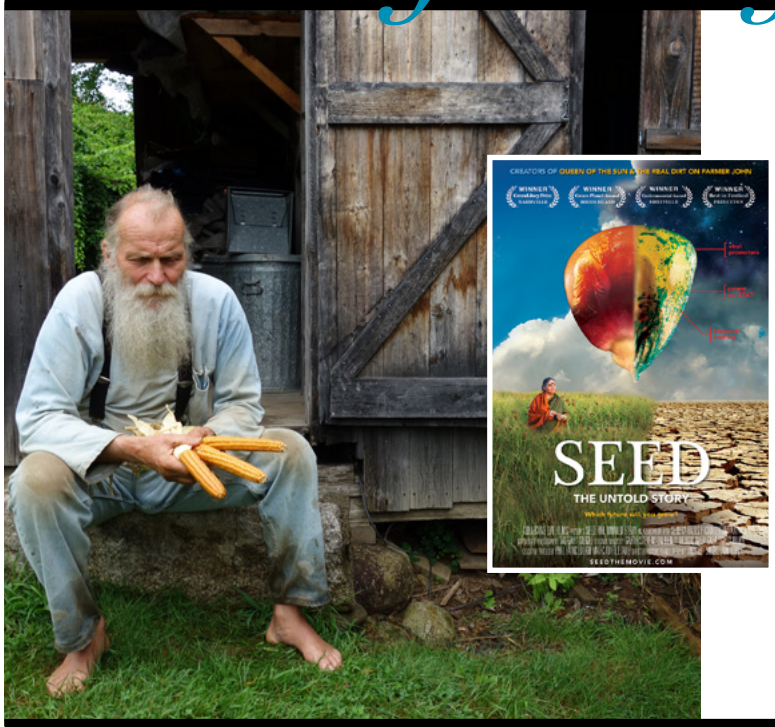
Urban Ag News is a *connector* for a niche industry. We bring together farmers, growers, researchers, educators, manufacturers, suppliers, as well as everyone else interested in controlled environment agriculture (CEA). Our goal is *education*. By providing a unique blend of entertaining and educational content our readers and viewers will achieve a basic understanding of the science, leaders and technology shaping the industry and leading us into the future.

You are not just advertising when you work with Urban Ag News – you are an involved partner. Your input will help to shape what Urban Ag News becomes.

Talk to us about how you could advertise with us at a discount by providing a blog post or article.

Click here to see all the sponsor opportunities.

~ food films ~



SEED: The Untold Story

SEED is an eye-opening environmental documentary about the dramatic loss of seed diversity and the future of our food. Partnering with organizations in cities across the country to raise awareness about this critical issue as well as organizations that are working to build healthy, sustainable communities. SEED's community outreach and engagement team will work with your organization and provide the resources to make this event a success and an opportunity to involve like-minded people in your organization.

Premiering in Los Angeles, Calif. Sept. 30 - Oct. 6, 2016

Plant This Movie

The International Urban Agriculture Documentary

"Plant This Movie" explores the zeitgeist of urban farming around the world, from the incredible story of Havana, Cuba to communities of urban farmers in cities as diverse as Shanghai, Calcutta, Addis Ababa, London, and Lima. In the U.S., the story focuses on New York, New Orleans, Los Angeles and Portland, Ore. The film is narrated by Daryl Hannah.

For more Food films, visit FoodTank

Among the 19 films to satisfy your food films palette are:

American Meat
Dive! The Film
The Empire of Scents
Farmageddon
Food Chains

foodtank
THE FOOD THINK TANK

FDCEA

FOUNDATION FOR THE DEVELOPMENT OF CONTROLLED ENVIRONMENT AGRICULTURE

The Foundation for the Development of Controlled Environment Agriculture is a private foundation created in 2014.

Mission

To join the future stakeholders of controlled environment agriculture in order to build a platform in which shared resources can be used to invest in the development of a shared industry.

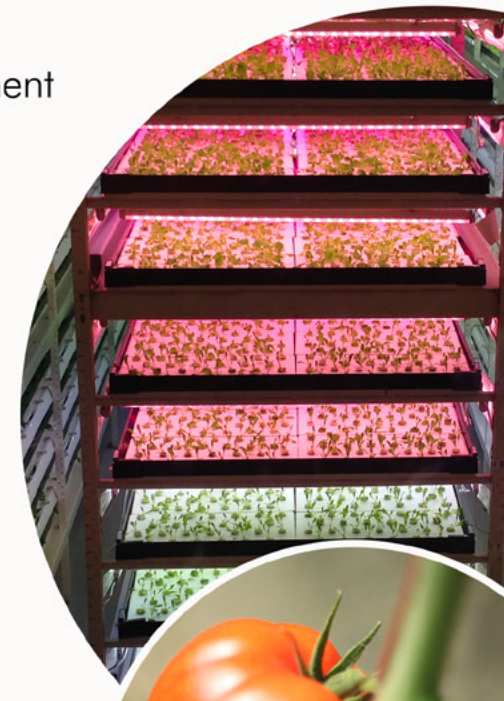
How we work

To create an industry that sees the available natural resources and then develops the necessary strategies to maximize the production of fresh produce in a wide variety of climates our Foundation invest in the research and education needed to develop technology and talent.

We are committed to specific areas of need. We work with experts to define strategies and goals with a clear understanding of how we will achieving them.

Learn more and join us!

For complete understanding of who we are, what we do and how to benefit from being part of the FDCEA please contact us directly or visit our website for more information.

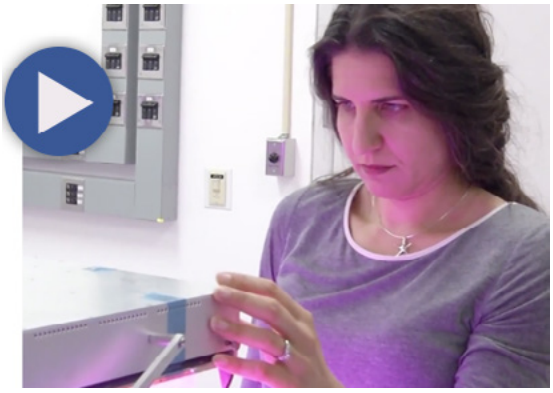


FDCEA.COM

VOICES of HORTICULTURE
with Dr. Steve Millett

Dr. Gioia Massa, “Veggie” Scientist at the Kennedy Space Station, NASA

“NASA’s Veggie and Space Kids”



Dr. Gioia Massa is a plant scientist in NASA’s Veggie program which aims to grow plants in the International Space Station (ISS). Gioia is a Future Farmers of America (FFA) alumni and has grown her early love for plants to a career that is now helping us explore space and preparing humans for space travel. Her professional talks are captivating, inspirational, mind-boggling and always end up giving me goosebumps. She talks with me briefly about NASA’s “Veggie” program on the ISS and how kids on earth are being inspired to reach for the stars.

