

Local Seeds for Local Needs

*by Glenn I. Teves
County Extension Agent
UH CTAHR Cooperative Extension
Service - Molokai*



Selecting Resilient Lettuce



Quotable Quotes

***Don't judge each day by the
harvest you reap but by the
seeds that you plant.***

Robert Louis Stevenson



Farming Success Starts With Adapted Seed

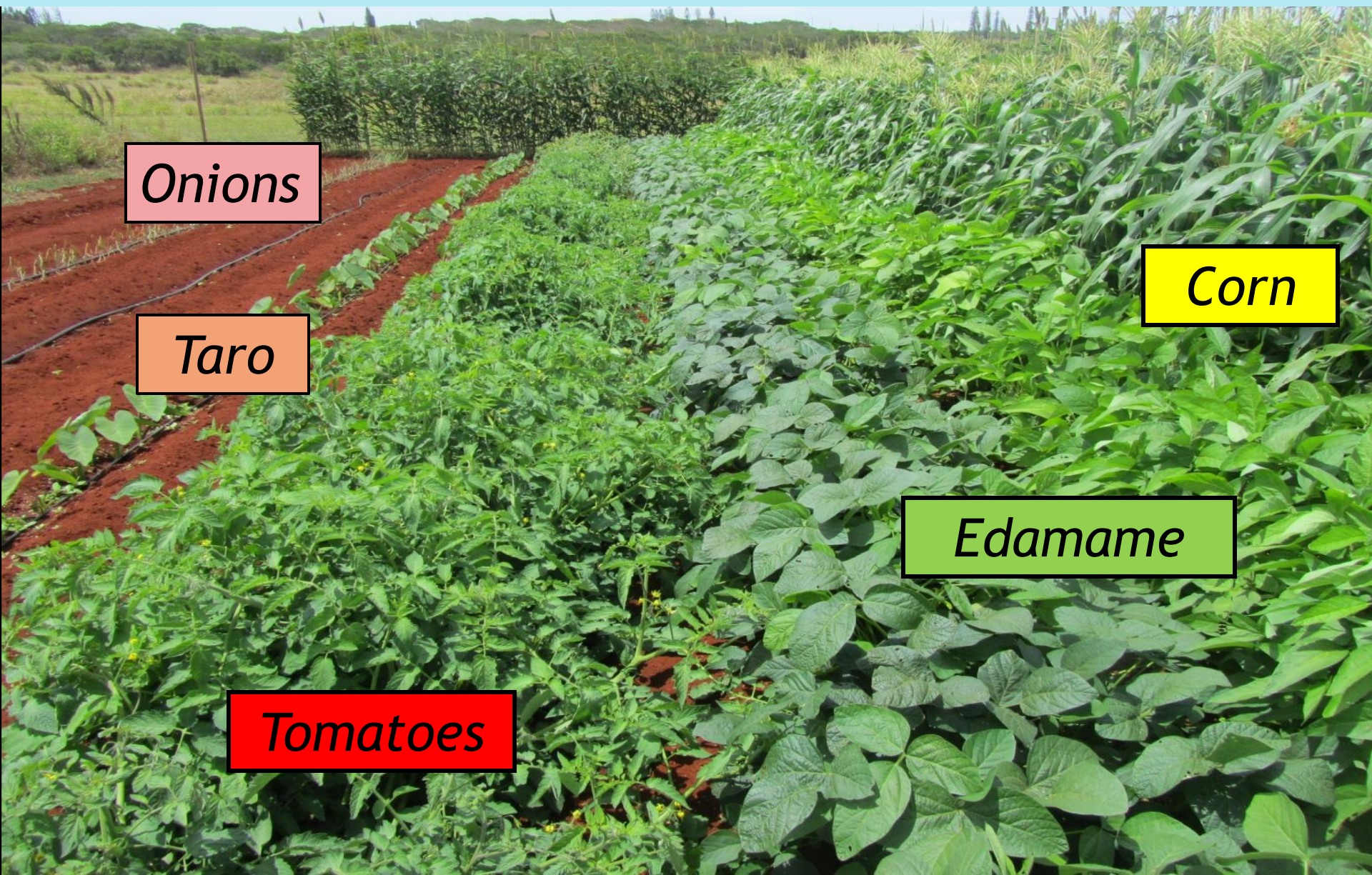
Onions

Taro

Tomatoes

Corn

Edamame



The Lost Art of Seed Saving



Farmer/Gardener–Refined Seed

Examples of cultivars refined by farmers:

