Varietal Screenings to Minimize Pests

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Sugano, 1997
Chewing Pests:
Feeding on the foliage, stems, fruit or roots.
Pests within this group include beetles, caterpillars, earwigs, leaf miners, etc.
Sucking Pests
These pests pierce plant's vascular tissue and withdraw plant sap. They cause plants to discolor, twist and distort. Pests within this group include aphids, whiteflies, mealy bugs, scales etc.

Thrips
Thrips have rasping and sucking mouthparts. Damage results in discoloration and scaring of leaves, stems, fruit and flowers. They are also plant vectors which are organisms that can transmit a pathogen such as a bacterium, virus, or phytoplasma into a plant.
Mites

Mites have rasping and sucking mouthparts. Damage results in a brown to russet discoloration of leaves, stems, fruit and flowers.

Fruit Flies

There are 4 fruit flies in Hawaii: Oriental fruit fly, Melon fly, Mediterranean fruit fly, Malaysian fruit fly. Adult females sting fruits and vegetables resulting in blemishes. Larvae tunnel within fruit.
Slugs and Snails

Slugs and snail are problem for low-growing vegetables. They are active in the evenings and are commonly associated with seedlings magically disappearing overnight.

Nematodes

Roundworms that attack the root system of plants and impair water and nutrient uptake. Symptoms: stunting, poor plant growth, narrow and weak stems, foliar chlorosis, root rotting and galling, plant toppling and poor root development.
Fungal Diseases
Fungal diseases are caused by fungal pathogens. Reproduce and disperse by spores (air, water, soil and via humans too). Common fungal pathogen include: powdery mildew, downy mildew, Alternaria, Cercospora, Phytophthora, etc.

Bacterial Diseases
Bacterial pathogens reproduce quickly and cause damage by degrading cell walls produce toxins, alter hormones, clog xylem of plant tissue. They are spread primarily via rain, or splashing water (seed and soil as well). They often enter plant tissue through natural openings or injury sites. Examples include: Xanthomonous, Pseudomonas, Erwinia, etc.
Viruses are caused by viral organisms which cause stunting, malformation, mosaic mottling symptoms, etc. They can only survive on living plant tissue. Once infected there is no cure. They are mainly transmitted by insect vectors, farm tools, etc. Common plant viruses include Banana Bunch Top Virus, Tomato Spotted Wilt Virus, etc.

Plant Hoppers

Plant hoppers damage leaves, stems, fruits, and flowers. They also serve as vectors for plant diseases, especially phytoplasmas.
Phytoplasma

Phytoplasma are plant diseases that are caused by a bacteria which parasitizes on the phloem of plant tissue via a sucking type of insect vector. Symptoms range from yellowing of plant tissue, cupping of leaves, witches broom, stunting and even death of infected plants. Leafhoppers are often associated with vectoring of phytoplasmas like the Watercress Aster Yellow (WAY).

Weeds

Weeds (annuals, biennials, perennials, etc.) often outcompete plants for food, sunlight, etc. They are fast growing, prolific seed producers, etc. Some weeds may be alternative hosts for crop pests (insects and diseases).
Importance of Variety Screenings

- High influx of new pest and diseases annually
- Existing pest populations easily adapt
- Environmental conditions are changing
- New varieties being developed annually
- Utilizing varieties with natural tolerance to pests may help ease other pest management efforts
Tomato Yellow Leaf Curl Virus

- Devastating disease of tomato first detected in 2009
- Vectors are the silver leaf (*Bemisia tabaci*) and the sweet potato whitefly (*Bemisia argentifolii*)
- UH CTAHR screened several dozen varieties for TYLCV tolerance in replicated field trials from 2009-2016

Chlorotic (yellowing)  
Interveinal discoloring  
Leaflets curl or cup upwards
Summary: UH Field Trials from 2009-2016 (with Melzer, Kaufman, Tateno, & Wright, etc.)

- Varieties exist with tolerance to TYLCV strains on Oahu based on tissue blot test:
  - Beef Steak Type (12):
    * Adonis, PIK Ripe 461, Pamela, Sacramento, VT-62940, VT-62966, Tovi Star, Tovi Roca, VT-62966, Yaqui, Xaman (Roma) and Tygress
  - Specialty Type (7):
    * Grape: 72618, Rona, Rojita, Komohana
    * Cherry: Felicity, Hathor, Sarina

Online Publications:
http://www.ctahr.hawaii.edu/e-notes/downloads/Field_day_handout_last_version.pdf
Turnip Mosaic Virus (2014)
14 varieties screened