HOW-TO VIDEOS FROM HORT AMERICAS

GE ARIZE LED Grow Lights Installation at Dallas Grown Greenhouse

Hort Americas Organic Hydroponic Fertilizer Option - Terra Genesis and Terra Bella

HORT AMERICAS

INSECURITY in VENEZUELA

A Family Story by Jim Pantaleo

food in·se·cu·ri·ty (noun)

The state of being without reliable access to a sufficient quantity of affordable, nutritious food, "more than 800 million people live every day with hunger or food insecurity as their constant companion" (FeedingAmerica.Org)

My intent in writing the following article was borne from a recognition of a symbolic connection between my personal, family experience in Venezuela some 30 years ago and the current-day challenges of food insecurity facing this Latin American nation. To me, the loss of a loved one is a daily pain, an emptiness that can never be assuaged. At first, a catastrophic event can take on both physical and psychological aspects relating to the pain of loss. There is also a feeling of deep injustice. I consider hunger, based on Venezuela's extreme food insecurity, to have similar qualities, the pain, loss, injustice and emptiness is physical, psychological…and relentless.

New coffee venture

In the spring of 1984 my older brother, Tim married a lady from the capital city of Caracas, Venezuela, whom he met in San Francisco, Calif. His reason for leaving the States, besides love, was to begin a new venture exporting coffee from Venezuela back to the United States. This was well before Starbucks became the global coffee powerhouse it is today. Tim was traveling back to Caracas after visiting a number of coffee farms operated by a most humble group of families. In fact, it was well-known at the time there existed a "Coffee Cartel" where roughly five Venezuelan families ruled the coffee industry. This cartel would eventually be broken up by Hugo Chavez, but more on that soon.

Jim and Tim, 1984

Sadly, Tim was in the country for less than a month before he was killed. The incident became big news in a place where the military and police commonly took the law into their own hands against their own citizenry. He was shot and killed while a passenger in a car outside of Caracas. The incident was the result of an intoxicated colonel in the Venezuelan National Guard (La Guardia Nacional) who took umbrage with the car not moving out of the "fast lane" when he flashed his headlights to pass. Tim was 30 years old and had his entire life ahead of him. Needless to say, my family was devastated at the tragic and senseless loss of his young life.

Retracing Tim's final days

Shortly after Tim's death, I traveled to the country to retrace his final days and see for myself what he was attempting to accomplish while personally meeting with the coffee farmers who sought to help him. I slept in the very places where Tim spent his last nights. I walked the same coffee farms he walked and I shared in the knowledge and insight of these simple and strong people. I found Venezuela and its people to be incredibly beautiful, vibrant and generous of spirit.

At the time, Venezuela was defined, relatively speaking, as a "democracy" and was presided over by then-President, Jaime Lusinchi, who was ousted in 1989 by a member of his own party. Among other reasons for his departure were a growing economic crisis, currency depreciation, inflation and corruption. I always thought it amusing when I was told that during the week, Lusinchi spent his time at the presidential palace with his wife while on the weekends he stayed in his country house with his mistress. This was accepted and common knowledge apparently.

Disparity between rich and poor

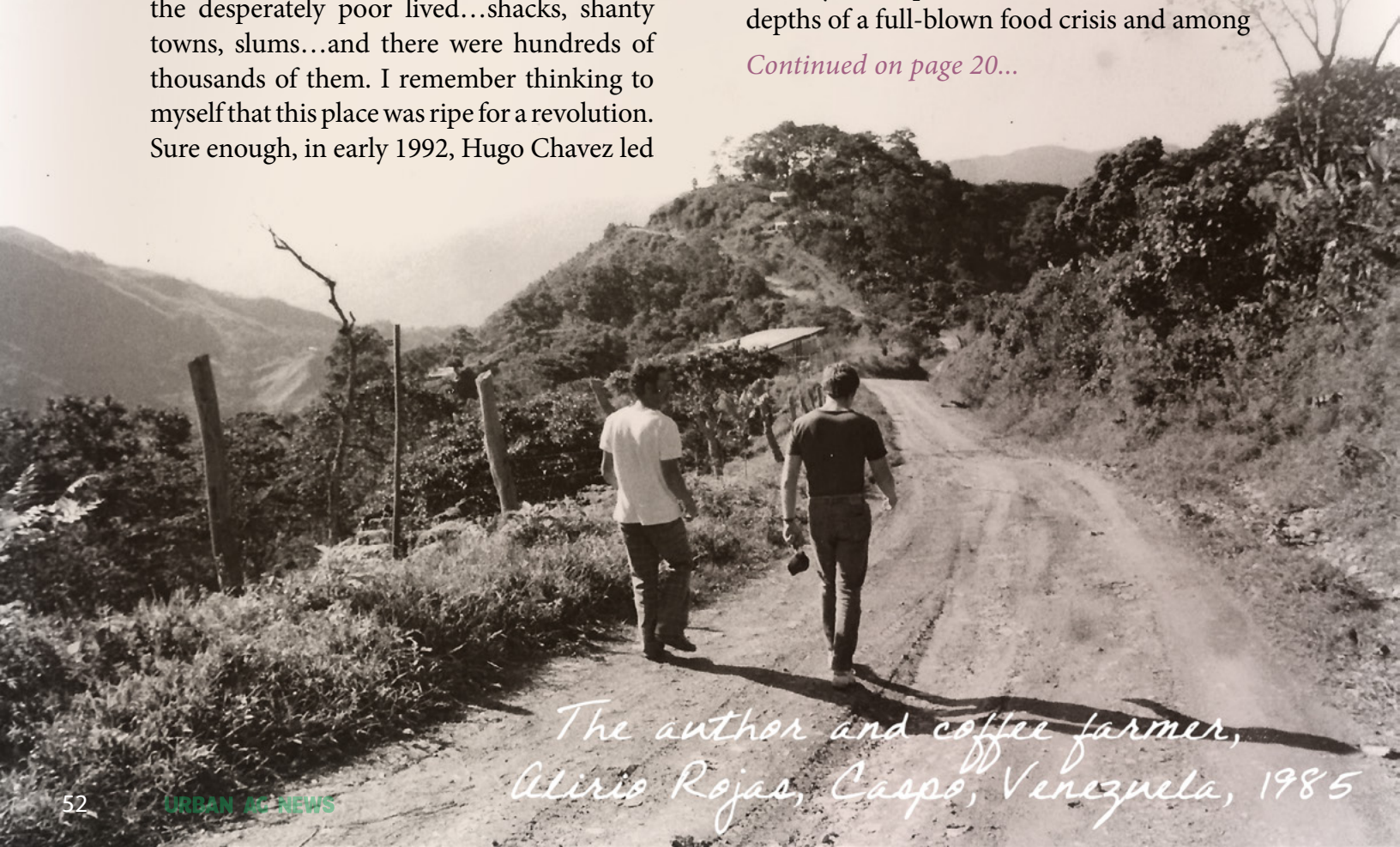
One of the first things I noticed, however, was the massive disparity between rich and poor. There seemed to be no middle class. In the capital of Caracas, for example, the surrounding hillsides were covered with terra cotta-colored structures called "Los Ranchos" by the locals. Like the Favela's of Brazil or the Barrios of Mexico, this is where the desperately poor lived…shacks, shanty towns, slums…and there were hundreds of thousands of them. I remember thinking to myself that this place was ripe for a revolution. Sure enough, in early 1992, Hugo Chavez led the first military coup which failed miserably and he was jailed for many years following.