Eggplant – Molokai Long, Nitta, Tolentino,
Hamasaki

Lettuce – Manoa

Beans – Lualualei

Kai Choy – Hirayama

Green Onion – Koba

Local Cucurbita moschata (squash) land races

And many, many more...



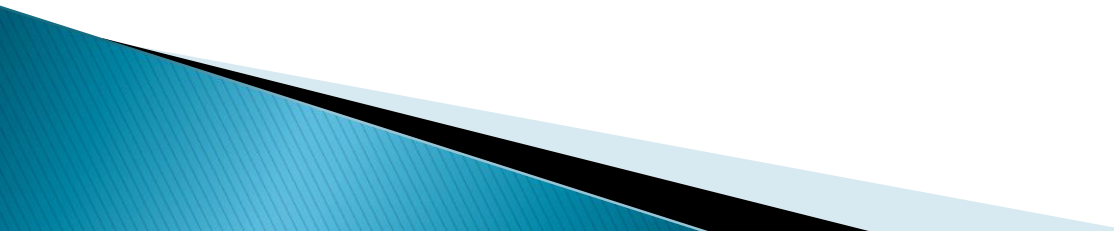
Koba Green Onion Seed Production UH Volcano Research Station



Akakai – Hawaiian Shallots




What are U.S. Mainland Vegetable Breeding Priorities?

- ▶ Earliness due to short growing season.
 - ▶ Cold tolerance to protect against frost damage.
 - ▶ Regional disease issues.
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Kale – Blue Lacinato



Hawaii's Growing Challenges

- ▶ Ability to thrive in tropical conditions, including hot days and warm nights creating small day/night temperature differential.
 - ▶ Resilience or adaptability to wide variation in weather; hot & cold, wet & dry, sunny & overcast, windy & calm.
 - ▶ Due to high cost of pest control, tolerance to insects/arthropods and diseases are important.
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Lettuce – Hilo Green

(Rex X Little Gem) X Manoa



Cultivar Selection in Organic and Low Input Systems


- ▶ Low input–low water, slow release nutrients
- ▶ Heat Tolerance– bolting, tip–burn/blossom end rot
- ▶ Scavenging roots
- ▶ Disease tolerance
- ▶ Insect tolerance
- ▶ Taste
- ▶ Late maturing
- ▶ Long harvest period



Blondkopfchen (Blond Girl)

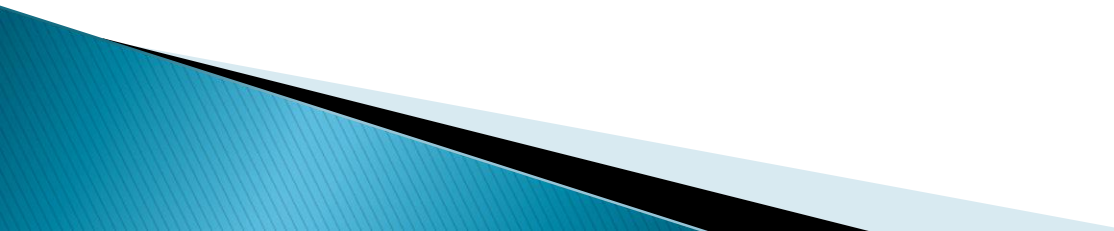


Crop Environment

- ▶ Climate Change requires cultivars able to adjust to extremes in temperature and moisture.
 - ▶ Sound farming systems critical including crop rotation for soil building, organic matter increase, weed control, and pest control, including nematodes.
 - ▶ Water management can affect what cultivars will better adapt to your farm environment; frequency and duration.
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Tradeoffs in Cultivar Screening