Aphid transmitted
UH Field Trials (2014-2015)

- Promising Daikon Varieties
  - Alpine, Minowase, Summer Cross, April Cross, Bravo (2016)

Promising Turnip Varieties:
- Tokyo Cross, Hakurei, White Lady
Basil Downy Mildew (2010)
Variety Field Trials w/ Tian and Bost (2015)

Basil Downy Mildew Screenings (2015)
14 Varieties

Photo credit: J. Uchida & C. Kadooka
Disease scale: 1=very diseased affected to 9=absent
108 (segregated) and 111 highest yielding

Persian Cucumber (2014)

- Screened 12 varieties of Persian cucumbers
- Based on preliminary data:
  - Jawell, Unistars, Alexander, GVA 608, GVA 609, GVA 606

Online Publication:
Heat Tolerance Field Trials

Romaine (29), red and green (30+) leaf lettuce
Evaluated Shade (2010)
Field trials w/ Migita, Valenzuela & Goo

- 6 top producing Romaine varieties
- 30% shade Fall and Summer
- 4 replications with shade and full sun
- Results suggest shade is only needed in the summer months for Romaine production a low elevation sites on Oahu

Evaluated 29 Romaine Varieties (2014)

- Jerico remains top producer, but color unacceptable
- Jerico, Valmaine, Ridgeline had the highest yields
- Caesar and Wildcat were promising for processors- small core
- Spretnak, Claremont were baby romaine types

Online Publication:
Yield, Color, Core, etc.

Jerico
Ridgeline

Everyone ❤️ Manoa Lettuce
Field trials w/Nagata, Teves, Shingaki, & Shimabuku

Tip Burn
30 Box Red & Green Lettuce Variety Trials
Quick response to aquaponic and leafy green growers’ request for heat tolerant varieties

Evaluating Varieties with Putative Heat Tolerance
Red-Cherokee, Rouai, Pomegranate Crunch (baby romaine), Multi red, Cannatrix, Salanovas, Roxy, Fossey, Red Sail, etc.
Green-Anuenue, Nancy, Adriana, Spretnak (baby romaine), Dragoon (baby romaine), Tropicana, Nevada, Kiribati, Concept, Gecko, Panisse, Rex, etc.
2015: Heat and Diamond Back Moth (DBM) Tolerance
Head Cabbage (23) and Chinese Cabbage (13) & Broccoli (4)
Maui and Oahu
w/ Migita, Shingaki, Shimabuku & Bost

Head Cabbage: Kula Research Station
Seeded March 10, transplanted April 21, harvest started June 8, 2015

Approximately 40-70 heads of each head cabbage variety were grown in replication in Kula, Maui. The average weight per head was calculated based on a random selection of twelve heads per replication. There were three replications (36 heads)/variety.
Eighteen varieties of head cabbage were transplanted in a randomized complete block planting design at the Poamoho Experiment Station with the assistance of Research Station Manager, Susan Migita and staff. The intent of these field trials are to evaluate yield and the horticultural characteristics of head cabbage cultivars at low elevation sites (<1,000 feet). Tropicana yields well but seeds are hard to find.
2015: Statewide Hybrid Eggplant Variety Trial
(w/Migita, Takeda, Shingaki, Shimabuku, & Motomura)

Oahu, Maui, & Hawaii (7 sites). Molokai (2015)
Waimanalo Research Station (Organic Culture) Data: June-August 2014

New Crop Evaluations
Field trials with Migita, Nakamoto, Hamasaki, Kawabata(s) & Whitmore Ag Development

- 16 varieties evaluated
- Yield and brix data collected
- Grown under a plastic covering (rust) and netting (birds)
- Project ended in September 2014 due to tropical storm
2016: Kale Variety Trial
**2016: DBM & Caterpillars: Kale (18)**

**NOTES:**
- Harvest on 5/18, 5/25, and June 1.
- Heavy La Nina rains during harvest.
- Severely pruned and sprayed for aphids, worms, and thrips on June 3, 2016.
- Postpone harvest until July 6.
- Heavy pest pressure. No screen house post assessment. Lots of white flies, aphids and thrips on the leaves.
- Treated with Crymax, Wetcit, and Pyrene prior to initial harvest and data collection.
- No crop protection applications during data collection period.

**Overall Kale Production: Inside vs Outside Screen**
Suitability

- Each location varies
- Screen recommended varieties in your respective areas
- Stay current with seed companies and their offerings
  - Hawaii’s market share is small, varieties can be discontinued without notice
- Utilizing varieties with tolerance to pests and disease is just way to manage pest in an IPM system

For More Information

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