But then in 1999, he was elected president, and the country has never been the same. A self-described Marxist, Chavez set about to liberate Los Rancheros, those millions who resided in the aforementioned slums. And why wouldn't he be a hero to them? Who else was trying to help them? But where in the course of human history has communism proved to be a favorable option not for some, but for all of its citizens? Someone will win and someone will lose. In this case, the owners of capital and the well-to-do were on their way out.

A food crisis

Fast forward to 2016 and Venezuela is a country decimated by social and political strife, massive brain-drain and emigration of the best and brightest, and the real reason for this article, food insecurity. More than any country on the planet, Venezuela is now in the depths of a full-blown food crisis and among

Continued on page 20...



The author and coffee farmer, Alirio Rojas, Caspo, Venezuela, 1985

VENEZUELA TODAY

By Alicia Morcillo

Today the people in Venezuela are struggling to buy food. Those of you reading this may wonder, "why aren't they growing their own food by now?" Roselyn Vasquez, a young woman from Caracas, helped us understand. "Most in the cities are not accustomed to growing and they don't have the space to do it," said Roselyn.

Those who have the means to do so are able to purchase (at outrageous prices) the items they need to cook a decent meal. And some who don't have the money have sadly resorted to digging through the trash.

"In other areas of the country, especially in the Andean regions, families with land have always planted something in their own gardens, such as tomatoes, carrots, potatoes, plantains, mangos, bananas, guava, etc.," said Roselyn.

Nancy Liliana Suárez de Guillén lives in the city of Caracas with her husband and two kids, and is still able to pay the high food prices. On Aug. 30, Nancy left home at 5:30 a.m. to get into a food line. She was assigned number 330. She waited until 9 a.m. when she was told she would not be able to purchase food that day. She was told she would need to return the next day at the same time, even though food would not be sold until 11 a.m. She did so, without knowing what food items would be sold. On the second day, she was able to buy soap, but no food.

Most families have gone from three meals a day to two. And some parents have given up their dinners to make sure their children are getting a full meal. And food is not the only thing that is priced out of reach. Some parents have had to stop sending their children to school because there is not enough money for transportation, school supplies or uniforms. There have been reports of students in school who are passing out because they haven't eaten in so long.

Venezuela needs help, and fast.

Alicia Morcillo is Urban Ag News graphic artist. She grew up in Argentina and traveled to Venezuela in 2010.

Growing food is more common in mountainous regions.

Nancy waits on the second day to see what they will sell her.

...Continued from page 18

the many reasons of this outcome, a big part of the dilemma is borne of the policies of the Chavez government now perpetuated by the current president, Nicolas Maduro.

Since the discovery of oil in Venezuela nearly a century ago, the economy depends on up to 94 percent of oil revenue for income. Such heavy dependency has led directly to the neglect of other sectors, agriculture included, making Venezuela highly dependent on imports.

From Wikipedia: "Shortages occur in regulated products, such as milk, various types of meat, chicken, coffee, rice, oil, precooked flour, butter; and also basic necessities like toilet paper, personal hygiene products and medicine. As a result of the shortages, Venezuelans must search for food, occasionally resorting to eating wild fruit or garbage, wait in lines for hours and sometimes settle without having certain products." And more, "In March 2016, it was estimated that 87% of Venezuelans are consuming less due to the shortages. There was a 50% to 80% rate of food shortages with 80% of medicine was in short supply or not available."

The consequences of food insecurity

To absorb the above is to truly know and understand the pangs of hunger and real suffering. Food insecurity and its off-shoot tentacles include crime, looting and violence; while sickness, desperation, famine and death remain a real part of daily life in Venezuela. Anyone who has read a newspaper or watched the news recently knows this.

For all the political blame tossed around, let's get some facts straight: According to Stephen Devereux, a development economist from the University of Sussex in the United Kingdom, "There's no doubt that democratic governments that allow freedom of trade, movement, and information are more likely to prevent famines than countries with repressive or controlling governments that interfere too much in the market or stop people from moving, prevent trade, and suppress information."

Devereux continues, "There is a serious food crisis in Venezuela, because the government interfered in agricultural production and trade, and they are rationing electricity and water. All of these interventions in the economy made it difficult for people to access food. There was not enough being produced and people couldn't buy food as it is being imported at exorbitant black market prices that they can't afford, so people are now rioting to get access."

The resulting fallout is an unprecedented cross-border fiasco with neighboring Columbia where Venezuela has opened its previously closed border to allow people to buy food and medicine unavailable at home. Colombia's government said some 44,000 people crossed on a recent Saturday in July of 2016 to buy food, medicine and cleaning products, noting it expected the number to double the next day, Sunday. A black market offers no sustainable solution to the problem.

Urban farming initiative

Could there be any positive upside to the crisis? The Venezuelan government's "Great Agro-Venezuela Mission" is promoting city farming, resulting in a record number of citizens growing their own food. It's been reported that some 135,000 Venezuelans have produced 273 tons of vegetables, fruit and herbs in urban settings over the past year.

In theory, with the new urban farming initiative, Venezuela is attempting to follow the lead of its ally Cuba, which pioneered sustainable agriculture during the so-called "Special Period" in the 1990s after the collapse of its Cold War benefactor, the Soviet Union. The Food and Agriculture Organization of the United Nations

calls Havana the greenest city in Latin America.

With the assistance of the Great Agro-Venezuela Mission, the head of the newly created Ministry of Urban Agriculture, Lorena Freitez, is wagering home-grown gardens will make up more than 20 percent of the food supply by 2019. She claims, "Urban agriculture will cushion the effects of the shortages. Cities will not be so dependent on imports, and we will make great strides in food sovereignty."

As reported by Jim Wyss of the Miami Herald recently, "Vertical gardens were pioneered during World War II" and this is Venezuela's latest weapon in its battle against hunger: urban agriculture. As the country has been swamped with images of empty shelves, soul-crushing lines and food riots, the administration is urging city dwellers to embrace modern-day Victory Gardens.

Whatever the outcome, the fact remains, Venezuelans are hungry. They need to eat and without question, change is eminent, if not to save lives, to save a country. It's been more than 30 years since I became a reluctant visitor. My hope is the future will be brighter than the past and that no child, woman or man will go to bed hungry. Tim would have wanted the same.

Jim Pantaleo, Director of Business Development at Urban Ag News, jim@urbanagnews.com

News of Tim's case

worked on the Dean crash. There were a dozen accidents in northern San Luis Obispo County that weekend, including another fatality on Highway 101.

"East of Eden" was the only one of Dean's films that had been released at the time of his death, and Tripke had no idea who the driver of the Porsche was. "It never occured to me. People

more people out to Cholame to see the memorial. But this year only the true believers are making the pilgrimage, like Cannon, who makes a tradition of walking the mile of old Highway 46.

A couple of groups were expected to come up from Los Angeles for this weekend's vigil, including one caravan of vintage cars that will follow

dirt lot around the Cholame restaurant and talk about James Dean.

