UF | IFAS Extension
UNIVERSITY of FLORIDA

A General Introduction to Ethnic Vegetable Crops





G.D. Liu

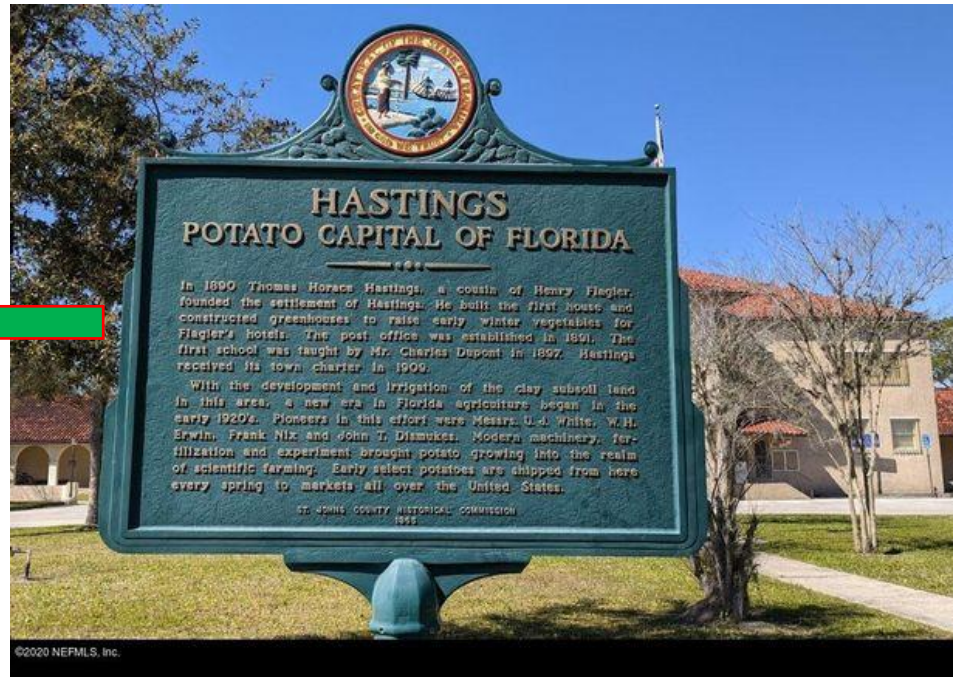
Horticultural Sciences Department, University of Florida/IFAS

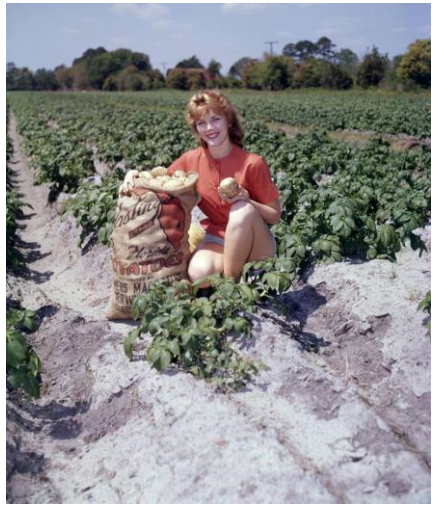
IST Training Program (ID: 32154) online, February 22nd, 2023

Outlines

- Ethnic Vegetable Introduction
- Ethnic Vegetable N Management
- Useful sources

Crops Grown in Florida





Susan Deen
Florida Potato Queen in 1962

Some photos above and in some other slides from The Internet

Statewide Production of Ethnic Vegetables

https://www.taobao.com/list/item/597715206065.htm
https://specialtyproduce.com/produce/Cucuzza_Squash_856.php



















Ethnic Vegetable Production Rapid Expanding Since 2013

https://asiangarden2table.com/product/winged-bean-early-dragon/

Photo credit: M.M. Dixon; Jian Huang

Number of Ethnic Vegetable Crops Grown in Florida

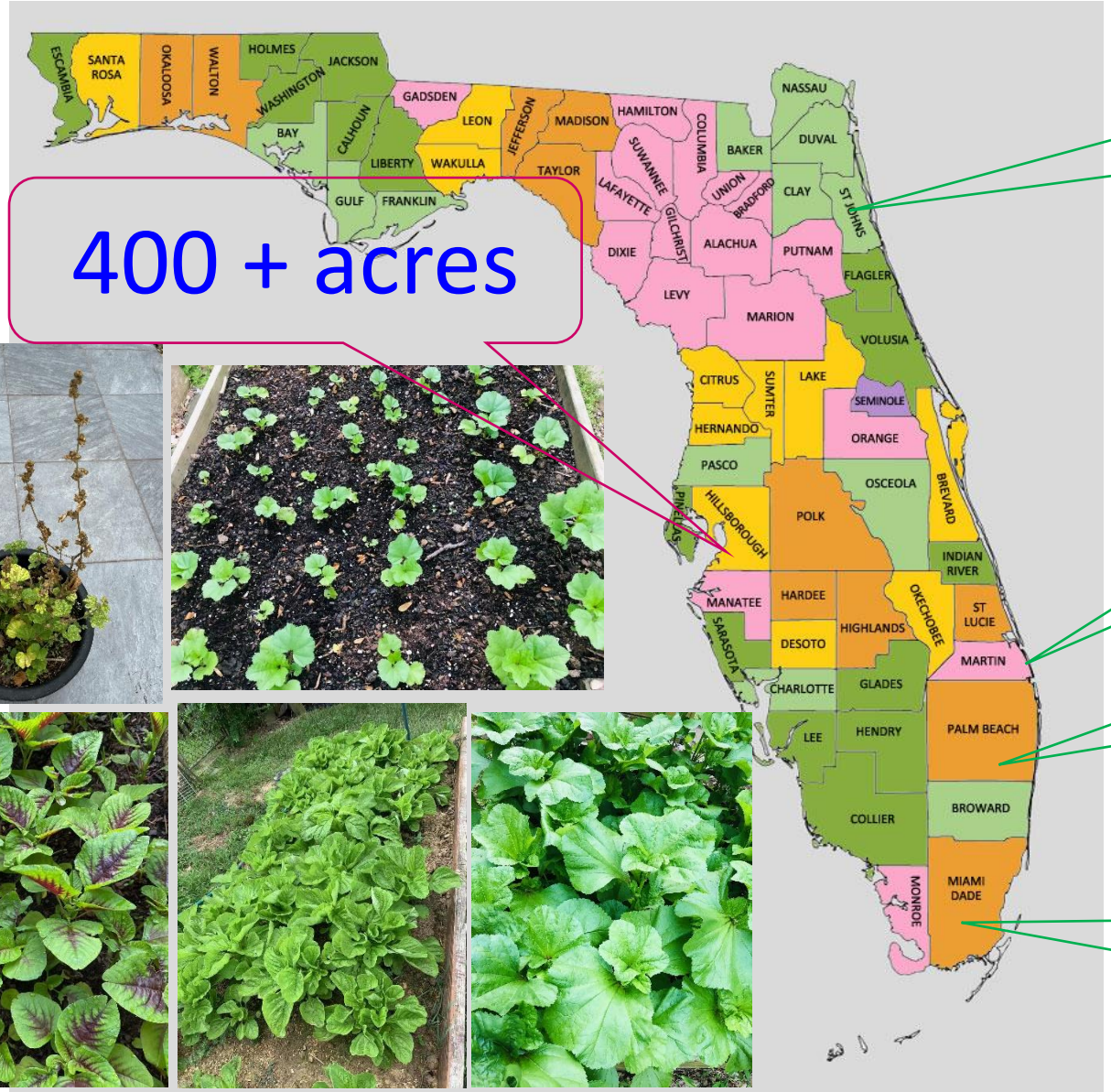
- ~20 in 2013
- >50 in 2022

Planted Acreage of Ethnic Vegetable Crops

- ~1,000 acres in 2013
- >7,500 acres in 2022

Where Are Ethnic Vegetable Crops Grown?

1,000+ Master Gardeners/homeowners



400 + acres

5,500 + acres

600 + acres

700 + acres

700 + acres

Photo credit: Q. Zeng & R. Wugang

What is an Ethnic Vegetable?

- A specialty vegetable *meeting the demand of ethnic populations* and diversifying the food systems for the population at large
- The ethnic vegetables come from Asia, Central America, the Caribbeans, and other regions.

Principal Ethnic Vegetable Crops Grown in Florida

Chayote	Indian bitter melon	Long napa	Sword Bean
Chinese bitter melon	Indian eggplant	Long squash	Tonghao (Crown daisy)
Choy sum	Kabocha	Angled luffa	Taiwan cabbage
Daikon radish	Kalabosa	Smooth luffa	Turmeric
Fuzzy squash	Line pepper	Winged bean	U choy
Gailon	Lobok radish	Shalihon (spider mustard)	Wawa choy (Baby Chinese Cabbage)
Garlic chive	Long bean dark green	Shanghai bok choy	Winter melon
Hyacinth bean	Long bean white	Shanghai tip	Yacon

How Many Ethnic Vegetables Grown in Florida?

	Crop	Number of Ethnic Vegetables
1	Root	8
2	Leafy	11
3	Stem	3
4	Flower	2
5	Fruit	27
	Total	51

Sword bean

Chinese gailon

Jicama

Line pepper

1. Root Crops


Lotus roots


Chinese radish


Daikon radish


Jicama


Rhizome
Yacon


Watermelon radish


Turmeric

2. Leafy crops

3. Stem Crops

Purple choy sum

Green choy sum

Purple choy sum

4. Flower Crops

Chinese gailon

Snowy cauliflower

5. Fruit Crops

Acreage in NE Florida Rapidly Expanded

Why Are Ethnic Vegetables Expanding?

1. Market Growth
2. High profitability
3. Sustainability enhancement
4. Health benefit for people
5. Effective Outreach

1. Nationwide Market Growth

- Asian Americans, the fastest-growing group
- Some Asian Americans seek Asian vegetable produces for years
- 10-year contracts with major cities
- Sometimes buy in fresh produces
- Sell produces locally

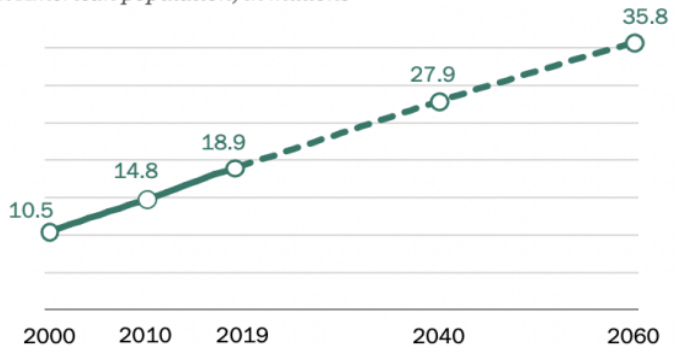
Asian Americans were the fastest-growing racial or ethnic group in the U.S. from 2000 to 2019 ...

