

History of Seed Production and Breeding in Hawaii

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History of Breeding and Seed Program at UH

- 1918, sweetpotato, head lettuce, Cheung
- WWII Victory Gardens
- 1940s- formal breeding work WA Frazier
‘Pearl Harbor’ tomato 1945
- 1940s- tomato, Hawaiian Wonder pole bean,
‘Line-5’ Solo papaya, Tomatoes, ‘Niihau’,
‘Kauai’, ‘Oahu’, ‘Maui’, ‘Lanai’, ‘Molokai’,
‘Hawaii’

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History of Breeding and Seed Program at UH

- 1950s, Anuenue lettuce, Onolena sweetpotato
Anahu tomato, Puakea cauliflower,
Manoa sugar pea (powdery mildew),
N-tomato hybrids,
Kulanui head lettuce,
- 1960s- Awahia onion (pungent),
Healani tomato, sweet corn, soybean,
Hawaii Long eggplant, Manoa Wonder
pole beans,



History of Breeding and Seed Program at UH

- 1961- tomato varieties with resistance to 8 diseases, Nematodes
- 1962- multiple disease resistance in sweet corn
- 1970s- Hawaiian Supersweet No. 9, sweet corn, Waimanalo Long eggplant, Poamoho pole bean
- Pele and Waimea potatoes (late blight)



UH Tomato: some Disease resistance traits

- **Root-knot nematode**
- **Tomato Spotted Wilt Virus**
- **Fusarium Wilt**
- **Stemphylium leaf spot**
- **Cladosporium, leaf mold**
- **Spider Mites**
- **Short internodes**



People in the UH Breeding Program

- **Tex Frazier, corn, tomato, Oregon**
- **Jim Gilbert, tomato, cauliflower, cucumber soybeans, onions, pyramid disease resistance**
- **Jim Brewbaker, sweet corn, field corn**
- **Jack Tanaka, sweet potatoes**
- **Frederick Krauss, cover crops, Production**
- **Yukio Nakagawa, Veg Specialist**
- **Dick Hamilton, Fruits, explorer**



Growers and Extension Agents: backbone of UH breeding programs

- **Eggplant- Nitta Eggplant, Mr. Nitta**
- **Green Onion- Koba (selection from Japan)**
- **Kay Choy, Hirayama, white rust resistant (from Molokai, selection)**
- **Basil Fusarium resistant (Hamasaki)**
- **Maui Sweet onions (Ted Hori, Shimabuku, variety selection, crop management)**



Seed Program at UH

- **Initiated 1960 (Gilbert), Seed Distribution Program**
- **Funded by legislature 1969**
- **7 hybrids, 16 vegetable varieties and Papaya**
- **Seed production on all islands; papaya on Kauai**
- **Need a Vegetable Breeder at UH**
- **Need a Seed Specialist**



Seed Programs

- **Public, Government**
- **Private (*narrow germplasm*)**
- **Artisanal or Informal
(*diverse germplasm*)**

Home-gardening

Indigenous

Community



Decline of Public Breeding Programs

- decline over past 40-50 years
- Nationally and in Hawaii
- Land-grant universities shifted to produce 'products' that were more profitable, royalties, patents
- less classical breeders, more molecular biologists



Alternative Breeding Programs

- **Public breeding initiatives, participatory models**
eg Organic Seed Alliance & Cornell
- **Plant breeding clubs**
- **Seed Saving Networks**



Hawaii Statewide Seed Assessment

SurveyMonkey.com

N= 128 responses



Farm Size in Survey

- **Range= 0-250 Acres**
 - **Most farms= 1 Acre**
- **Average size= 10 Acres**
 - **Larger farms= 250,
195, 75, 10-20**