The restaurant used to be Stella's Country Kitchen. It's Aggie's now, owned by the Bayus family.

Aggie's sells postcards of Dean and has a few posters and articles around the restaurant, but business goes on as usual. Out by the memorial, a steel

and concrete
Alleanthem
time to time
inscription.
The mer
businessma

Venezuelan colonel to be tried

—From Page A1

only witness to the shooting — from the wrath of guardsmen.

"The extraordinary thing is that I am alive," Garcia said.

Kincy's widow, Olga Vera de Kincy, takes small comfort in the fact that the wheels of Venezuelan justice are grinding out a decision in the death of her husband, who she sees as the victim of "absurd" killing in a country

ry, Spanish
middle-cla
no, and K
time with
Venezuel
Kincy
Venezuel
Area.
Olga
34, who
with Ol
quickly
-cia, a p
cialiting
tempte
more le
Gar
ways
Venez
have
ness I
Th
visit
hear
good
gion.
per
take
hou
me
bas
hi

THY KINCY AND OLGA VERN
r Monterey before fatal trip to Venezuela

e wanted
her friend,
be "a won-
e, very car-
about his
ere when I
ally and pro-

fessionally."

In the course of their courtship, Kincy accompanied Olga on summer trips back to Caracas, a sprawling city of concrete towers and jammed freeways that may have reminded him of his Southern California roots.

They stayed in her parents' two-sto-

The Rojas family with the author, Caspo, 1985

JAPAN SPECIAL REPORT

LED GROW LIGHTS MOVEMENT IN JAPAN

The number of plant factories with artificial lighting (PFAL) has been increasing in Japan. Numerous Japanese companies started PFAL businesses particularly after 2009, which has been called the third PFAL boom.

Multiple LED manufacturing companies have entered this up-and-coming sector. Just like other PFAL-related firms including system manufacturers/suppliers, LED light companies have been facing increased competition, scrambling for limited opportunities in the domestic market. Lighting companies active in the Japanese PFAL market include: Showa Denko, Nihon Advanced Agri, Keystone Technology, Ushio Lighting, Toshiba, Kyocera and Stanley Electric. LED lights from foreign firms, including Philips Lighting and Current, which is powered by GE, are also being installed in large-scale commercial PFALs in Japan.

Switching from fluorescent lights to LEDs

Among approximately 200 commercial PFALs in Japan, the majority of farms opened before 2010 are equipped with fluorescent lights (FLs). These farms are gradually replacing FLs with LED lights. For this reason, apart from newly established PFALs, there are large replacement demands for LED lights in the Japanese PFAL market.

LED light companies are required to provide multifaceted solutions with diversified PFAL business models, crop varieties and targeted nutrient components. As is the case with academic research, red-blue LEDs, white LEDs, purple LEDs and other wavebands have been extensively discussed and studied for the last few years. Some companies are also starting to pursue the supplemental lighting business after experiencing LED grow light PFAL projects for some years.

Clarifying LED issues

While there has been progress in the industry, LED users have some issues with LED grow lights that need clarification. These include a lack of uniformity of product features or specifications of LED light systems between companies. This lack of uniformity could cause confusion particularly when evaluating and comparing multiple LED light options or conducting research.

In order to address these concerns, in September 2015 the Japan Plant Factory Association (JPFA) organized a committee and facilitated activities with major LED grow light companies, LED-related companies and academic experts. After holding a series of discussions, the committee created an example table for LED lighting systems. The table includes optical, energy and system characteristics and other items measured by a total luminous flux measurement system.

Some of the committee's outcomes were published and presented by Dr. Eiji Goto at Chiba University, Graduate School of Horticulture, at the 2016 academic conference, Japanese Society of Agricultural, Biological, and Environmental Engineers and Scientists in Kanazawa, Japan. More details can be found in the new book, "LED Lighting for Urban Agriculture," published by Springer Singapore. The book's editors are Toyoki Kozai, Kazuhiro Fujiwara and Erik Runkle.

Japan Plant Factory Association (JPFA)

The Japan Plant Factory Association is a non-profit association devoted to academic and business advancements in the Plant Factory/ Vertical Farm/CEA industry. About 20 consortium research-and-development projects are conducted in PFALs and greenhouse facilities at Chiba University and off campus.

Monthly workshops, training courses and intensive business session courses are offered for professional growers and potential entrants. Business and research-and-development cooperation, consulting services, research activities and collaborations are always welcomed.

The association also conducts onsite study tours with lecture/discussion with Dr. Toyoki Kozai, CEO of JPFA, including a tour to its onsite LED PFAL with multiple LED lightings. The next Plant Factory Study Tour is scheduled for Oct. 11, 2016, in Kashiwanoha, japan, which is an agri-smart city outside Tokyo. Reservations for the tour are required.

For more: Japan Plant Factory Association, info.english@npoplantfactory.org; http://npoplantfactory.org/english.html

-Eri Hayashi

Japan Plant Factory Association (JPFA) Director International Relations & Consulting

E*Green Lab Inc., CEO

Panama looks to build a *controlled environment agriculture* research center

by Jim Pantaleo

A number of organizations and companies in and outside Panama are looking to develop El Centro de Investigación para la Producción de Agricultura en Ambiente Controlado (CIPAC), a world-class controlled environment agriculture research and development center.

Linking Central and South America, the diverse and dynamic nation of Panama is poised to bring controlled environment agriculture (CEA) into the 21st century. The country is establishing a world-class research and development center known as El Centro de Investigación para la Producción de Agricultura en Ambiente Controlado (CIPAC). Translation: Research Center for the Production in Controlled Environment Agriculture. Following independence from Spain in 1821 and the completion of the global shipping link, the Panama Canal in 1914, Panama is once again seizing its own future and the future of agriculture by establishing a premier research center.

With a population of 4 million people, Panama leads the region in economic growth, second only to Brazil at 10 percent per annum. Ninety-five percent of Panama's population is literate. Following the deposing of strongman Manuel Noriega in 1989, Panama has adopted a robust and business-friendly environment with an ever-modernizing infrastructure. It is the ideal place to nurture the growth of the most cutting-edge aspects of agriculture.

Organizations, companies, government work together to develop CIPAC

The creation of CIPAC is led by a number of forward-thinking organizations, which like their predecessors, are working together to advance controlled environment agriculture. Contributors to the development of the center include:

- **Urban Farms**, the nation's first large scale indoor vertical farm.
- **SENACYT**, Panama's National Secretariat of Science and Technology
- **IICA**, the Inter-American Institute for Cooperation on Agriculture
- **Technological University of Panama**

Other parties involved with CIPAC's creation are Panama's Ministry of Agriculture, the University of Panama, and the Development Bank of Latin America or CAF (Corporación Andina de Fomento). Contributors from outside of the Americas include Japan's Chiba University, home of Dr. Toyoki Kozai, known as the "Father of the Modern Plant Factory," and Priva, a Netherlands-based company develops and produces innovative solutions for indoor climate control.

Representatives from some of the organizations involved with the development of CIPAC shared their insight on the work being done on this world-class controlled environment research center.

David Proenza,
CEO at Urban Farms

How did the initiative to develop the CIPAC come about?

