HYDROPONIC INTENSIVE WORKSHOPS
at the Controlled Environment Agriculture Center
January 2018

Focus on Tomato Production
Jan 3-7, 2018

Focus on Lettuce Production
Jan 6-10, 2018

Combined Tomato & Lettuce
Jan 3-10, 2018

Controlled Environment Agriculture Center
1951 E Roger Road, Tucson, AZ 85719

College of Agriculture and Life Sciences
CONTROLLED ENVIRONMENT AGRICULTURE CENTER
Event Snapshot

January 3rd
• Tomato Workshop  9am – 5pm

January 4th
• Tomato Workshop  9am – 5pm

January 5th
• Tomato Workshop  9am – 5pm

January 6th
• Tomato Workshop  9am – 6pm
• Lettuce Workshop  3:30pm – 6pm
• Dinner & Reception  6pm – 7:30pm

January 7th
• Tomato & Lettuce  Combined Day  9am – 5pm

January 8th
• Lettuce Workshop  8am – 6pm

January 9th
• Lettuce Workshop  8am – 6pm

January 10th
• Lettuce Workshop  8am – 5:30pm
Jan 3 – Wednesday, 9am-5pm
Check-in as early as 8:30am

*Light Breakfast Provided*

From *Seed to Harvest Video (30min)* Tour of the CEAC including:
- Mist house (more on plant propagation)
- Teaching Greenhouse (Intro to the greenhouse, control systems, experiment, greenhouse set-up) (Chapter 3)
- Tomato plant rep assignments for the course

**Plant propagation (Chapter 6)**
- Seeds, media, fertilization, irrigation, environmental conditions
- Grafting

*Lunch Provided*

**Greenhouse set-up (Chapter 3 - PART 1)**
- Crop layout & Crop scheduling

**Crop maintenance – Emphasis on tomatoes (Chapter 3 PART 2)** –
- Training & pruning, finding the head, growth tapes
- Physiological disorders – leaves, stems, trusses (briefly, fruit)

**GH Plant work: Crop training & pruning**
- Finding the tomato head – Stem clipping & pruning
- Putting up growth tape
- Nodes, internodes and location of leaves & clusters on the stem
- Leaning & Lowering – proper techniques
- Note any leafy material on clusters
Jan 4 – Thursday, 9am-5pm
9am - Coffee & Previous Day Discussions

*Light Breakfast Provided*

Discussions and questions from previous day

Factors Controlling Plant Architecture
• How to “steer” the plant (Chapter 3)

Flowers, pollination and the fruit
• Bee hives / bee management (Chapter 7)
• Cluster maintenance (Chapter 8)
• Fruit problems (Chapter 3)

GH Plant work:
• Exercise - Reproductive vs Vegetative
• Exercise – Pollination % – Are the bees working?
• Continue Leaning and Lowering, plant work

*Lunch Provided*

Harvesting/grading/storage
• Individual versus cluster (TOV) harvesting
• Fruit categories including fruit problems
• Weighing & record keeping
• Types of packaging/storage
• Marketing/sales

GH Plant Work
• Harvest, sorting, weighing
• Cluster maintenance – pruning, clipping, j-hooks
Jan 5 – Friday, 9am-5pm
9am - Coffee & Previous Day Discussions

Discussions and questions from previous day

Basics of Nutrient Delivery Systems
Stock tanks, fertigation frequency and control
pH/ EC control

Monitoring Fertigation – Importance of lysimeters
How to make and use lysimeters

GH work:
Look at Hortimax system and lysimeters
Exercise – Lysimeters

*Light Breakfast Provided*

Back to CEAC classroom for:
Monitoring Growth, Plant Health, and Nutrition
• Crop registration parameters
• Plant tissue and water analyses
• Insect and disease diagnostics

Environmental conditions and settings (Chapter 3 PART 3)
• Light, temperatures, relative humidity, carbon dioxide, oxygen, air circulation

Pest Identification (Chapter 4)
• Introduction to the pests: Insects, Mites & Diseases
• Monitoring and recordkeeping