U.S. population change by race and ethnicity, in thousands

	2019	2000	Change '00-'19	% Change '00-'19
Asian	18,906	10,469	8,437	81%
Hispanic	60,572	35,662	24,910	70
NHPI	596	370	226	61
Black	41,147	34,406	6,742	20
White	197,310	195,702	1,608	1
Total	328,240	282,162	46,077	16

... and their population is projected to pass 35 million by 2060

Asian American population, in millions



Note: NHPI is the acronym for Native Hawaiian and Pacific Islander. White, Black, Asian and NHPI individuals include those who report only being one race and are not Hispanic. Hispanics are of any race. Population figures rounded to nearest 1,000. American Indian and Alaska Native and multiracial groups not shown.
Source: Pew Research Center analysis of U.S. intercensal population estimates for 2000-2009, U.S. Census Bureau Vintage 2019 estimates for 2010-2019, and Census Bureau 2017 population projections for 2020-2060.

PEW RESEARCH CENTER

PEW Research Center April 9, 2021

2. Highly profitable

Gross income:

>$40,000/acre

3. Medicinal effects

Bitter melons

- Lower sugar levels in blood of diabetic patients
- Anti-cancers: skin tumors, breast cancer, prostate cancer, etc.

Turmeric

- Turmeric extracts may be beneficial for relieving symptoms of degenerative joint disease (knee osteoarthritis)

Photo credit: Amazon.com

Bitter melons can help reduce blood sugar

Journal List › Asian Pac J Trop Dis › v.3(2); 2013 Apr › PMC4027280

APJTD
Asian Pacific Journal of Tropical Disease
Home | Editorial board | Guidelines | Aims | Submission

Asian Pac J Trop Dis. 2013 Apr; 3(2): 93–102. PMCID: PMC
doi: 10.1016/S2222-1808(13)60052-3

Antidiabetic effects of *Momordica charantia* (bitter melon) and its medicinal potency

Baby Joseph* and D Jini

Interdisciplinary Research Centre, Department of Biotechnology, Malankara Catholic College, Mariagiri, Kaliakkavilai - 629153, Kanyakumari

Reviewed by Arun Kumar

District, TamilNadu, India
Associate Professor, Department of Biochemistry, International Medical School (IMS),Management and Sci
University (MSU) Shah Alam Campus, Selangor, Malaysia., Tel: +601116280732, E-mail: arun732003@gmail.co

▸ Author information ▸ Article notes ▸ Copyright and License information Disclaimer

Abstract

Go to

Diabetes mellitus is among the most common disorder in developed and developing countries, and the disease is increasing rapidly in most parts of the world. It has been estimated that up to one-third of patients with diabetes mellitus use some form of complementary and alternative medicine. One plant tha

Asian Pac J Trop Dis

Journal of Ethnopharmacology 134 (2011) 422–428

ELSEVIER

Contents lists available at ScienceDirect

Journal of Ethnopharmacology

journal homepage: www.elsevier.com/locate/jethpharm

Hypoglycemic effect of bitter melon compared with metformin in newly diagnosed type 2 diabetes patients

Anjana Fuangchan[a,1], Paveena Sonthisombat[a,*], Tippawadee Seubnukarn[b,2], Rapeepan Chanouan[c,3], Pontap Chotchaisuwat[d,4], Viruch Sirigulsatien[e,5], Kornkanok Ingkaninan[f,6], Pinyupa Plianbangchang[a,7], Stuart T. Haines[g]

[a] Department of Pharmacy Practice, Faculty of Pharmaceutical Sciences, Naresuan University, Muang, Phitsanulok 65000, Thailand
[b] Dans
[c] Chiar
[d] Nakh
[e] Diab
[f] Depa
Phitsa
[g] Univ

ART

Article
Receiv
Receiv

Journal of Medicinal Food, Vol. 21, No. 7 | Full Communications

Full Access

Momordica charantia Administration Improves Insulin Secretion in Type 2 Diabetes Mellitus

Marisol Cortez-Navarrete, Esperanza Martínez-Abundis, Karina G. Pérez-Rubio, Manuel González-Ortiz, and Miriam Méndez-del Villar

Published Online: 1 Jul 2018 | https://doi.org/10.1089/jmf.2017.0114

Sections PDF/EPUB Share

Abstract

An improvement in parameters of glycemic control has been observed with *Momordica c* e 2 diabetes mellitus (T2DM). It is unknown whether this improvement is through a modificat ulin sensitivity, or both. We hypothesized that *M. charantia* administration can improve insulin secretion and/or insulin sensitivity

Complementary and Alternative Medicine (S Kolasinski, Section Editor) | Published: 28 January 2021

Efficacy and Safety of Turmeric Extracts for the Treatment of Knee Osteoarthritis: a Systematic Review and Meta-analysis of Randomised Controlled Trials

Zhiqiang Wang, Ambrish Singh, Graeme Jones, Tania Winzenberg, Changhai Ding, Arvind Chopra, Siddharth Das, Debashish Danda, Laura Laslett & Benny Antony

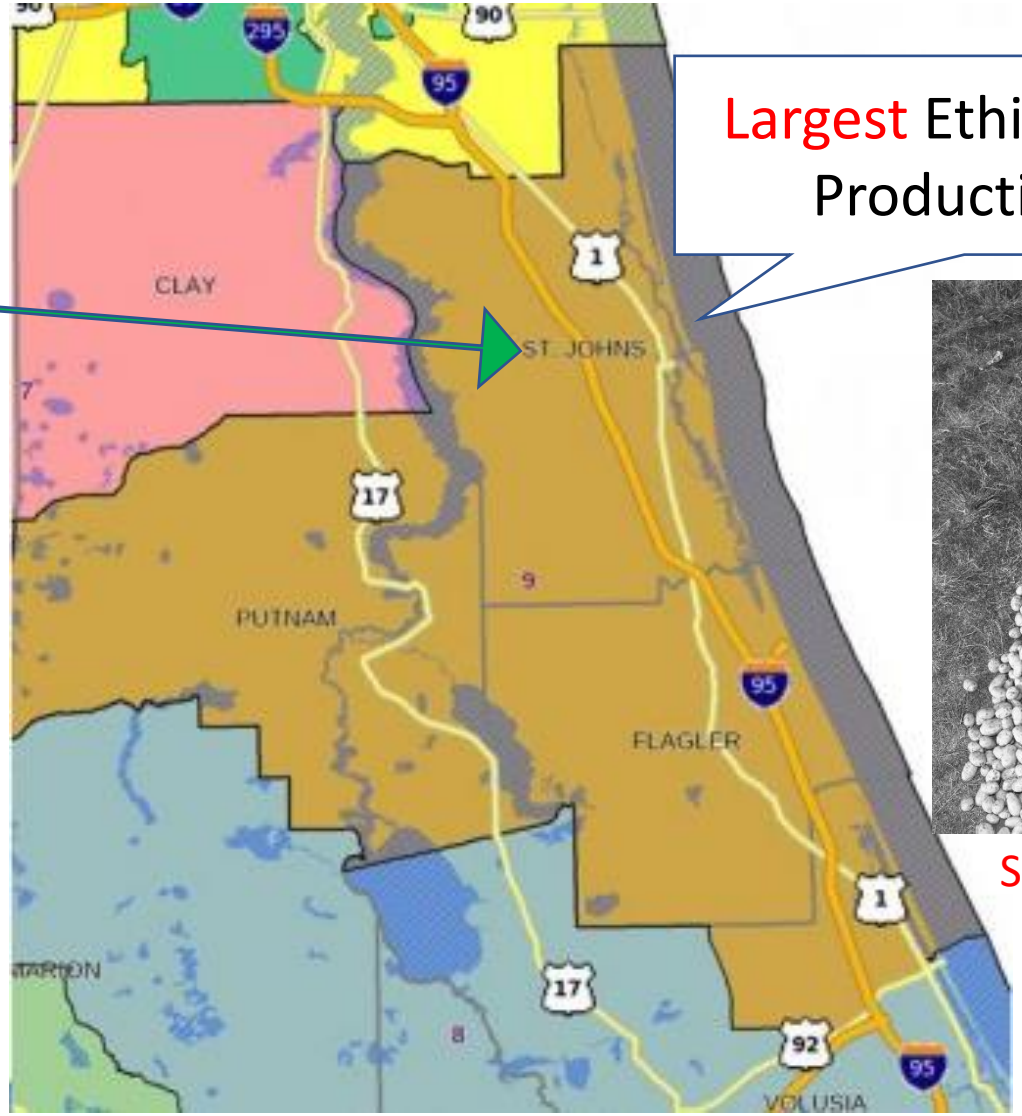
Current Rheumatology Reports **23**, Article number: 11 (2021) | Cite th