Environmental Conditions in Farm

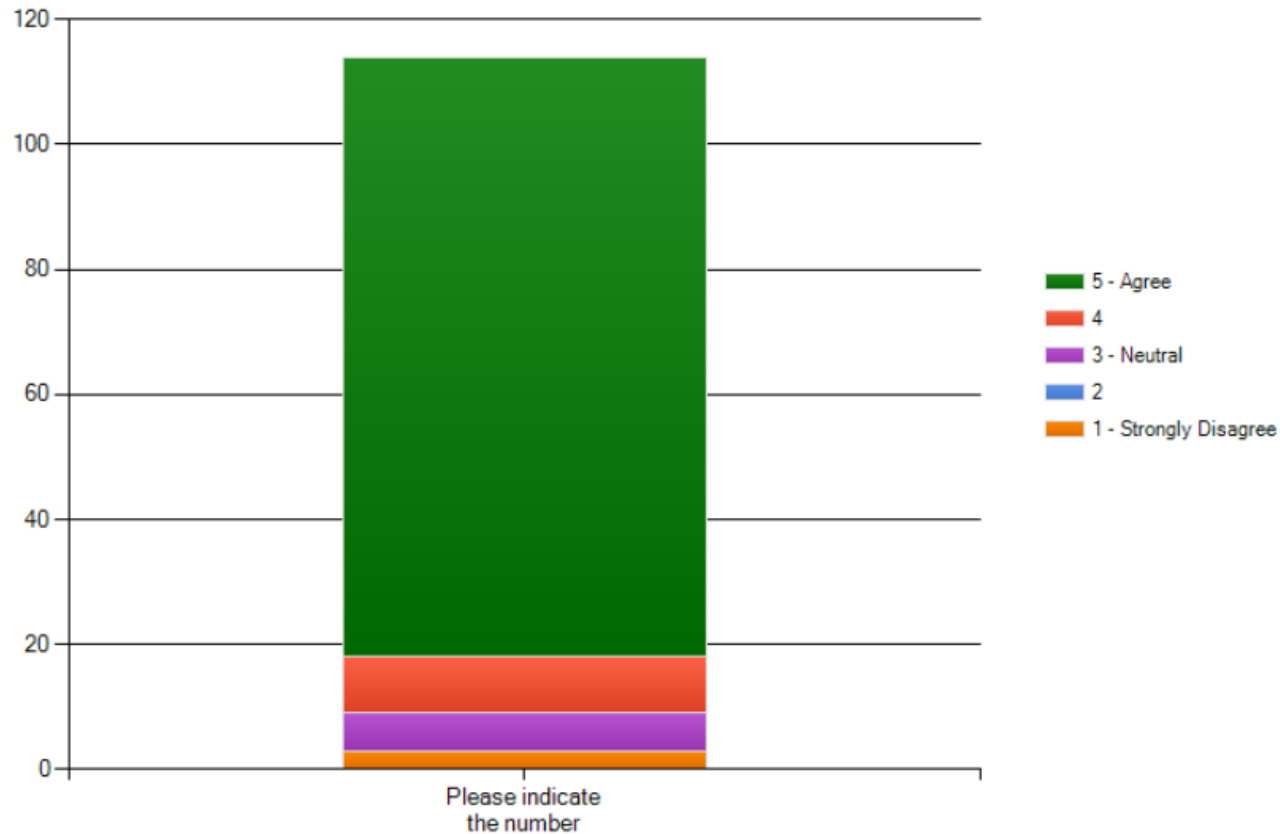
Frequency mentioned

- Rainfall- 9,15, 30.. 100s, 125, up to 180”
 - Elevation- sea level, range 200 to 1000s,
and 1000-3000 ft
- Temperature minimums- 30s to low 80s
- Temp. maximums- low 80s to mid 90s

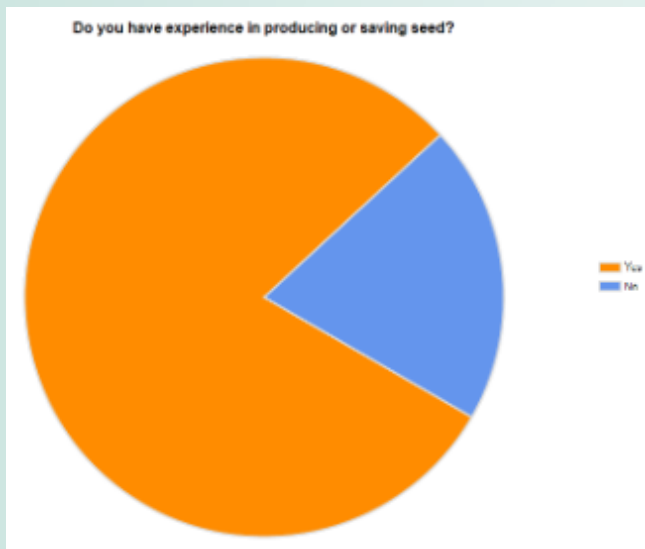


Breeding in Hawaii important for Food Security?