- ▶ Early vs. Late maturing
 - ▶ Tender vs. Tough
 - ▶ Resistance vs. Taste
 - ▶ Yield vs. Sweetness
 - ▶ Color vs. Yield
 - ▶ Single harvest vs. Multiple harvest
 - ▶ Annual vs. Perennial
 - ▶ Compact vs. Large framed
 - ▶ Shelf life vs. Taste
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Eggplant

Farmer's Long & French White

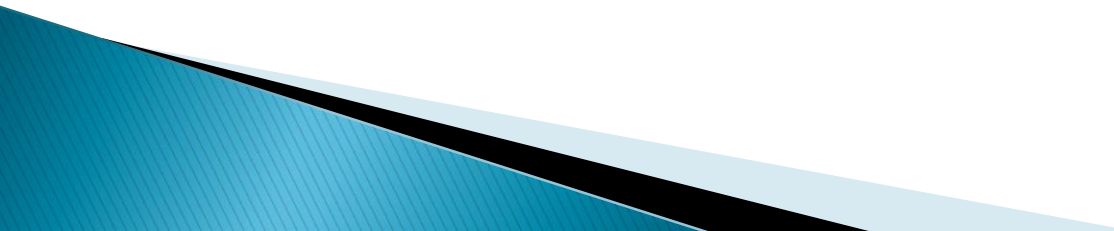


Lettuce

Many Colors, Shapes, and Tastes



Lettuce Types

- ▶ Romaine
 - ▶ Crisp Head
 - ▶ Loose Leaf
 - ▶ Batavian or Summer Crisp
 - ▶ Butterhead
 - ▶ Celtuce
 - ▶ Oak Leaf
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Celtuce – Cracoviensis



Oakleaf Lettuce



Hawaii's Lettuce Challenges

- ▶ **Tip burn:** High temperatures accelerate metabolic rate, affecting water uptake and calcium delivery especially to extremities. High nitrogen can aggravate tip burn by creating Ca:N imbalance.
- ▶ **Early bolting:** Result of heat stress. Will bolt & flower to perpetuate itself.
- ▶ **High temperatures:** Heat stress increases milk (lactose) production adversely affecting taste. Need to select for taste.
- ▶ **Diseases:** Spotted wilt and other viruses, Sclerotinia leaf drop (2 species), Downy mildew (high elevations), Powdery mildew (low elevations), others

Tipburn on Manoa Lettuce



Lettuce Bolting due to High Temperatures



UH Lettuce Cultivars

Developed by Dr. Charles Poole, (early 1950's):

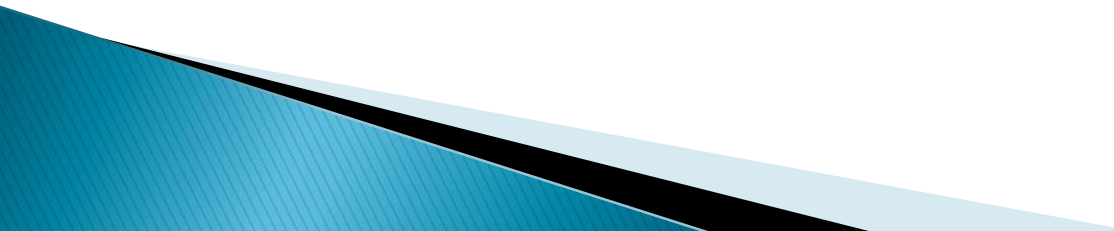
- ▶ Anuenue, Kauwela – Manoa X Great Lakes
- ▶ Laupili – (Manoa X Great Lakes) X Great Lakes
- ▶ Kulanui – (Manoa X Great Lakes) X Manoa

Developed by Dr. Richard Hartmann, (mid-1970's):

- ▶ UH Manoa – Improved Manoa with better heading characteristics, but increased tipburn susceptibility compared to Manoa.