Photo credit: Amazon.com

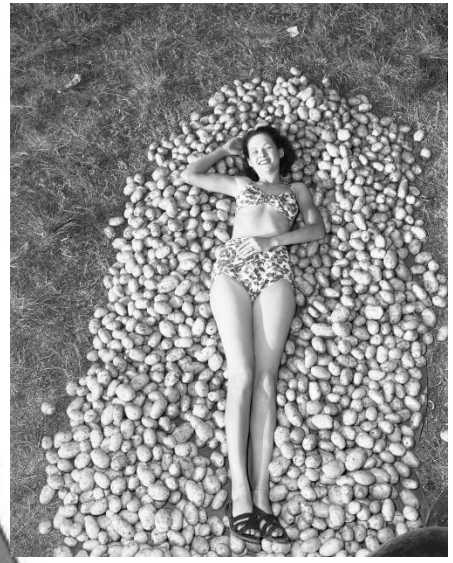
Abstract

Purpose of the Review

4. Environmental Sustainability Enhancement



Largest Ethic Vegetable Production Area

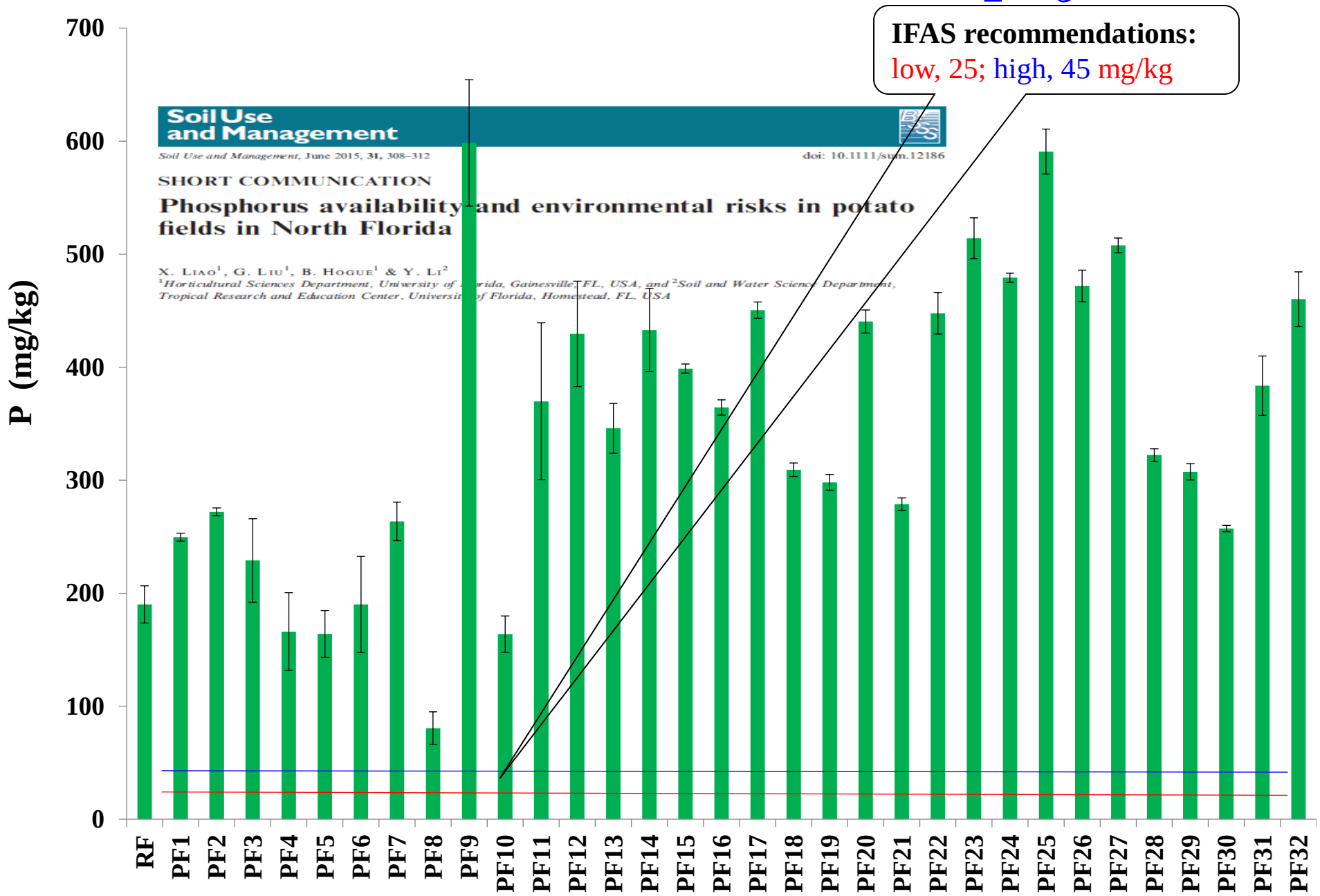


Spud queen, 1947
Peggy Davis

Current Situation of P Application

		The IFAS recommended P_2O_5 rate (lb/A)	*Growers' P_2O_5 rate* (lb/A)
when M-3 P level			
• > 45 PPM	or P_2O_5 > 206 lb/A	- 0	100
• 25 PPM - 45 PPM	or P_2O_5 115 - 206 lb/A	- 100	N/A
• < 25 PPM	or P_2O_5 < 115 lb/A	- 120	N/A

Mehlich-3 P (1,571 lb/A P_2O_5)



Soil Use and Management

Soil Use and Management, June 2015, **31**, 308–312 doi: 10.1111/sum.12186

SHORT COMMUNICATION

Phosphorus availability and environmental risks in potato fields in North Florida

X. Liao[1], G. Liu[1], B. Hogue[1] & Y. Li[2]

[1]*Horticultural Sciences Department, University of Florida, Gainesville, FL, USA, and* [2]*Soil and Water Science Department, Tropical Research and Education Center, University of Florida, Homestead, FL, USA*

Water Pollution-Eutrophication

1. Water body accumulates nutrients, especially phosphorus and nitrogen.
2. Excessive algal growth.
3. Aquatic organisms die.
4. As algae die, organic matter decomposition depletes oxygen—dead zones.

https://www.nbcnews.com/politics/elections/toxic-algae-seeps-florida-s-politics-ahead-primary-n904026

Microcystis Bloom - St. Johns River mid-channel south of the Buckman Bridge - 08.19.05 - 2:04pm

Microcystis Bloom - East bank of the St. Johns River - Mandarin - 08.19.05 - 2:42pm

Courtesy of T. Obreza

Potato vs. Ethnic Vegetable Production

	Potato	Ethnic Vegetable
• N:	200 lbs./acre	150 lbs./acre
• P_2O_5:	100	0
• K_2O:	250	150

Challenges

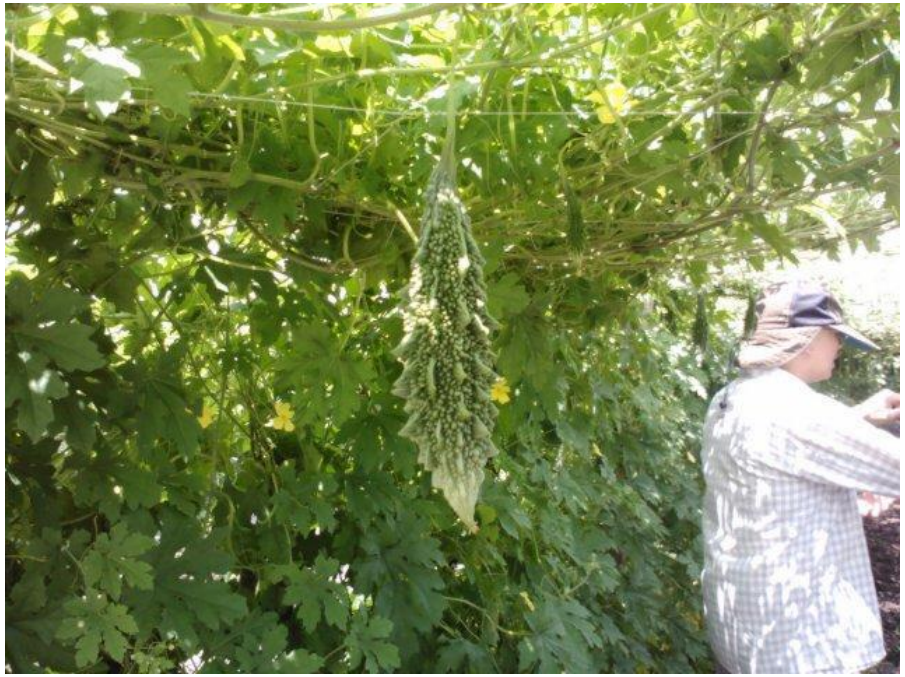
- Diseases
- Insects/nematodes
- Weeds
- Irrigation
- Fertilization
- Postharvest Handling

Most Soils in Florida Are Sandy by Nature

5. Effective Outreach

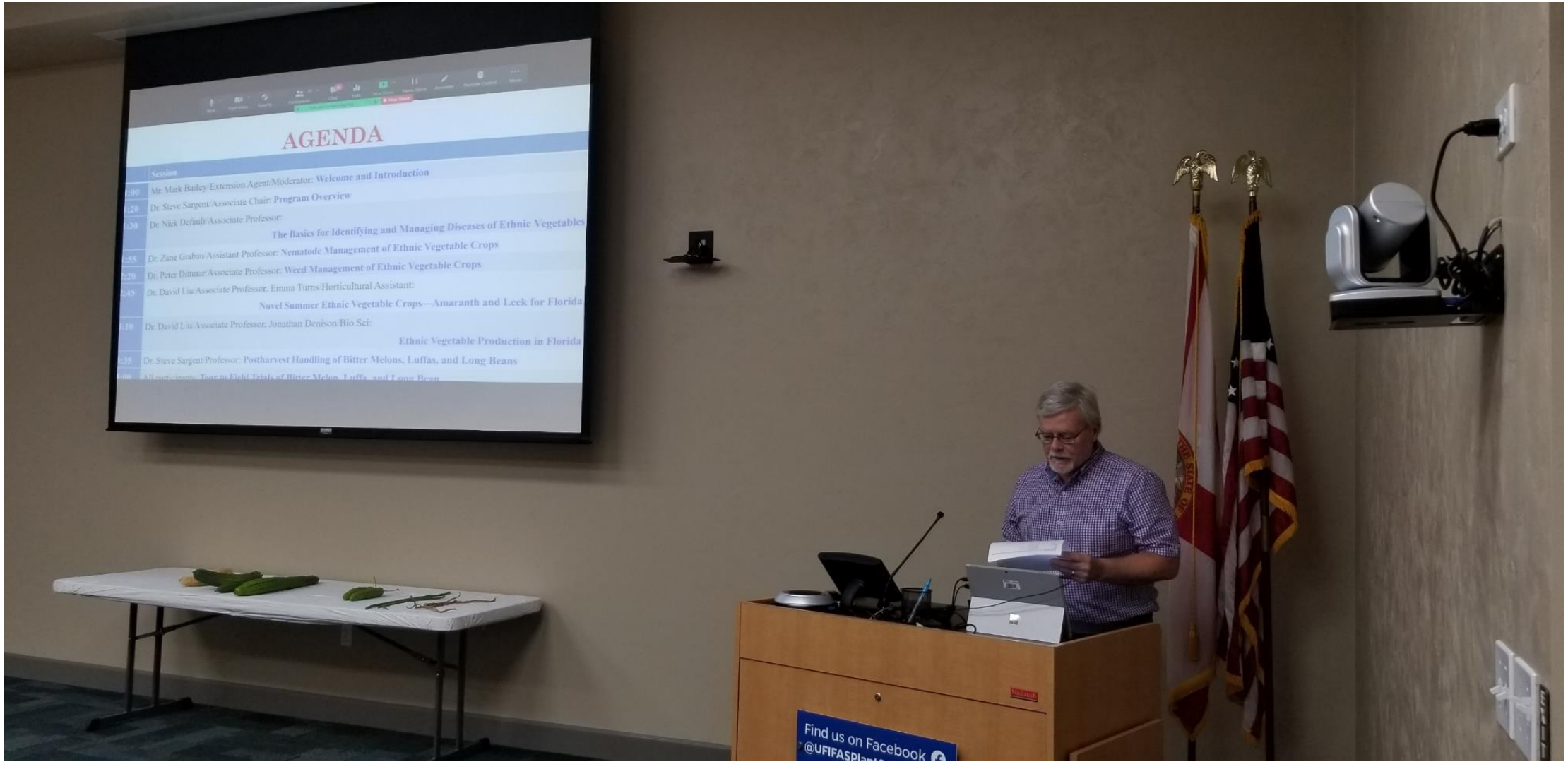
- Field Demonstrations/Field Days
- Farm Visits
- Grower Meetings
- FSHS Annual Meetings
- Ag Expos
- EDIS Publications
- Newsletter Articles