Greenhouse Work
• Exercise – Pest ID & Scouting
• Exercise – Crop Registration
• Leaves & leaflets – Removing lower leaves, how and why

*Lunch Provided*
Jan 6 – Saturday, 9am-6pm
9am - Coffee & Previous Day Discussions

Discussion and questions from previous day

Plant nutrition basics
• Tomato nutrients & deficiencies (Chapter 9)
• Continue nutrient delivery systems (Chapter 10)

Basic nutrient recipes

Making the concentrated solutions
• Components (keeping things separate), weighing & mixing the tanks

TOUR: Nutrient delivery systems in different greenhouses

How to refill the stock tanks
• Fill with same recipe
• How to change recipes

How to create a nutrient recipe based on target values (Chapter 10)
• Exercise: Nutrient solution calculations

Group Exercise - What’s the problem here? Plus Q & A

Dinner & Key Note Speaker
6pm – 7:30pm
• A Dinner & Networking Session provided for both Tomato & Lettuce Attendees

*Light Breakfast Provided*

*Lunch Provided*
Jan 7 – Sunday, 9am-5pm

*Combined Day*

*Light Breakfast Provided*

**Greenhouse Basics**
- Greenhouse site selection (Chapter 11)
- Greenhouse designs & materials (Chapter 12)
- Environmental control – including sizing heaters & fans (Chapter 13)
- A bit about greening the greenhouse (Chapter 14)

**Plant protection (Chapter 4)**
- Introduction to the pests: Insects, Mites & Diseases
- Integrated pest management (IPM)
- Control approaches

*Lunch provided during round table discussion with greenhouse engineers*
- Includes professors of Agricultural & Biosystems Engineering Department at The University of Arizona and CEAC / CAC personnel (as available): Dr. Gene Giacomelli, Dr. Murat Kacira, Mark Carson.

**Food safety & GHP/GAP certification (Lewis)**
- Safe production & handling procedures

**Organic Hydroponic Production (Tollefson)**
- Certification issues
- Production methods and issues
Jan 6 – Saturday, 3:30pm-6pm

• Introduction

• Tour of CEAC Campus & Analysis of Structures & Systems

• Common Questions

**Dinner & Key Note Speaker**

6pm – 7:30pm

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Jan 7 – Sunday, 9am-5pm

*Combined Day*

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• Production methods and issues
Jan 8 – Monday 8am-6pm
8am - Coffee & Previous Day Discussions

“Greening the Greenhouse”
- Resource use Optimization

Deciphering your greenhouse – “Virtual Grower”
- Projecting heating costs
- Forecasting performance

Crop registration forms
- Data collection and measurements

Environmental control & system maintenance & monitoring
- Set-points and setup
- Monitoring methods
- System maintenance
- Plant/Environment Relationships
- Real-time monitoring – CEAC/tomatoes live

Propagation
- Substrate choices and starting materials
- Seeds and seeding
- Germination conditions
- Scheduling

*Lunch Provided*
Jan 9 – Tuesday, 8am-6pm
8am - Coffee & Previous Day Discussions

*Light Breakfast Provided*

IPM, Disease, and Deficiencies
- Common pests and treatment procedures
- Diseases common to production
- Nutrient deficiencies

Growing Lettuce
- Nutrition
- Spacing and layout
- Crop maintenance and monitoring
- Harvesting

IPM, Disease, and deficiencies
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- Diseases common to production
- Nutrient deficiencies

*Lunch Provided*

Post-harvest & Food safety
- Post-harvest procedures
- Packaging, storage, and shipment
- Food safety procedures
- Safe production and handling procedures

Certifications & GHP / GAP
- GHP / GAP
- Certified Naturally Grown, Organic, and other labels
- Audits, check-ups, and maintenance of certifications
Jan 10 – Wednesday, 8am-5:30pm
8am - Coffee & Previous Day Discussions

Economics of production
• Materials costs and consumption
• Operating costs
• Financials

Business Considerations
• Business planning
• Marketing
• Customers and Selling

*Light Breakfast Provided*

*Lunch Provided*