During my second trip to Japan in 2012 following the tragedy at Fukushima and how that created a large number of indoor vertical farms addressing thousands of acres of fallow, radioactive farmland. Once we realized we were going to build vertical farms on a global basis, we started to develop our strategy.

Part of that process, as we went down the road of the various steps as a company to prepare ourselves was, "How do we train people? Where do we get trained people from?"

It's a new industry. We can pull them out of greenhouses, but they don't understand artificial lighting. Many agronomists may not understand production in a fully controlled environment unless they come from Holland, or graduated from one of the few universities teaching controlled environment agriculture, for example.

There were a lot of questions that came up and we could either try to answer them as a company or get the government and universities involved. Research and development is very expensive and we wanted to see how we could take that side of the business and develop a public-private entity with the support of the government and at the same time have a center, open to everyone.

From those initial concerns, CIPAC was born. We tasked the FDCEA (Foundation for the Development of Controlled Environment Agriculture) with taking the lead in contributing to help initiate and develop this new, innovative technology. FDCEA solicited help from SENACYT (National Secretary on Science and Technology), the Ministry of Agriculture, the Ministry of Commerce, the Development Bank of Latin America, local universities and IICA (International Institute for Agriculture Cooperation). We went directly to them making the proposition that Panama could be a global leader in this space, in the new technology, in training people, R&D, etc. It is a pure public-private initiative to include the government, universities and private industry.

Which horticulture-based partner companies will participate in CIPAC?

We've spoken to a lot of people already. We've spoken with representatives at Philips, Priva, Hort Americas and a number of equipment providers. They are all very much interested in participating. They are all on-board and we have a lot of interest from a number of key players in the industry.

One of the things we've proposed is that they could put their equipment into the center and people could engage in training while at the same time using their equipment. This is beneficial in that when those trainees go back to their various operations they can state, "We know Priva or produced plants using Philips LEDs. That's the equipment we learned on."

Nevertheless, we want to remain neutral to all manufacturers and allow everyone to participate. This is just one possible example.

The other aspect to training is these various manufacturers would provide training events

and seminars on their particular equipment. At the present time, we're still forming how participation (from manufacturers and suppliers) will work itself out. Beyond equipment, some have offered to help us fund the center to provide expertise based on other like-research centers around the world. The bottom line is we're getting a lot of interest from many companies.

Will CIPAC provide job placement following training?

That's a natural extension of CIPAC. However, at the moment I'm not confident to state that this is 100 percent within our power at the moment. Nevertheless, I believe CIPAC will train future indoor vertical farm agronomists and this (job placement) will be a natural extension of the initiative.

What products, such as leafy greens, herbs, fruiting and medicinal plants, will CIPAC study?

All of the above. The structure of CIPAC will consist of four chambers. Four individual, environmentally controlled chambers so we can produce, at any given time, four different products.

I am not just talking about lettuce. We will have no limitations. We will have an "open mind and out-of-the-box way of thinking" while addressing the pertinent issues at hand.

We want to test the limits of what new technology can achieve to produce various food products and how the new technology and food products can be economically viable and ultimately commercialized. This technology and research will be available to anyone who wishes to participate.

Will global leaders in the field of CEA be engaged with CIPAC?

Yes, we had a recent meeting, for example, with Dr. Kozai and Chiba University's administrative staff explaining what we wanted to do with CIPAC while cooperating in the form of a technology transfer scenario. They welcomed this with open arms. From this meeting we ended up sending eight Panamanian agriculture/agronomy students to Chiba University for a number of plant factory training sessions. Also, six students from Chiba University came to Panama for an internship at Urban Farms, as well as visiting greenhouses and other traditional farming operations throughout Panama.

In the bigger picture, CIPAC is open to working with all universities and research centers as well as governments and private enterprises. We want this center to be available to the entire industry not just the country or region of Panama. We see it as a win-win situation for all.

Victor Sanchez, Director of Business Development at Panama's National Secretariat of Science and Technology (SENACYT)

Where will the CIPAC R&D Training Center be located?

The current plan is to locate the center in Panama City directly within the campus of one of the two largest public universities in Panama, either at the University of Panama or the Technological University of Panama.

What are the short- and long-term goals of CIPAC?

The short term goals are primarily to help introduce the technologies and know-how required to set-up commercially viable (indoor) vertical farms. This also includes training for technical workers within the farms. The technologies and knowledge in question are not only those found in the horticultural field, but also in the engineering and design requirements to construct the vertical farms. In the long-term, we seek to become a world-class research center focused on improving efficiencies while assisting in the diversification of those specific crops being produced.

What locations/universities will participate in CIPAC initiatives?

Regardless of the final location we choose, we expect three main public universities to participate. This will include associate researchers along with smaller associated labs within their campuses. The idea is to have the participating students exposed to the relevant knowledge and technologies as early as possible. Specifically, we are referring to the University of Panama, the Technological University of Panama and UNACH: University of Chiriquí.

Which CEA firms will have a direct engagement with CIPAC?

At the moment, we are working very closely with the Panama-based vertical farm, Urban Farms. We are exploring further working relationships with other similar companies at the moment.

Will CIPAC have a marketing budget? If yes, how will those funds be used?

We are still working on the final design of the center and have not, as of now, decided on the specific budget distribution.

Will CIPAC have proprietary rights to experiments/data based on positive/exemplary outcomes?

We expect a rather open laboratory (to be funded primarily by the Panamanian government the first few years of its existence). We expect most research to be openly published and the results made available to the academic and business communities at large. Of course, we will also be available to work under contract with growers and companies, in which case there will be specific ND (non-disclosure) and IP (intellectual property) agreements specific to each project.

How will CIPAC data be collected and stored?

As mentioned, within an "open source" format.

Will the data and research results be available to anyone?

Yes, to both academia and the participating business community.

Dr. Gerardo Escurdero, Inter American Institute for Cooperation on Agriculture (IICA) representative

What is IICA's role in the development of CIPAC?

There are two stages. The first stage is where we will contribute to the development of the first part for the creation of CIPAC. We will produce a preliminary design document that will detail a clear necessity to pass a second part which is the facilitation design for CIPAC. We should have this completed within the next month.

In approximately four months, for stage two, we will have a final document with more specifics, which will permit us to obtain resources to proceed with the construction of CIPAC.

Who are in leadership positions at CIPAC?

There exists an institutional weakness today. It (controlled environment agriculture) is a very weak area today in Panama. It is administratively limited and lacking in representation. There are very few farms engaging in vertically grown (indoor) agriculture.

Urban Farms is a leader in this area based on their deep knowledge, their scale and they are now in fact producing for the marketplace. They have started this operation with absolutely all the conditions under control to commence vertically-grown agriculture. It's clear they are in a leadership position.

Secondly, at least at the present time there is a powerful state institution as represented by SENACYT (Victor Sanchez) who we are working very strongly with. And further, we are set to work with other institutions that will play a very important role, specifically the universities. It's very probable we will be working with the University of Panama and the Technical University of Panama.