1). Field Demonstrations/Field Trials

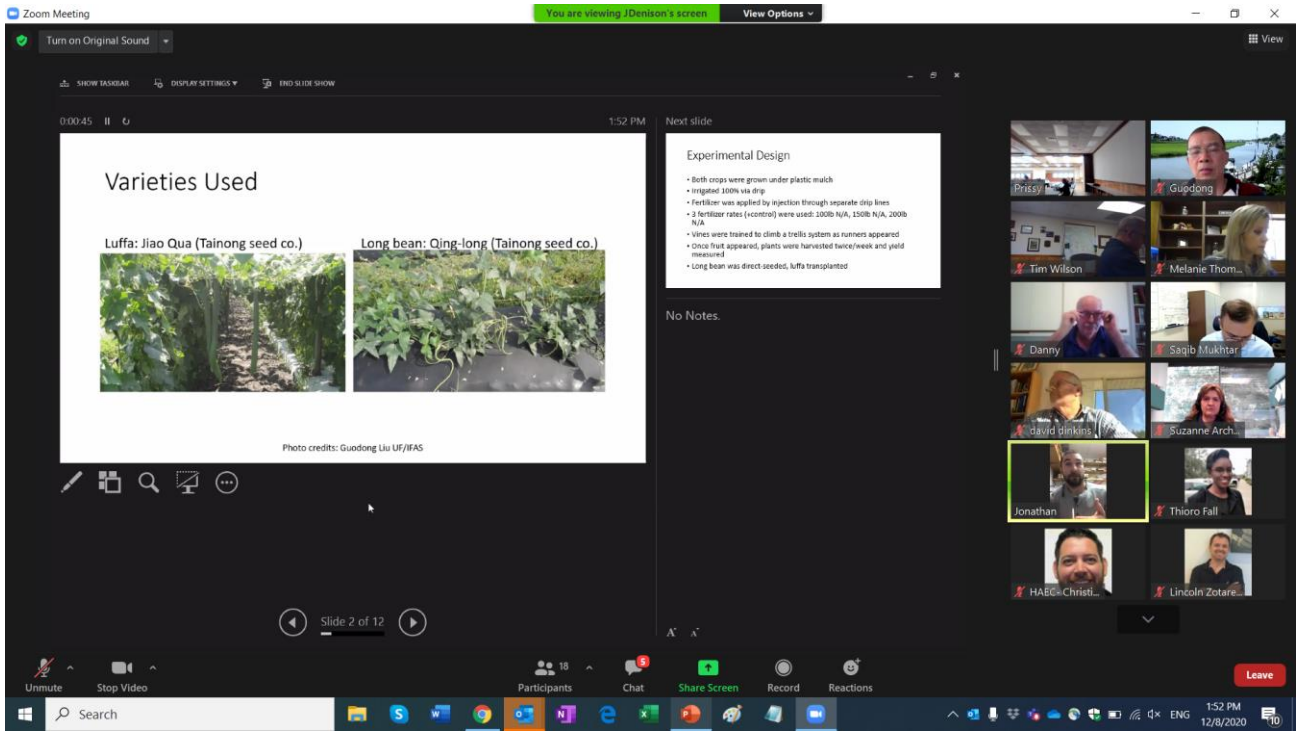


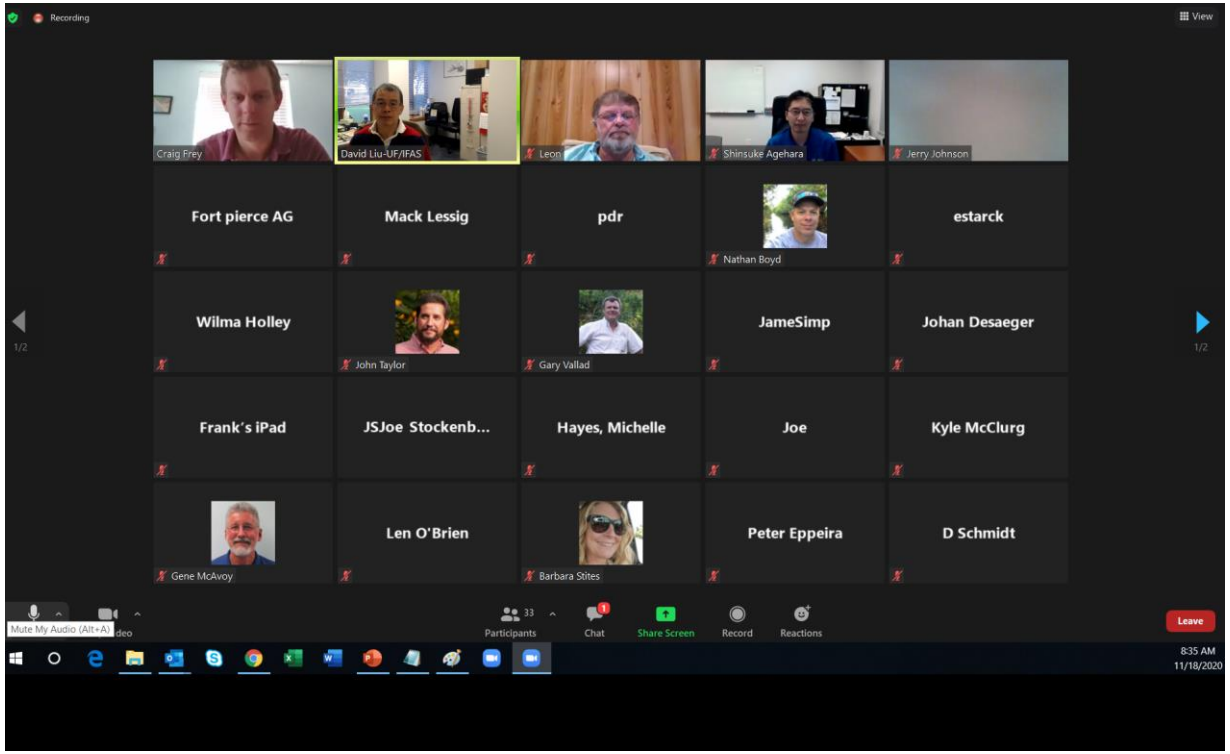
2). Farm Visits

3. Grower Meetings/Field Day Demonstrations



Zoom Meetings with Growers





How to control: pests, diseases, and weeds?

How to postharvest handle them?

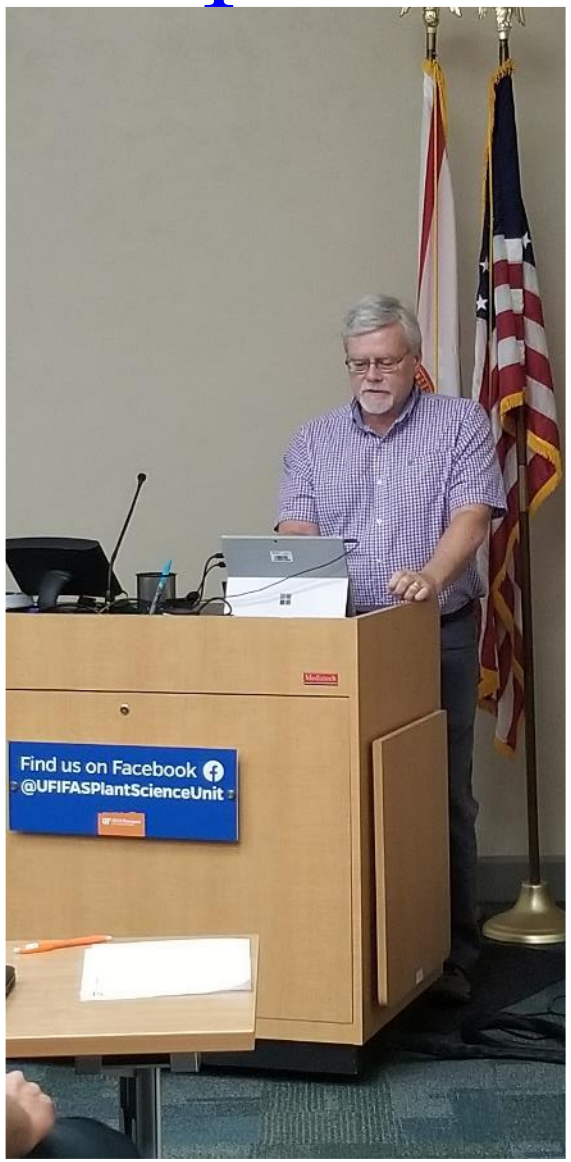


Photo credit: Dr. S. Sargent

4). FSHS Annual Meeting

5). Ag Expo

How to fertilize an ethnic vegetable?