Manoa

(Green Mignonette selection)

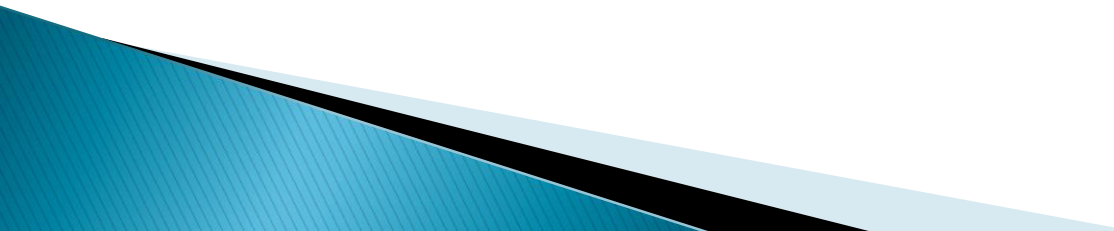
- ▶ Heat-tolerant heirloom from the mid-1800's.
 - ▶ Soft leaves with juicy crunchy midrib.
 - ▶ Compact plant, ideal for single serving lettuce.
 - ▶ Grown in Hawaii for several decades.
 - ▶ Adapted to tropical lowland conditions.
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Lettuce, Manoa



Leopard

(Merlot X Dark Green Romaine X Flashy Troutback=Forellenchluss)

- ▶ A smaller framed midi-sized romaine
 - ▶ Extra fancy crisping of the leaf margins, extra fancy dappling of glossy dark green leaves by dark red splashes.
 - ▶ High rating for downy mildew resistance.
 - ▶ Excellent taste
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Lettuce – Leopard