Please respond to the following statement: Breeding plant varieties in and for Hawai'i is an important priority for the future success of Hawaiian agriculture and local food security. On a scale of 1 to 5, please state whether you agree or disagree.



Experience Producing or Saving Seed?



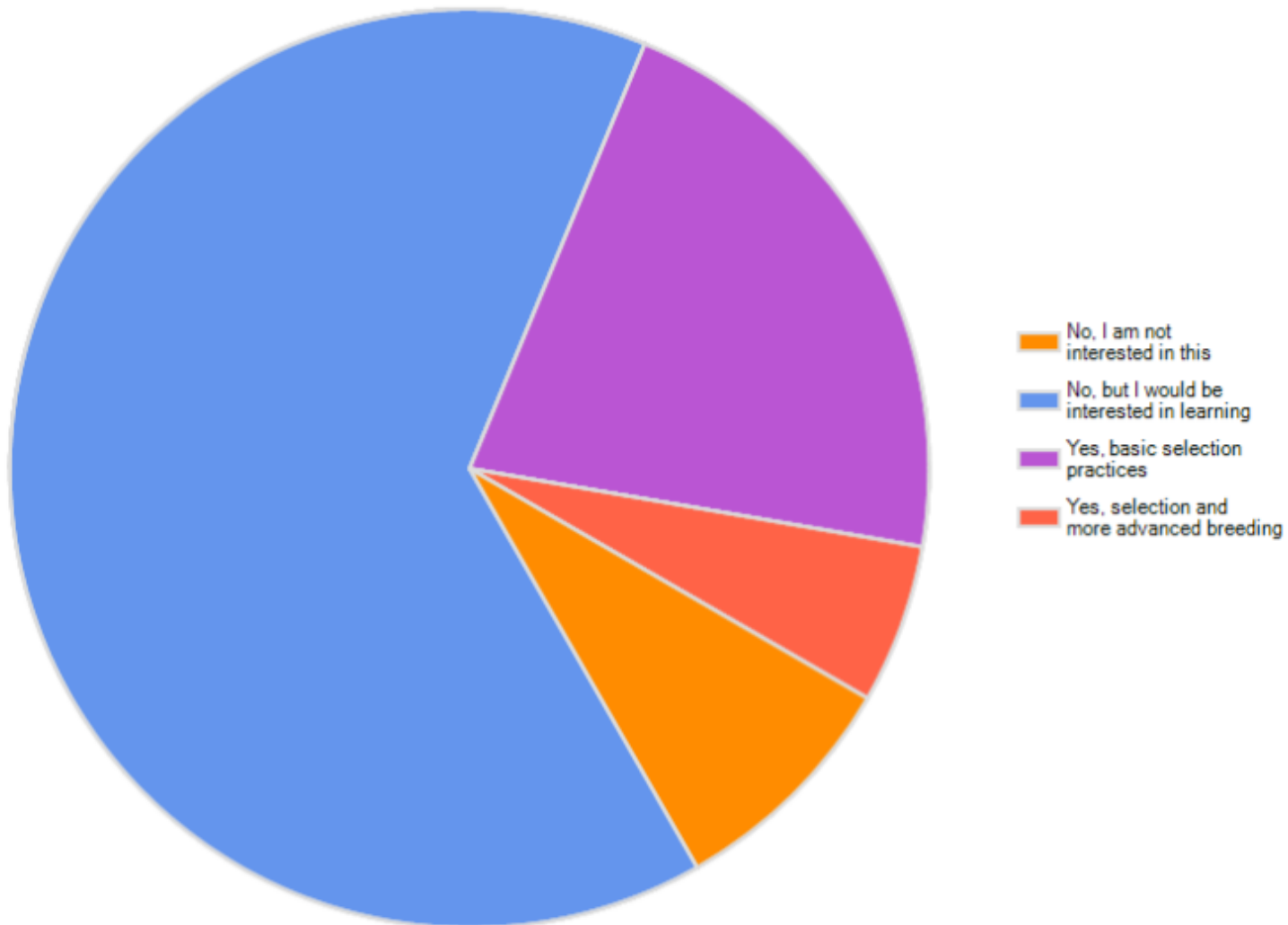
Years of Experience Saving Seed

- Range 1-50 yrs
- Average= 10 years
- median= 5 years
- Less than 3 years= 43%

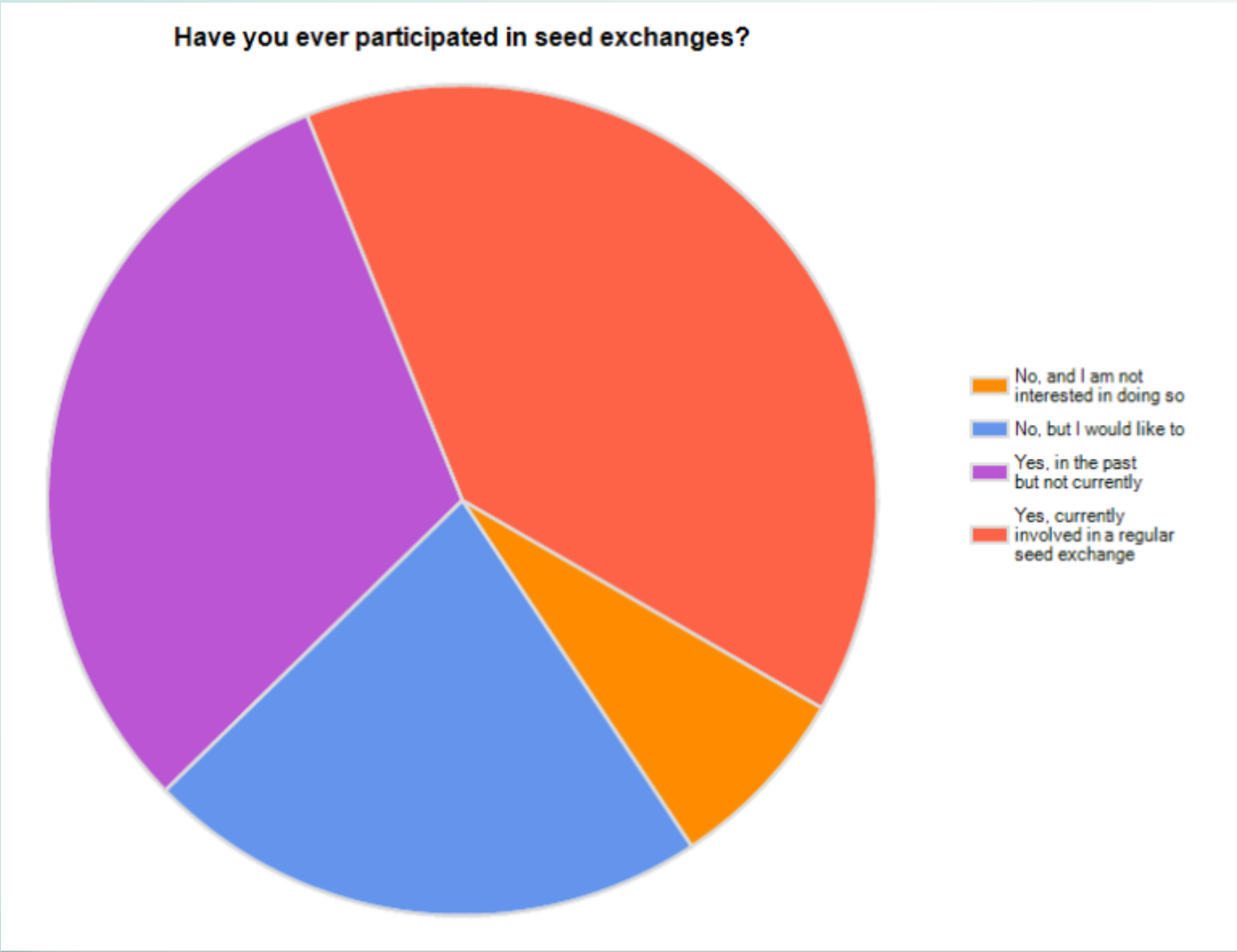


Have You conducted crop improvement, breeding?