- Identify which family the ethnic vegetable belongs to
- Check the fertilizer recommendations for crops in that family grown in the area
- Use those fertilizer recommendations for the new crop for the time being

Nitrogen Management:

Luffa, Long Bean, Bitter Melon

Background

- Florida potato growers operate on slim profit margins and seek new crops, potato acreage has reduced significantly
- Ethnic vegetable crops are a potential high-value option for growers seeking to diversify their acreage and replace potato production
- The objective of these experiments is to measure effects of nitrogen (N) rate on yield of three ethnic vegetables:

1. Luffa
2. long bean, and
3. bitter melon

Experimental Design, 2017-2018

- Crops grown under plastic mulch
- Irrigated 100% via drip
- Fertigation through separate drip lines
- 4 fertilizer rates (lbs./A N): 0, 50, 100, 150
- Vines trained to climb a trellis system as runners appeared
- Once fruit ready: harvest/5 days
- All direct sown, Bitter Melon failed to germinate in 2018

Experimental Design, 2020-2021

- The crops grown under plastic mulch
- Irrigated 100% via drip
- Fertigation (event/week) through separate drip lines for 11 weeks
- 4 fertilizer rates (lbs./A N) : 0, 100, 150, 200
- Vines trained to climb a trellis system as runners appeared
- Once fruit ready, harvested twice/week
- Long bean was direct-seeded, luffa and bitter melon transplanted

Varieties Used

Luffa: ‘Jiao Gua’

Long bean: ‘Qing-long’

Photo credits: Guodong Liu UF/IFAS

Varieties Used

Bitter Melon: Hybrid 500 ‘Green Giant’

Photo credits: Guodong Liu UF/IFAS

Fertilizer Program 2017-18

- Nitrogen was supplied through driplines as liquid 8-0-8
- 4 application rates: 0lb/A N, 50lb/A, 100lb/A, and 150lb/A

Fertilizer Program 2020-21

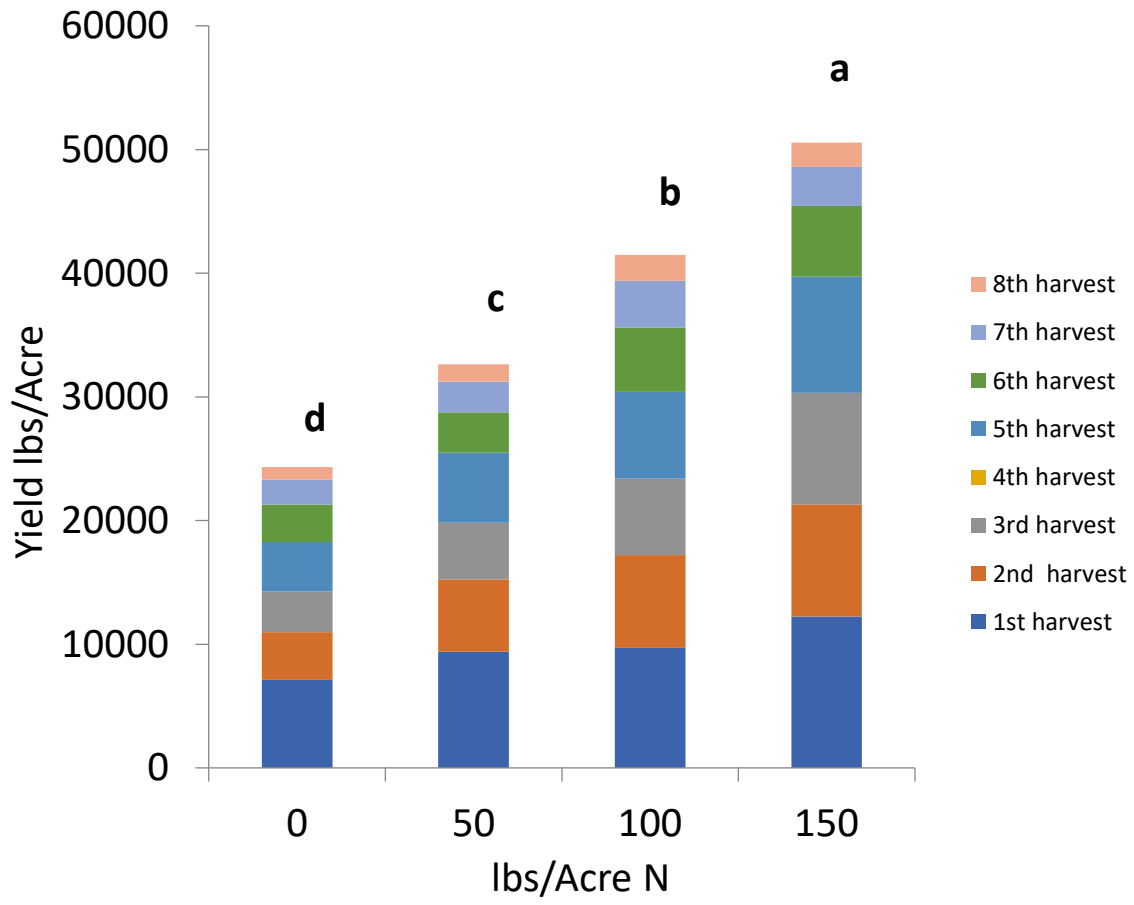
- Nitrogen supplied through driplines as calcium ammonium nitrate (CAN-17: 17-0-0-24Ca)
- 4 application rates: 0lb/A N, 100lb/A, 150lb/A, and 200lb/A
- Applications were made once a week for 11 weeks according to the following schedule:

Week	1	2	3	4	5	6	7	8	9	10	11
N (% of total)	5	10	10	15	15	15	10	5	5	5	5

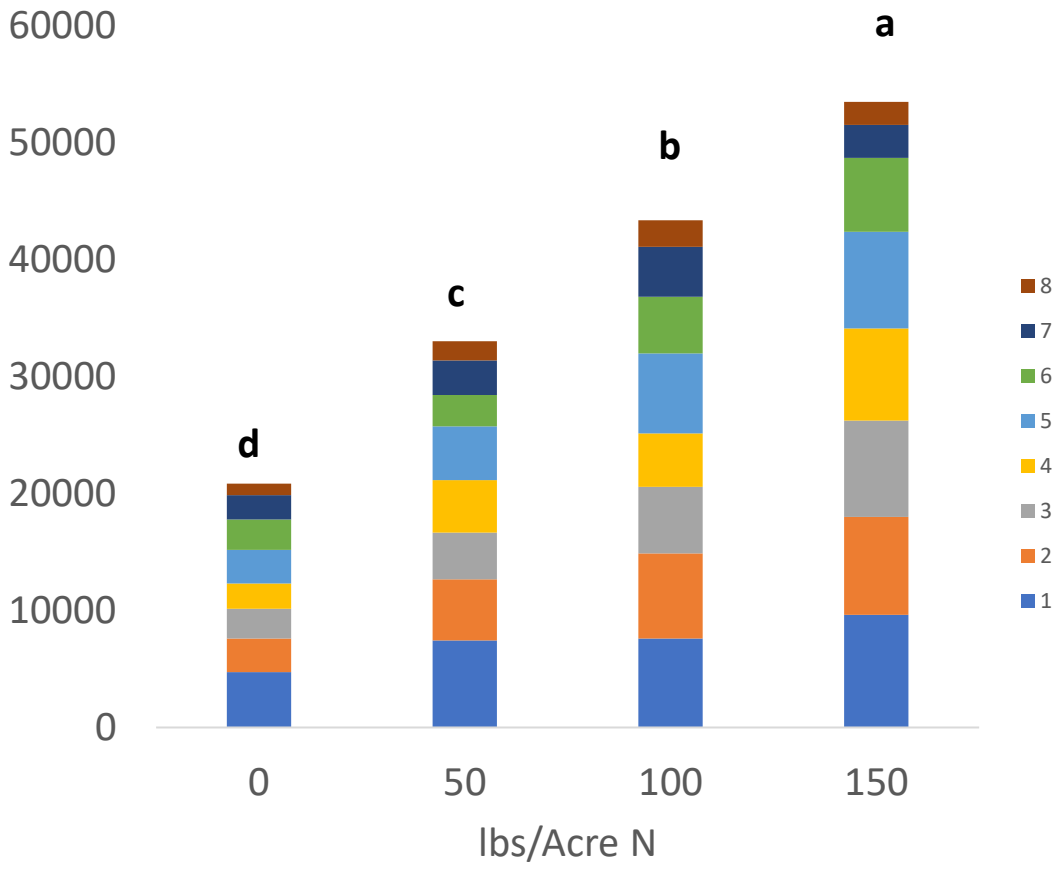
- All plots were supplied equally with soluble potassium on the same schedule