Lettuce, Manoa Leopard



Lettuce, Manoa Leopard



Selecting for Tip Burn & Bolt-Tolerance Summer 2014





Tip-Burn / Heat-Tolerant Individuals



Harvesting Seed



Poamoho Experiment Station-2/19/15

Bronze
Mignonette



Manoa
Leopard F3



Manoa
'77



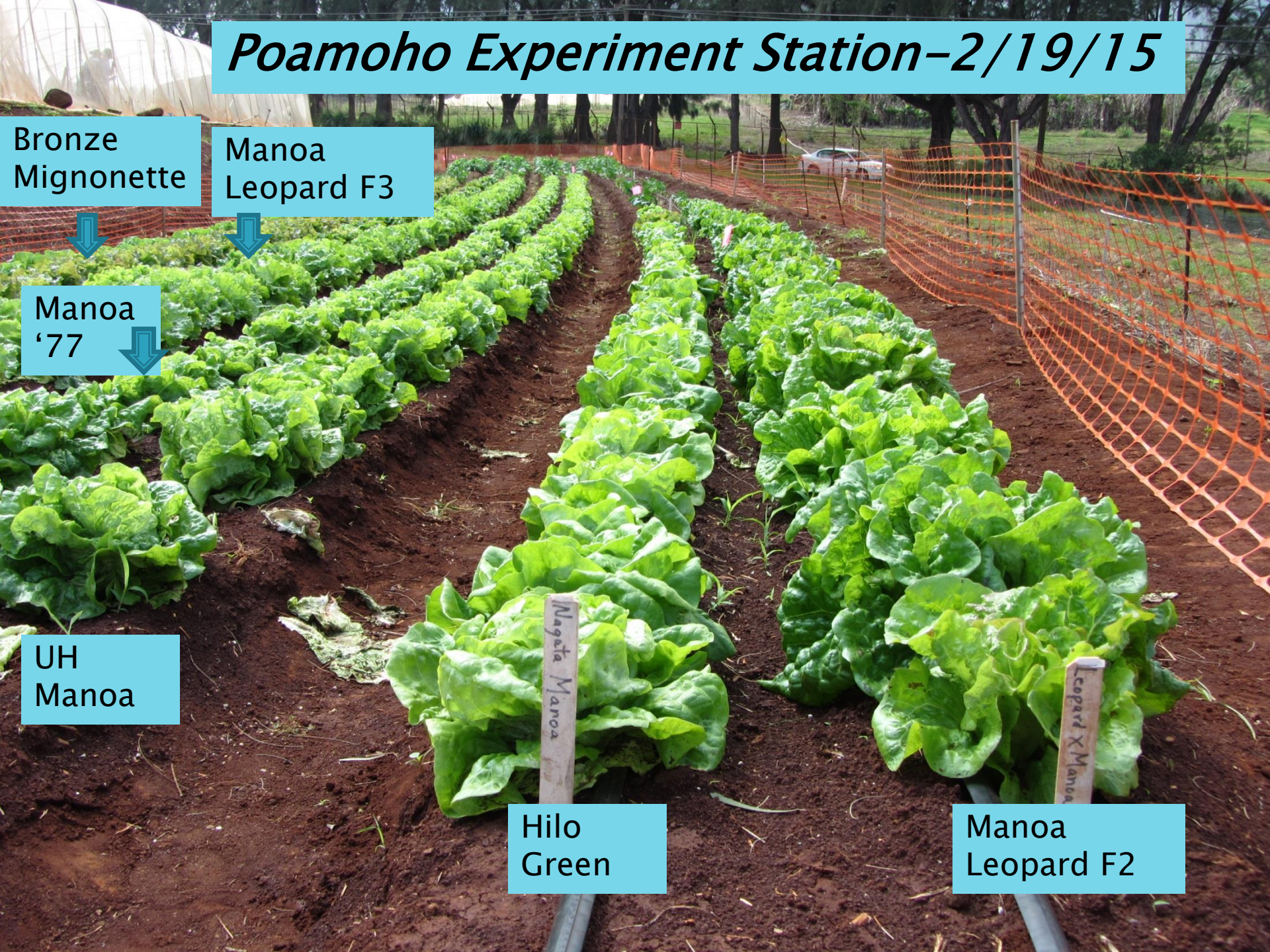
UH
Manoa

Hilo
Green

Manoa
Leopard F2

Manoa X Manoa

Manoa X Manoa



Manoa Leopard F2



Manoa Leopard F2



Spring 2016 Selections F4/F5



Spring 2016 Selections F4/F5



Tip Burn on Romaine selections



Seed Maturity
















Needs & Challenges

- ▶ Establish educational programs to train farmers in growing and processing quality seed.
 - ▶ Identify crops with competitive advantages and vital to Hawaii agriculture.
 - ▶ Develop seed production systems for small farms.
 - ▶ Identify key regions for certain crops, and coordinate seed production.
 - ▶ Access to seed processing equipment.
 - ▶ Develop seed marketing network to benefit farmers.
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Opportunities

- ▶ Additional crop for small farmers.
- ▶ Regional crop improvement of existing crops and creation of new crops.
- ▶ Creation of an artisan seed industry.
High value/limited edition.

Hawaii Public Seed Initiative

- ▶ Creation of website marketplace for sales of Hawaii-produced seed

Hawaii Seed Growers Network

<http://www.hawaiiseedgrowersnetwork.com/>

Acknowledgments

Collaborators & Cooperators:

Hawaii Public Seed Initiative–Kohala Center–Lyn Howe

Hawaii School Garden Network–Nancy Redfeather

Wild Garden Seed, OR–Frank Morton

Southern Exposure Seed Exchange, VA–Ken Bezilla

Commonwealth Seeds, VA – Edmund Frost

Turnip Wagon LLC, Paʻauilo, HI–Gary Cass

Organic Seed Alliance– Port Townsend, WA

Russell Nagata–Vegetable Breeder

Robb Farms–Chris Robb, Papohaku Farm–Ellen Sugawara,

Waialua PermaFarm–Robin Gorsich, Puu O Hoku Ranch–
Mark House,

CTAHR–Ted Radovich, Jari Sugano, Jensen Uyeda, Steve
Fukuda, Hector Valenzuela, Waimanalo & Poamoho

Research Station



Seed Security is Food Security

Grape and Midi Tomatoes



Novel Tomato Varieties



Tomato Violet Jasper



Tomato– Black & Blue (Black Cherry X Blue Tears)



Tomato – Black & Blue



Tomato – Janis Joplin



Tomato – Siberian Tiger



Tomato – Beauty Mark



Carinata Kale



Lacinato Kale

Carinata Kale Siliques



Harvesting Kale Seed



Drying Kale Seed



Beet Leaf Chard, Mountain Spinach



Cucurbita moschata – Crowning



Spinach, Long Standing Bloomsdale