In this atmosphere of participants, IICA is a public, international organization quite present throughout the Americas. It will play a role of incubating CIPAC to build a powerful strategy and local capabilities. In this way we can grow and develop and in that moment become independent from IICA.

Is there a CIPAC board of directors?

In this moment, CIPAC is an idea. We've still not formed it, but we have a clear idea to establish a board of directors to permit regulating and to normalize the development of CIPAC from a perspective of the public good. To decide to unfold the knowledge and the power of vertical agriculture, not just for

the advancement of indoor vertical farming but also for greenhouses.

The board of directors will have to be in direct contact with the public as a private partner, well connected to management and well oriented not making political decisions but playing a very important role for society.

Author note: There is currently a committee made up of the following stake holders, IICA, SENACYT, CAF, FDCEA and Urban Farms.

Who will lead the development effort and what are their qualifications?

Very strongly, through the Development Bank of Latin America also known as the Corporación Andina de Fomento (CAF). This is a very important participant as they have been supporting the development of stage one and now will identify the resources needed for stage two based on the feasibility studies undertaken. It is very probable they will also play an important role in the third stage which is the implementation and development of CIPAC.

With respect to this question, CIPAC must be founded with absolute technical expertise and this means we can't improvise. The handling of CIPAC will have functions, research and the development of capabilities. It shall be founded with the requirement of being world class, the latest generation.

Therefore, their qualifications must be at the highest technical and scientific levels in the subject of controlled environment agriculture. The way we are contemplating the participation of world class level technical people, we expect them to develop CIPAC and at the same time to create the (national) conditions, such as here in Panama, to integrate personnel based in-country. But here I want to repeat that there will be very high technical and scientific standards.

Therefore, should CIPAC become a central location for research and development based here in Panama, we will establish extremely solid alliances with public and private institutions, especially private. These institutions, which today are on the front lines of knowledge and action in this type of agriculture: Japanese, Dutch, Taiwanese, Chinese and in North America.

How will CIPAC be funded?

Short term, we foresee maintenance of four to five years of resources coming from a complimentary portion from part of the public budget, but principally from a blend of a budget that permits the combining of funds to provide security to set up so that CIPAC can consolidate one step at a time, short term, within five years. But the most important thing is to guarantee the financial sustainability of CIPAC. We are thinking from a mid-term view that we should establish CIPAC under a tax-free zone as allowed by Panamanian business legislation to provide financial sustainability. Because of this, from the first year of its founding, CIPAC should set a deep strategy of participation with a university to include, with management, participation from IICA to support important technical resources at a world class level.

Additionally, we view the possibility to have land or fields producing in different forms of protected agriculture. We want to say greenhouses and mid-level developments and indoor vertical agriculture to produce and to sell products that permit and generate a principal source which will help finance CIPAC. And in these products, not just the production of tomatoes or lettuce or berries, we need to define this in the business plan. And also facilitate the requirements that open the demand for agriculture that could also be a source of financial resources. The raising of capital and proper research are activities that require a level of support that we can't sustain by ourselves. The model is a model that combines the actions of research and raising capital but it

also requires the search for generating wealth in specialized fields of high production crops that can generate resources to sustain CIPAC.

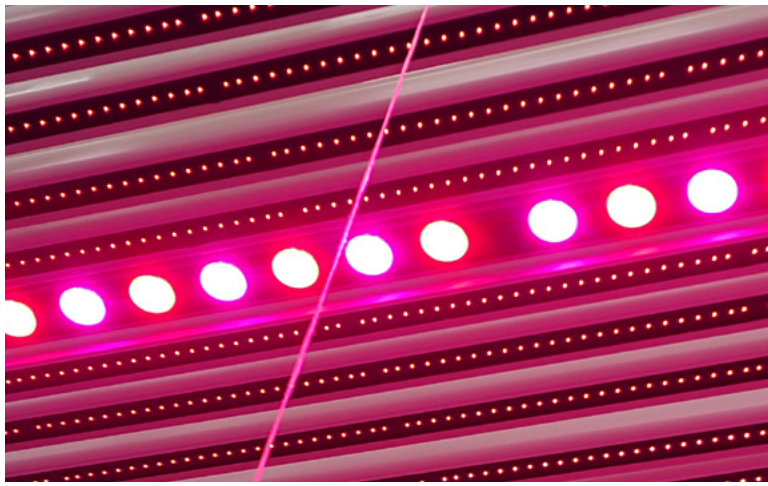
The second limitation is CIPAC has not been founded as a known institution in the world. They need to make a place for themselves in the world apart from other established research centers to compliment global efforts behind a particular specialization. CIPAC in Panama must define itself differently with respect to what they can do…or CIPAC in Peru, or in Germany or in Holland or in the United States.

We have to write a new mandate for the next generation to empower excellent economies of scale and an excellent international division of research in controlled environment agriculture. Therefore, the goal is to state a new tradition and to present many possibilities to strengthen us.

Will the CIPAC R&D and Training Center facilities be based primarily in Panama or are there plans for Latin America or globally?

Definitely CIPAC is a Panamanian initiative, but it is not significant that it should be exclusive only to reside in Panama. On the contrary, there are some demands that we have identified from Japan for example and in many countries within Latin America. Many want to shift the focus of their research centers to items that are specialized research and they don't wish to repeat what is being done at CIPAC in Panama. We need to realistically construct CIPAC with a world view in a way that the survival of CIPAC in Panama is able to integrate into other research initiatives that we understand are increasing around the world and throughout Latin America.

And we understand that in the United States there is also a very important movement in vertical agriculture and obviously in controlled environment agriculture. What we need to do



for CIPAC to grow is to have a greater alliance with the next generation on a planetary scale.

Will CIPAC seek to patent any of the research compiled, given there are patentable components based on exemplary outcomes?

It is part of the strategy of the development of CIPAC to be able to do that to acquire a patent. However, some conditions must be met first. For example, if a private company contracts CIPAC for a specific research reason, that company is entitled to patent the outcome (and it will be maintained confidentially). But the fundamental reason for CIPAC is not to generate patents, per se, but to work for patents that have a demand, but also for patents that can be a service or of use for the public good or for the world.

Above all, it is to facilitate access for small and large producing organizations. Another way to look at it, the concrete answer is yes you can patent, you should patent but you should do it for the common good and at the same time for a specific demand of an organization or consortium.

Like open source software?

Exactly.

Dr. Humberto Rodriguez Del Rosario, Director of Research at Panama Technical University

How is the university planning to work and engage with CIPAC?

We have a research center which is focused on agro-industries and the university is already planning on doing some parallel activities related to plant factories or indoor vertical farms (using 100 percent LED lighting). At the present time, the university has a primary focus on food processing and ensuring that food is not contaminated based on food safety requirements and regulations.

The mechanical engineering department and the research center CEPIA (Agricultural Production and Research Center) have already conducted several meetings and we will be asking representatives from the electrical and computer engineering systems departments to join us so as to assemble a group of researchers specifically focused on vertical farming and environmental controls engineering.

We are creating a proposal to acquire the necessary funds. This is the first thing that must be done. Before doing any research, we have to get the funds.