Results-Luffa

Luffa Yield-2017 and 2018

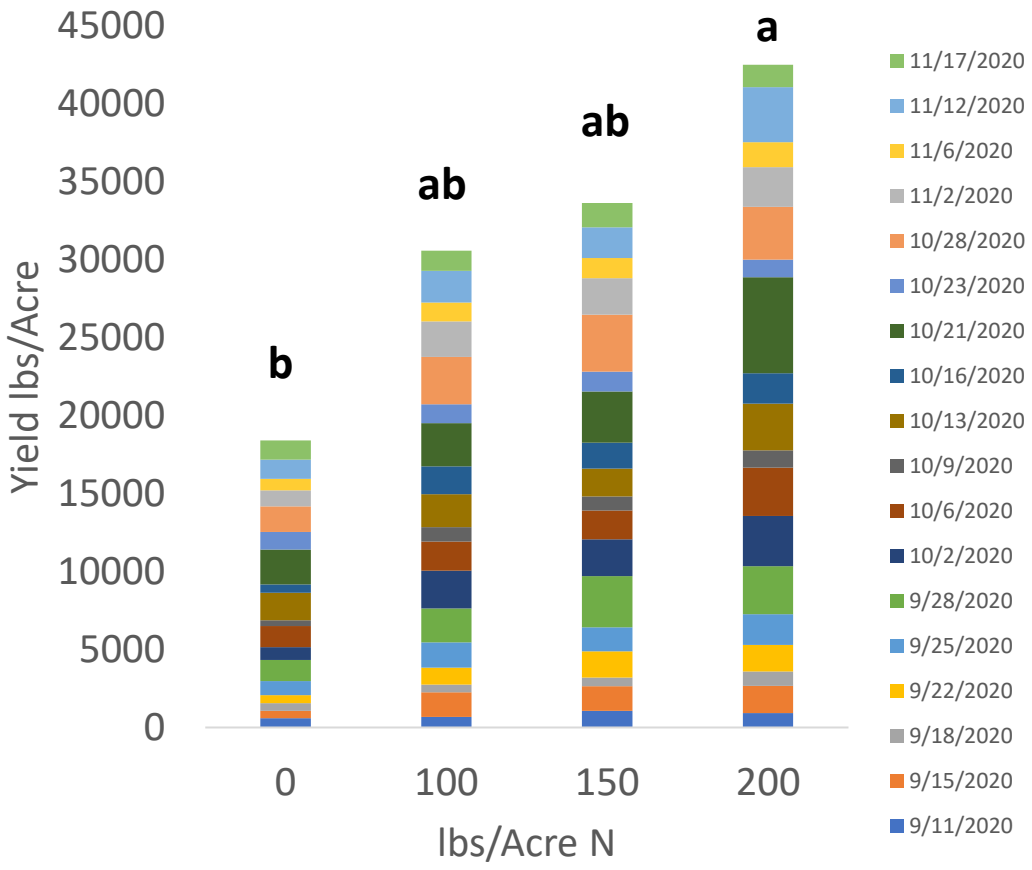


2017

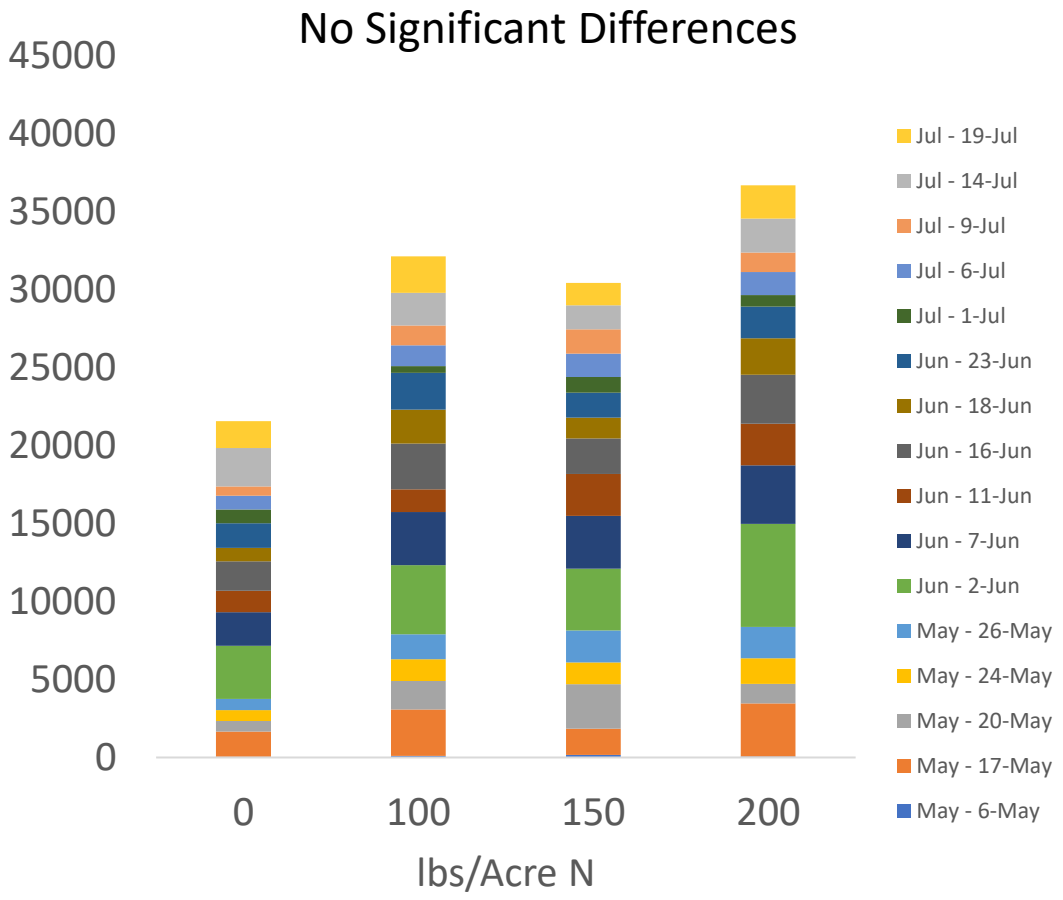


2018

Luffa Yield-2020 and 2021



2020



2021

Summary-Luffa

2017-2018:

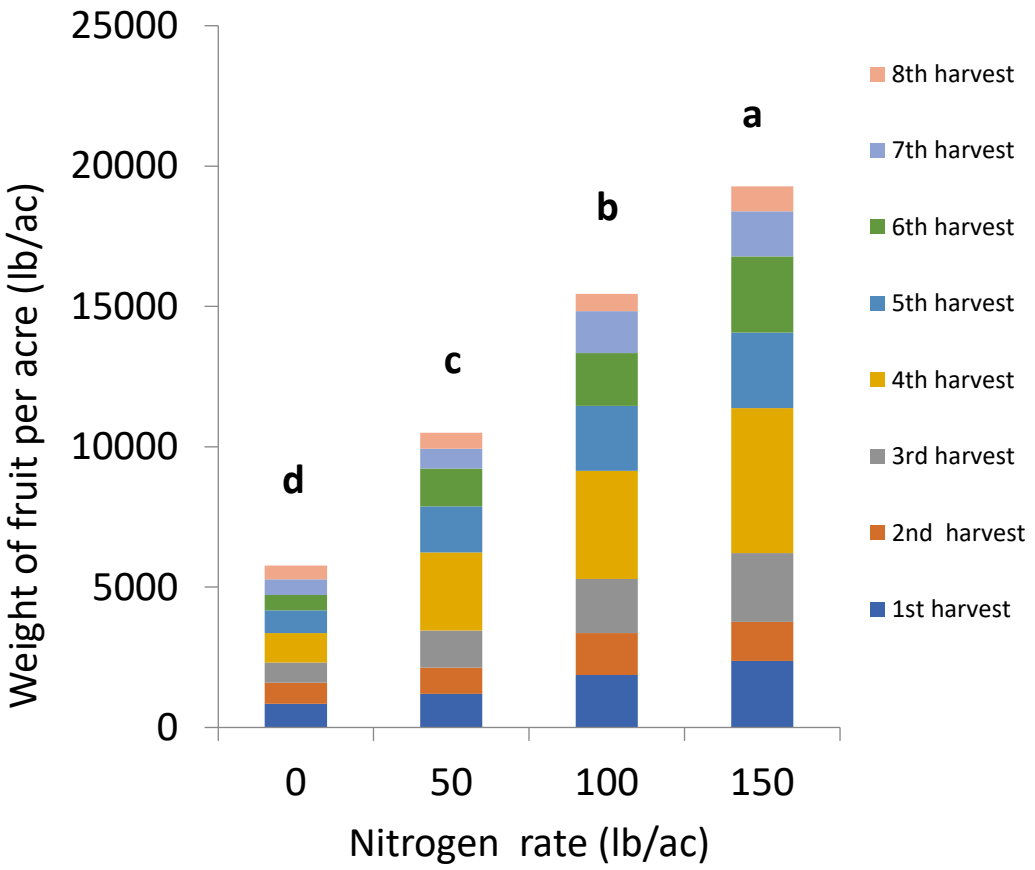
- Yield was significant increased with N rate

2020-2021:

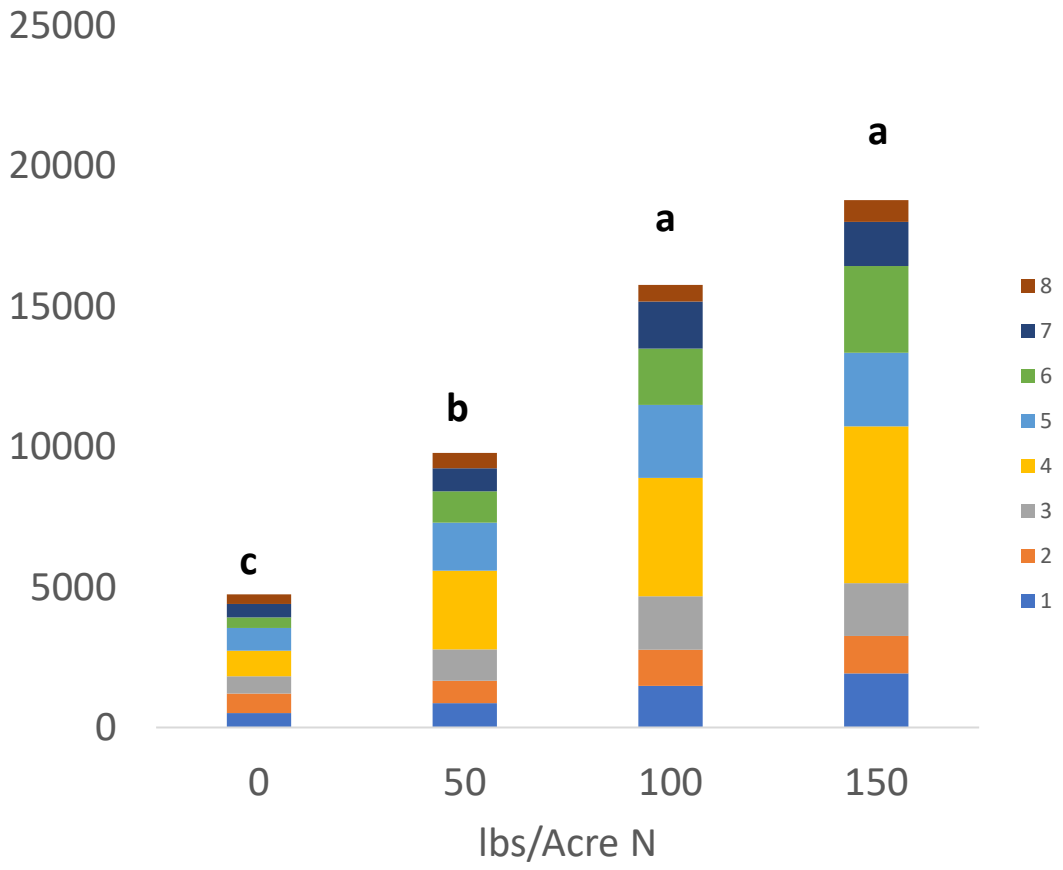
- 200 lb/A rate was the greatest yield and significantly better than control
- Differences between other rates were not found to be significant in 2021