Have you conducted crop improvement/breeding?

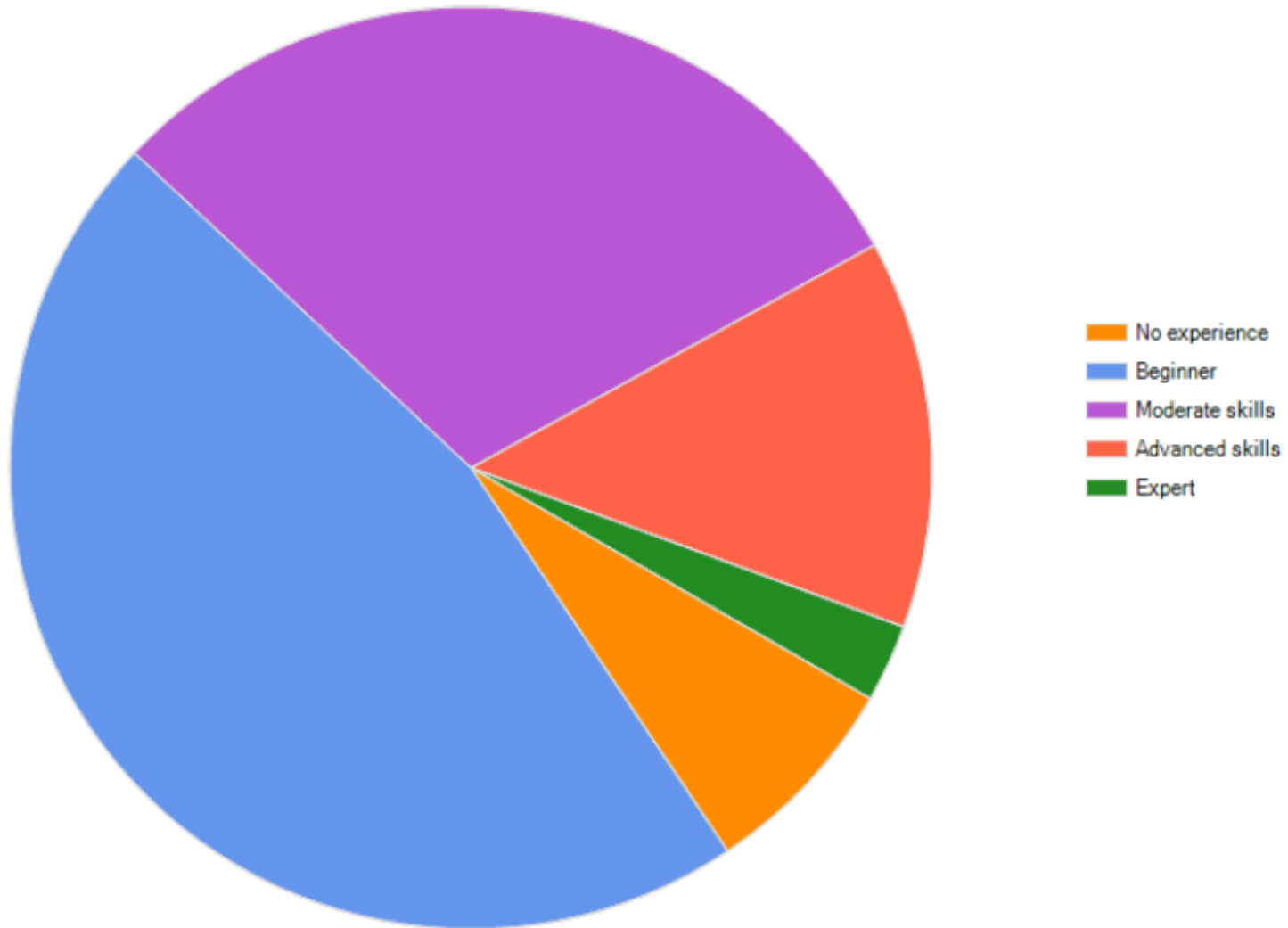


Have you participated in Seed Exchanges?