When CIPAC comes to realization, we will be sending members of this group to begin research in this area of controlled environment agriculture. The idea is that in the future, CIPAC will have researchers from many universities, public universities included, not just the Technical University of Panama.

CIPAC needs to have some rules for the use of equipment, the space, etc., but I think that it is perfectly possible to have this kind of collaboration with other universities. In fact, we could have multi-university teams.

Will you be directly involved in creating university curriculum based on CIPAC engagement?

That is something that has to be discussed with the appropriate department stake holders. To do something similar to what we have in the mechanical engineering department, we have areas of study which would result in a minor degree. For example, we have mechanical engineers who specialize in naval or environmental engineering so it is perfectly possible (to create curriculum) and I would be more than happy to help in this matter. And further, when you consider mechanical engineering and control systems, these are transversal subject matters meaning that the application and knowledge of control systems are wide-spread. In mechanical engineering, we teach HVAC (heating, ventilation and air conditioning) which are obviously part of environmental control systems. I think it is perfectly natural to create a minor degree program incorporating these disciplines as they relate to controlled environment agriculture.

In your view, how will CIPAC impact future Panamanian agricultural engineers and agronomists studying at the university?

This will change curriculum immediately. I believe these new disciplines as they relate to agriculture will bring in many more young people. This is going to be a new, modern career for students. There remains a challenge today in the number of students seeking to study agronomy or agricultural engineering, for example. I believe the change is very important

and will open many new doors. Obviously, we are trying to teach subjects that will provide a good income but also to help serve society. This technological change is so strong that the university has to act very quickly in order to create the programs necessary.

Do you see the creation of a formal degree program based on CIPAC engagement, specifically in the area of controlled environment agriculture?

I see a new future where dependencies and disciplines will be very closely tied. Initially, what will occur is that there will be legally-based certifications or licensures. For example, a mechanical engineer can design an air conditioning system and they will have the legal right to sign off on drawings or systems. Further, the Engineering and Architectural Society have a committee that validates such things providing a form of licensure to an individual's qualifications.

Nevertheless, there will be a measurement in those other capabilities that will be required. For example, if one designs a process for the distribution of nutrients, this can't be signed off by a mechanical engineer. It would require an engineer who is familiar with this type of process and technology to be "certifiable." In other words, it will be necessary for a different type of engineer or technologist to provide legal validation and certification. I see this not happening immediately but in the medium term. In the long term, I see the creation of specific careers based on the needs of the vertical farm.

Will the university have a financial, marketing or ownership stake in CIPAC?

I can't respond directly to this question as there still remains a period of negotiations for a final agreement based on the university's participation in CIPAC. Our president has offered some open space at the university so that CIPAC could be built inside the campus. It's highly probable that eventually CIPAC will generate patents and new commercial products. It's not however a center of production rather of research. However there is validity in the development of this type of relationship and that all participants share and collaborate. Upon agreement signing, there will an intellectual property agreement to include copyrights and co-branding.

Jim Pantaleo is Director of Business Development at Urban Ag News; jim@urbanagnews.com.

Former gangster is healing his neighborhood through organic gardening

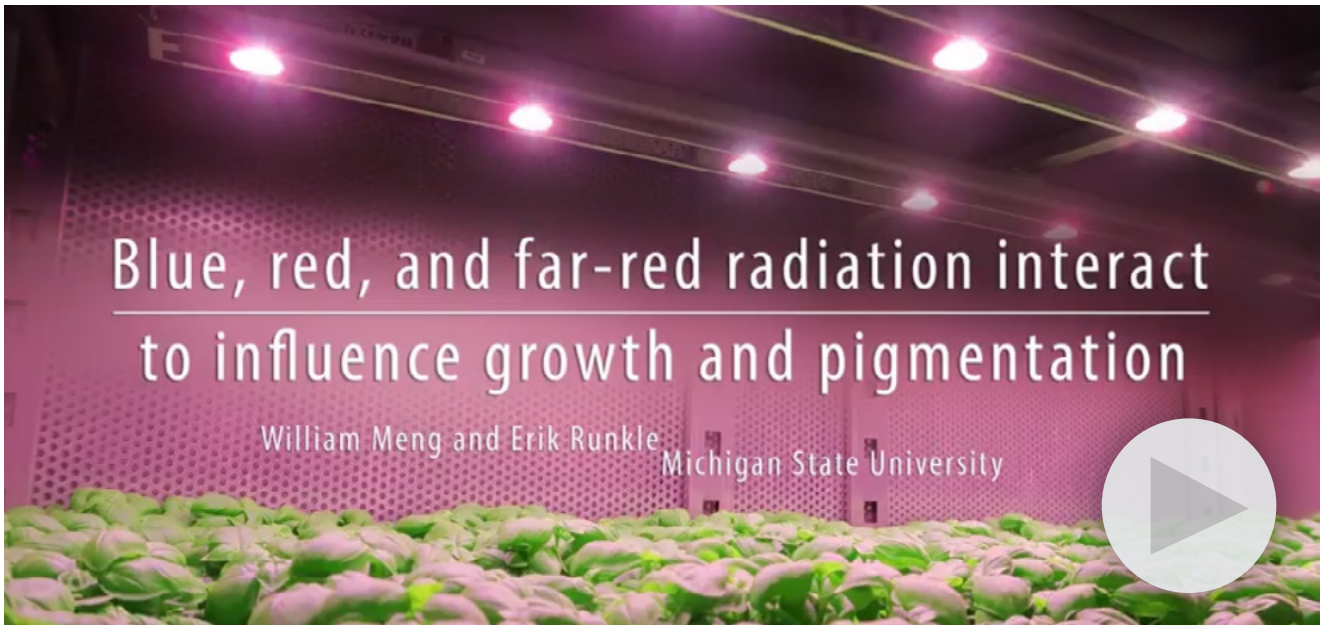
REPRINTS

URBANAGNEWS.COM HAS RECEIVED PERMISSION TO REPRINT THE FOLLOWING ARTICLES THAT ORIGINALLY APPEARED IN SCIENTIFIC JOURNALS

URBANAGNEWS.COM WANTS TO SHARE THE BEST AND MOST RELEVANT SCIENTIFIC RESEARCH AND DATA AVAILABLE. IF YOU HAVE PUBLISHED A PAPER AND WOULD LIKE TO HAVE IT APPEAR IN OUR QUARTERLY, PLEASE CONTACT US HERE.