Results-Long Bean

Long Bean Yield-2017 and 2018

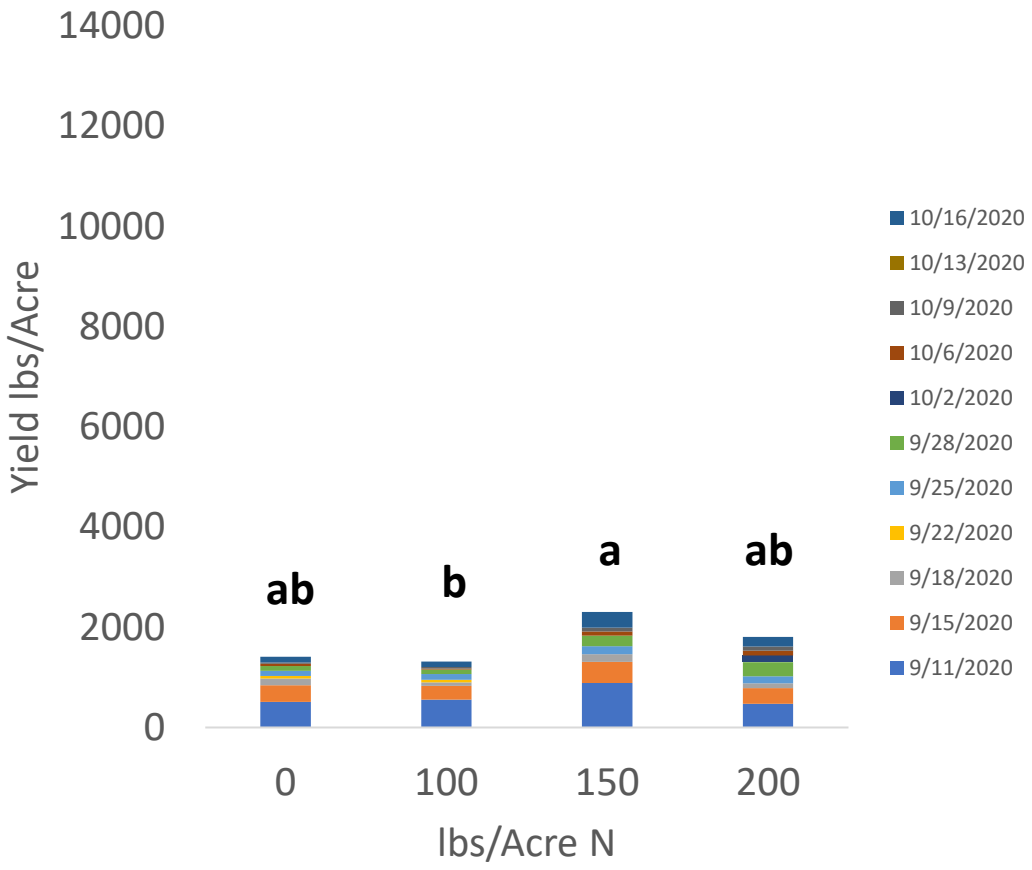


2017

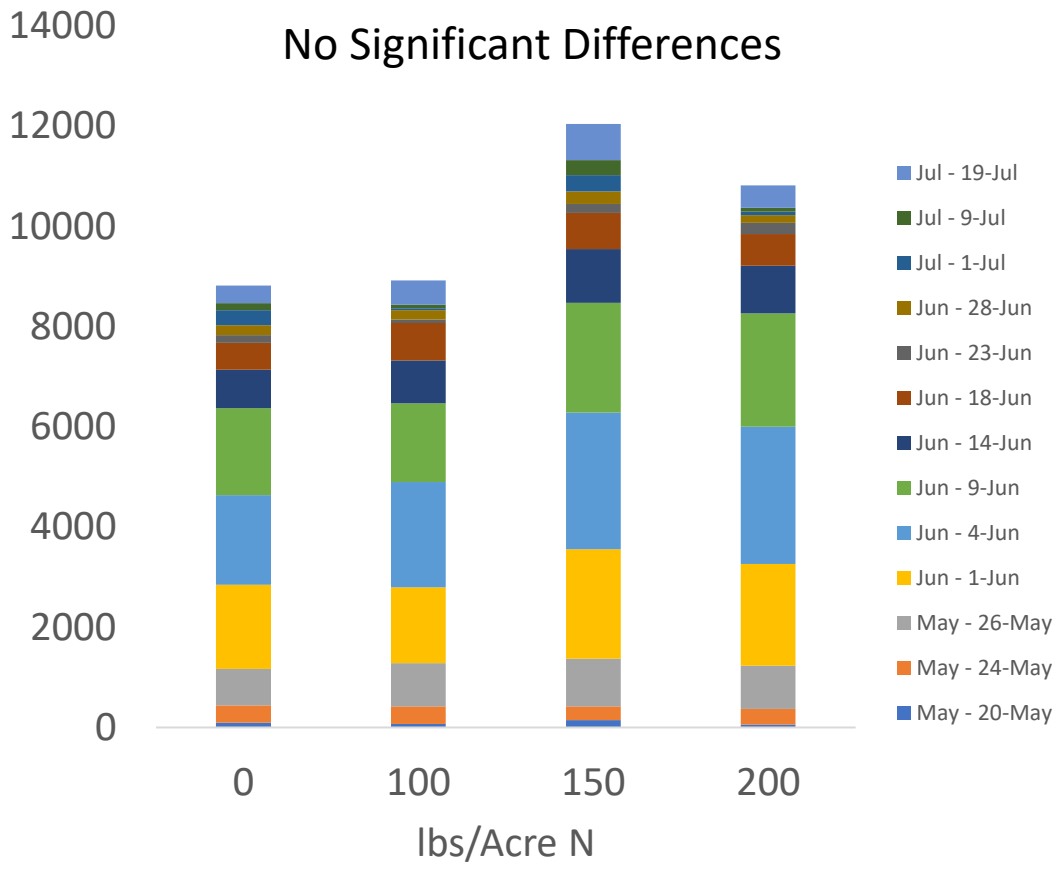


2018

Long Bean Yield-2020 and 2021



2020

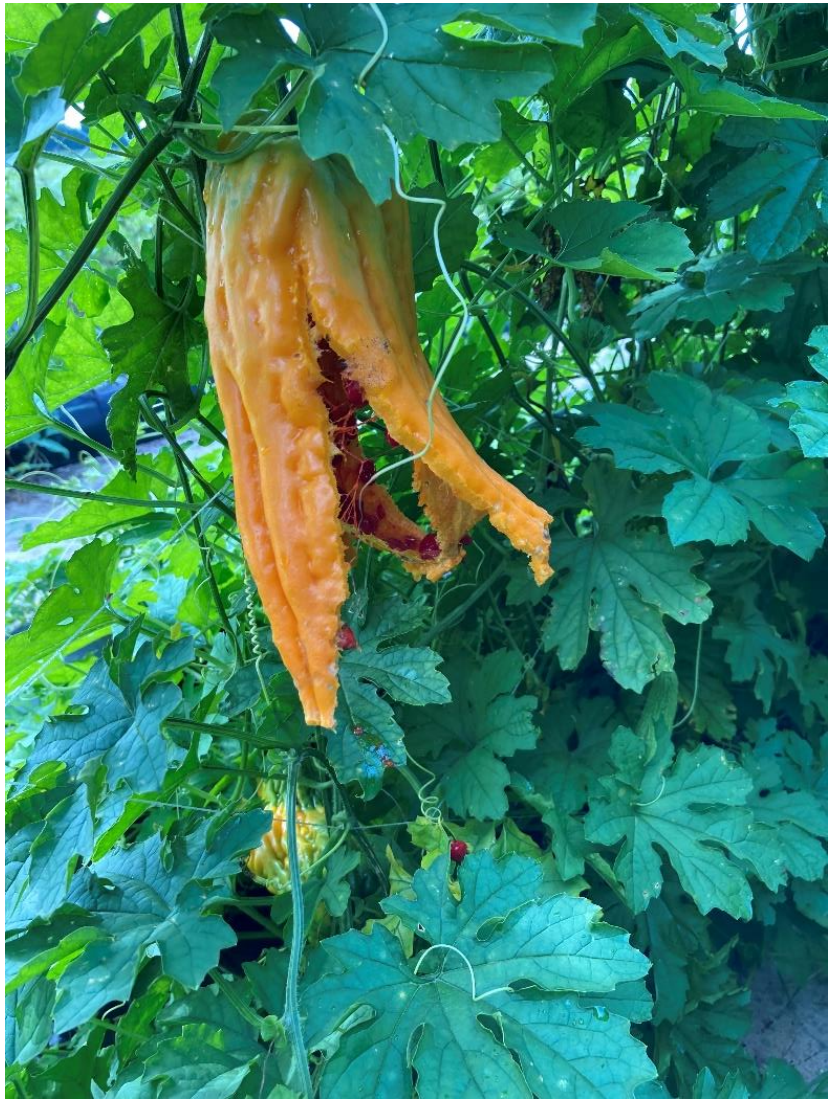


2021

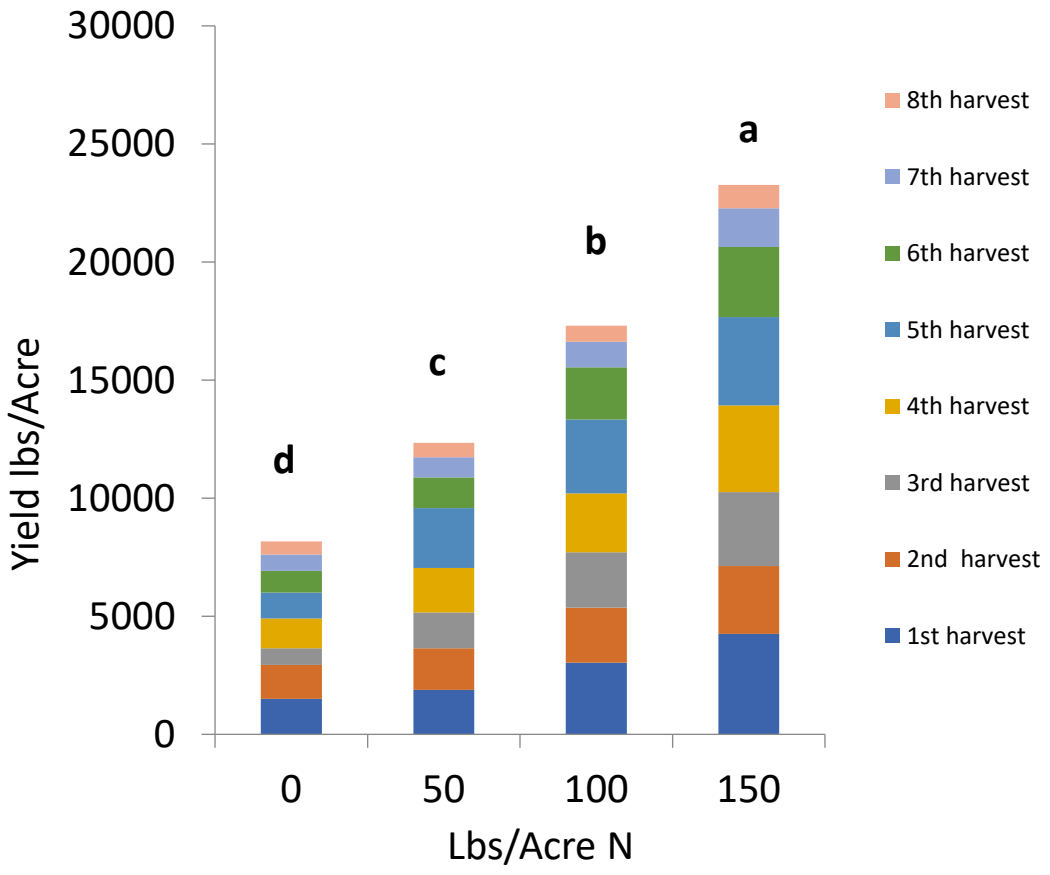
Summary

- In all years, the 150lb/acre was the high performer
- Yields were disappointing in 2020 due to disease pressure

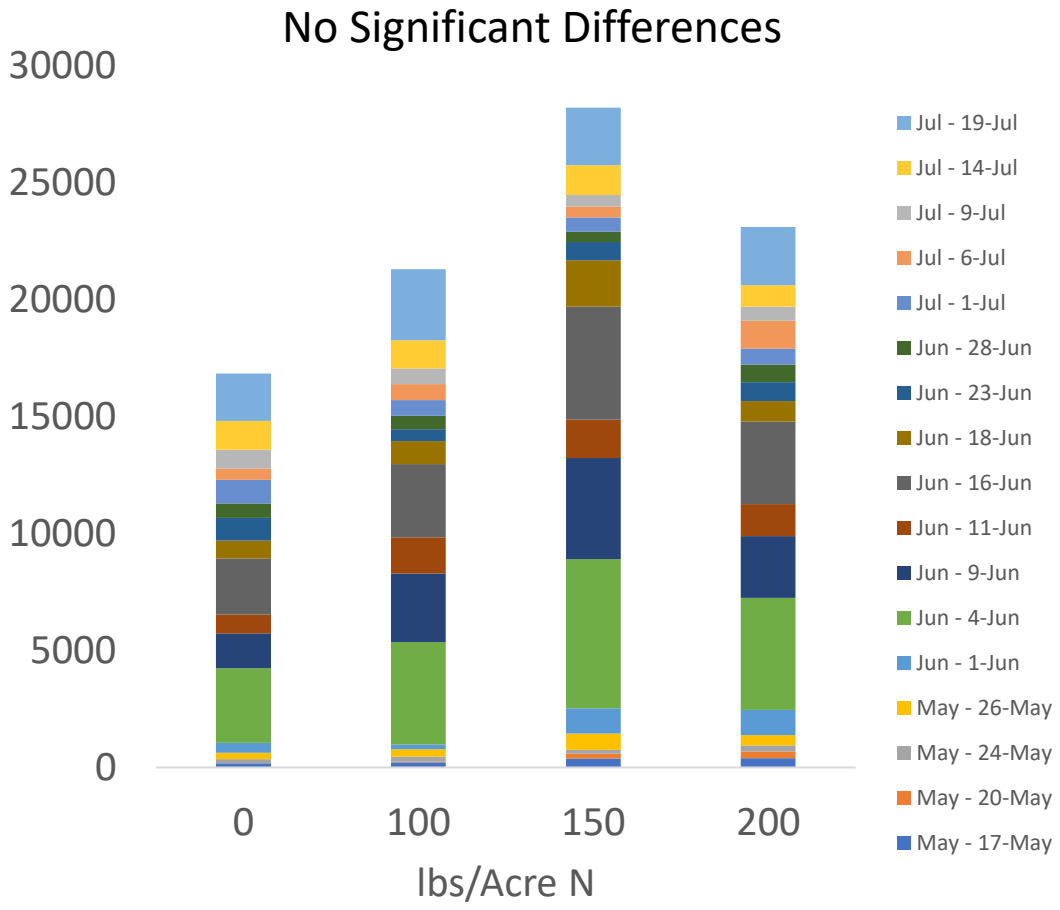
Results-Bitter Melon



Bitter Melon Yield/Treatment-2017 and 2021



2017



2021

Summary: Bitter Melon

- 150lb best yield in 2017
- 150lb best yield in 2021

Final Observations: Best N Rate

- Luffa: 200 lbs./A N
- Long bean: 150 lbs./A N
- Bitter melon: 150 lbs./A N

More Information

1. EDIS publications: https://edis.ifas.ufl.edu/publication/CV301
2. Video recordings: https://hos.ifas.ufl.edu/people/on-campus-faculty/guodong-david-liu/how-to-grow-asian-vegetables/

EDIS Articles & Video Recordings

EDIS Articles

- https://edis.ifas.ufl.edu/entity/author/a-liug

- https://edis.ifas.ufl.edu/publication/HS1370

Video Recordings

- https://hos.ifas.ufl.edu/people/on-campus-faculty/guodong-david-liu/

- https://hos.ifas.ufl.edu/people/on-campus-faculty/guodong-david-liu/how-to-grow-asian-vegetables/

EDIS Publications

Luffa—an Asian Vegetable Emerging in Florida.
http://edis.ifas.ufl.edu/hs1285

Tong Hao—an Asian Vegetable Emerging in Florida.
http://edis.ifas.ufl.edu/hs1276

Long Squash—an Asian Vegetable Emerging in Florida.
http://edis.ifas.ufl.edu/hs1272

Bitter Melon—an Asian Vegetable Emerging in Florida.
http://edis.ifas.ufl.edu/hs1271

Long Bean—an Asian Vegetable Emerging in Florida.
http://edis.ifas.ufl.edu/hs1268

Online Ethnic Crop Production Workshop (I)

Self-Paced CEU Sessions with 2.0 CEUs

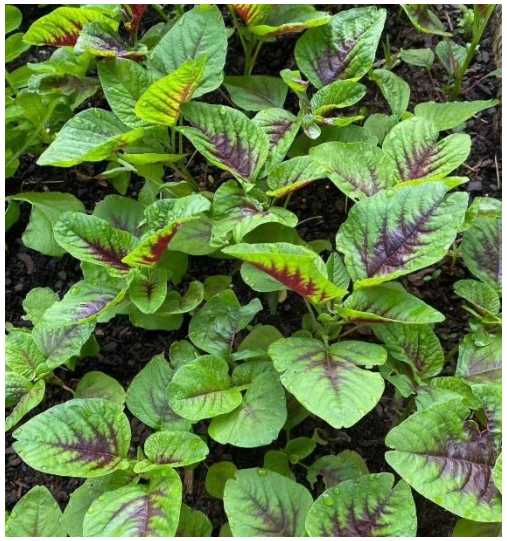
How to Register?

https://uflfas.instructure.com/courses/1654

Scan Me

FDACS CEU	
Maximum CEUs	***1.0***
Ag Row Crop	1.0
Demo & Research	1.0