Seed Saving Skills?

Assessing your own seed saving/production skills, please rate your technical competence and knowledge in seed saving:



Information Needs on Seed Saving?

- **Isolation distance (65%)**
- **Population size (77%)**
- **Seed maturity, harvest time (76%)**
- **Harvest guidelines (51%)**
- **Processing and storing (58%)**
- **Roguing guidelines (63%)**



Interest on Public Seed Initiative?

List of Top Activities

- **Saving Seed, personal use**
- **Restoring seed of Heritage or traditional Hawaiian Crops**
- **Seed exchange programs**
- **Attending advanced Seed Saving Class**
- **Participating in Variety Trials**
- **Attending class on crop Improvement**



Crops, success in Seed Production

Frequency mentioned

- No. 1. N= 46, beans, brassicas (kale), lettuce, Native, papaya, pumpkin, sweet corn, tomato
- No. 2. N= 45, arugula, basil, beans, cilantro, corn, ginger, herbs, cucurbits, papaya, tomato,
- No. 3. N= 54, basil, beans, dill, edible hibiscus, green onions, lilikoi, maile, potato, sesame, tobacco, flowers



Crops, **most difficult** for Seed Production

Frequency mentioned

- **No. 1. N= 35**, awa, basil beans, pepper, broccoli, onion, carrots, native, corn, cucurbits, lettuce, papaya, lettuce, ornamentals
- **Most mentioned overall:** arugula, beets, broccoli, cabbage, carrot, chard, corn, kale, lettuce, onions, pepper, cucurbits



6th Annual
**East Side Seed Exchange
& Harvest Festival!**
Saturday November 26th, 9:30am – 3:30pm
At La'akea Permaculture Community
Bring your favorite dishes using only locally grown food
for the **100% LOCAL FOOD COOK OFF AND POTLUCK!!**



ON KAUAI NOVEMBER 6-7, 2011



College of Tropical Agriculture and Human Resources
University of Hawai'i at Mānoa

Goal of Variety Trials

- **Expression of the plant due to genetics or to the environment**
- **ID varieties adapted to the land (replace inputs with well adapted varieties)**



Experimental Design

- **Observational (non-replicated) trials:**
screen varieties,
evaluate sources, check trueness to type

VS

- **Replicated trials**
(results are not due to environment alone)



Population Numbers to assess genetic variability

- **Corn 30**
- **Brassicas 30**
- **Carrots 50**
- **Radishes 50**
- **Tomatoes/pepper 10**
- **Squash, cucumbers 10**
- **Beans 30**

(source: OSA Farm Variety manual)



Consistent Treatments

- **Growing seedlings**
- **Transplanting/planting**
- **Irrigation**
- **Cultivation**
- **Fertilization**
- **Pest management**
- **Harvesting**



Trial Evaluation

- Log sheet
- scoring (**index**) vs measuring
Scoring may be more valuable and quicker-
- All on same date, scoring system
Scale of 1-9
(1= least, 9= most desirable),



Collaborative Research Trials

Hawaii Trial Network, on different islands to compare several microclimates and production niches; trial database with trial network to follow performance on different microclimates.

(Micaela Colley, HI Public Seed Conf. 2010)

- **Lettuce**
- **Tomato**



Tomato response to Nitrogen

Heirloom vs New Hybrid varieties, response





Leafies response to Phosphorus



Import Replacement: Romaine Lettuce Variety Trials

Seasons:

Winter, Spring, Summer



Locations:

Oahu, Molokai, Lanai

Seed Source:

Hazera, Johnny's, Nunhems, Orsetti, Rijk Zwaan,
Seminis, Siegers, Syngenta, Western Pacific Seed



cv Lital (Hazera)
(Spring, cooler months, light green foliage)



cv Brave Heart (Seminis)
(Molokai, Spring, cooler months)



cv Concept (Johnny's)
(Summer Poamoho)



Bamby (Johnny's)
(baby, specialty, cooler?, Waimea)



Specialties: Baby Watermelon





Atila



F1-345B



Atila



F1-345B