POWERED BY

Light Hort

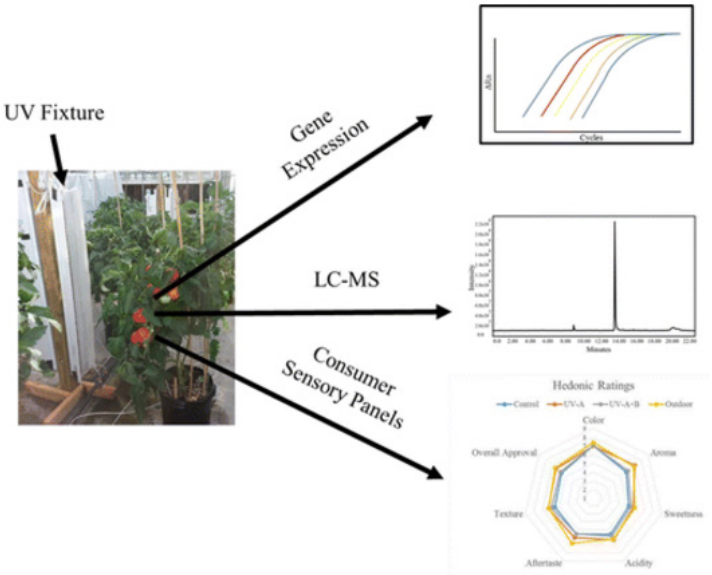


Horticultural lighting has primarily focused on photosynthetically active radiation, especially blue (B, 400 to 500 nm) and red (R, 600 to 700 nm), and its effects on plant growth. However, far-red (FR, 700 to 800 nm) radiation regulates numerous pathways crucial to photomorphogenesis, thus meriting consideration in sole-source plant lighting applications. We investigated how interactions among B (peak=450 nm), R (peak=660 nm), and FR (peak=730 nm) radiation from light-emitting diodes influenced growth of green butterhead lettuce (*Lactuca sativa*) 'Rex', red oakleaf lettuce 'Cherokee', and basil (*Ocimum basilicum*) 'Genovese'. Seedlings were grown in a growth chamber at 22 °C and were continuously irradiated by 180 $\mu mol \cdot m^{-2} \cdot s^{-1}$ of B and/or R radiation at various B-to-R ratios (R_{180}, $B_{30}R_{150}$, $B_{90}R_{90}$, and B_{180}, where subscripts indicate respective photon flux densities), with or without 30 $\mu mol \cdot m^{-2} \cdot s^{-1}$ of FR radiation (FR_{30}). Growth, morphology, and pigmentation were quantified 12 and 16 days after sowing lettuce and basil, respectively. FR_{30} increased leaf length and shoot weight of all crops, although the effects were more pronounced when FR_{30} was added to $B_{90}R_{90}$ than to $B_{30}R_{150}$. For example, the addition of FR_{30} increased shoot dry weight of all crops by 34–43% at $B_{90}R_{90}$, in contrast to 8–17% at $B_{30}R_{150}$. Adding FR_{30} increased root dry weight of basil by 18–26% at $B_{30}R_{150}$ or $B_{90}R_{90}$ and that of lettuce 'Cherokee' by 25% at $B_{30}R_{150}$, but did not influence that of lettuce 'Rex'. Adding FR_{30} to B+R radiation reduced chlorophyll content in lettuce by 10–20%, but not in basil. In the absence of B radiation, $R_{180}FR_{30}$ produced spindly lettuce seedlings with elongated, curling, chlorotic, and high-moisture leaves. Partially substituting B radiation for R radiation in $R_{180}FR_{30}$ suppressed hypocotyl and leaf length of lettuce and increased chlorophyll content in both lettuce and basil. A color space analysis revealed that more B radiation or lack of FR radiation corresponded with darker and redder leaves of lettuce 'Cherokee', possibly linked to a greater anthocyanin concentration. We conclude that both B and R radiation are required for desirable plant traits, and that B and FR radiation exert antagonistic effects on extension growth and pigmentation. FR radiation can be added to sole-source B+R lighting to increase leaf expansion, radiation capture and thus, growth.

Originally published: http://lighthort.com/2016/08/19/grow-greens-blue-red-far-red-leds/

Manipulating Sensory and Phytochemical Profiles of Greenhouse Tomatoes Using Environmentally Relevant Doses of Ultraviolet Radiation

Michael P. Dzakovich[1], Mario G. Ferruzzi[2], and Cary A. Mitchell[1]



Greenhouse tomatoes grown during the winter have a poor reputation compared to their garden grown counterparts in terms of flavor and their chemical profile. One of the differences between greenhouse and garden grown tomatoes is the lack of ultraviolet B (UV-B) radiation as well as some ultraviolet A (UV-A) in glass-glazed greenhouses and in polyhouses with UV-B-absorbing films. Since UV-B has long been known to influence the amount of vitamin C, phenolics, and carotenoids (the pigments that give tomatoes their color) in tomatoes, this study tested the hypothesis that supplemental UV-B radiation would restore garden-grown attributes in greenhouse tomatoes. Additionally, many of the compounds that give tomatoes their flavor come from the same pathways as phenolics and carotenoids, so changes in amount of these compounds might alter the flavor of tomatoes. Because of this, consumer sensory panels were used to test if supplemental UV-B radiation altered the flavor of greenhouse tomatoes. All greenhouse treatments were compared to the same variety of tomato grown outdoors during the summer. This study found that UV-A and UV-B radiation did not strongly alter the biosynthesis of phytochemicals found in tomato fruits. Although, a prominent phenolic compound, rutin, was increased in tomatoes that were supplemented with both UV-A and UV-B. Interestingly, it was found that supplemental UV-A radiation was able to increase the overall liking of fruit aroma, acidity, and overall approval. Fruits supplemented with both UV-A and UV-B tended to be better-liked than control fruits, but not as strongly as those supplemented with only UV-A. This suggests that UV-A might be a candidate for future studies using light to increase the flavor of greenhouse tomatoes. Gene expression analyses indicated that the plants adapted to greenhouse UV treatments and responses to UV radiation may have been reduced due to competition among photoreceptors for other forms of light (abundant visible light from the sun or from HPS lamps used for supplemental light during the winter). More research is needed to better understand how plants perceive UV radiation in the presence of other forms of light when grown in production systems.

Full article: http://pubsdc3.acs.org/doi/abs/10.1021/acs.jafc.6b02983?journalCode=jafcau&

[1]Department of Horticulture and Landscape Architecture, Purdue University, 625 Agriculture Mall Drive, West Lafayette, Indiana 47907-2010, United States
[2]Department of Food Science, Purdue University, 745 Agriculture Mall Drive, West Lafayette, Indiana 47907-2010, United States

J. Agric. Food Chem., 2016, 64 (36), pp 6801–6808
DOI: 10.1021/acs.jafc.6b02983
Publication Date (Web): August 26, 2016

JOURNAL OF AGRICULTURAL AND FOOD CHEMISTRY

Some of our sponsors

HORT AMERICAS
www.hortamericas.com

PONIC JOBS

CHIGGINS CONSULTANCY
FOR A GROWING MARKET

Light Hort

FOUNDATION FOR THE DEVELOPMENT OF CONTROLLED ENVIRONMENT AGRICULTURE

TALLER Horticulture

CONTACT US TO FIND OUT HOW TO PARTNER WITH US AS AN EDUCATION PROVIDER OR SPONSOR

Ag Education providers

THE GREENHOUSE PROJECT
NY SUN WORKS

CityFARM

INTERNATIONAL CONGRESS ON CONTROLLED ENVIRONMENT AGRICULTURE
VERTICAL FARMING · GREENHOUSE · AG TECH

URBAN AG NEWS

News on Technology for Vertical, Controlled Environment & Urban Farming

URBANAGNEWS.COM

CLICK TO CONTINUE READING IN ONE OF OUR PREVIOUS FOURTEEN ISSUES