Limited Urban Fertilizer	1.0

CCA CEU	
Maximum CEUs	***1.0***
Crop Management	0.5
Nutrient Management	0.5



1. Emma Turner, Y. Qiu, and G.D. Liu	**Amaranth**
2. Mary Dixon and G.D. Liu	**Bitter Melons**
3. Andrea Sanitini, H. Liu, and G.D. Liu	**Bok Choy**
4. Andrea Sanitini, Y. Qiu, M. Dixon, J. Denison, F. Alferez, G. D. Liu	**Fingered Citron**

UF | IFAS Extension
UNIVERSITY *of* FLORIDA

Online Ethnic Crop Production Workshop (II)

Self-Paced CEU Sessions with 2 CEUs

How to Register?




FDACS CEU	
Maximum CEUs	***1.0***
Ag Row Crop	1.0
Demo & Research	1.0
Limited Urban Fertilizer	1.0

CCA CEU	
Maximum CEUs	***1.0***
Crop Management	0.5
Nutrient Management	0.5

https://uflfas.instructure.com/courses/1674

1. Andrea Sanitini, Y. Jiao, and G.D. Liu	**Giji Berry**
2. Mary Dixon and G.D. Liu	**Long Squash**
3. Mary Dixon and G.D. Liu	**Luffa**
4. Mary Dixon and G.D. Liu	**Tong Hao**

UF | IFAS Extension
UNIVERSITY of FLORIDA

An Example of Online Video Recordings

https://www.youtube.com/watch?v=5oOEGWSEqp8&t=4s

Take-home Message

Why Is Ethnic/Asian Vegetable Production Rapidly Expanding in Florida?

- Because these "foreign" crops:

1. **Economically,** improve Florida's economy
2. **Ecologically,** enhance environmental sustainability
3. **Socially,** provide many job opportunities; benefit people's health

What are Ethnic Vegetables?

- Specialty vegetables meeting the ethnic populations' needs and diversifying food supply for the population at large

How should these ethnic specialty crops be fertilized?

- Best N rate (lbs./A): luffa—200; long bean—105; bitter melon—150
- Use the fertilizer recommendations of other vegetables related to the ethnic vegetable to be grown

More information

- EDIS publications, videos, Extension programs

Acknowledgements

- USDA-AMS
- FDACS
- UF/IFAS Extension
- UF/IFAS PSREU
- Mr. John Sykes

Thank You!

http://hos.ufl.edu/faculty/gdliu

guodong@ufl.edu

352-273-4814

UF | IFAS
UNIVERSITY of FLORIDA