Weed control in Tropical Cropping Systems

Joe DeFrank
UH-Manoa
Tropical Plant and Soil Science

Topics Covered

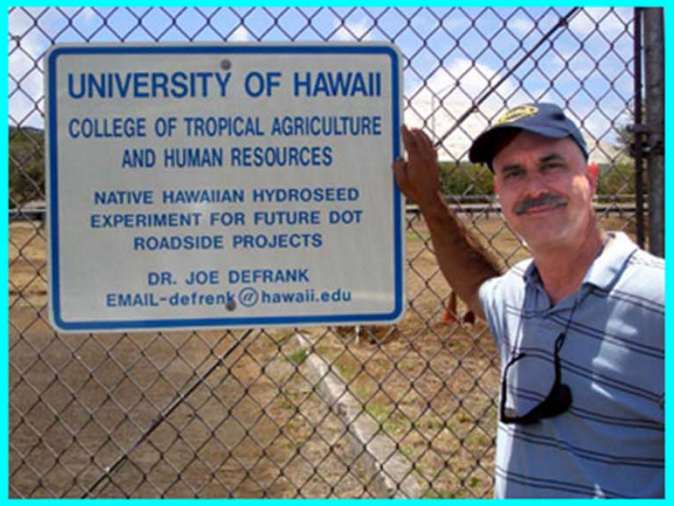
1. Web based resources for weed ID and control recommendations
2. Weed control in turf, considerations for maximum turf health
3. Problem weeds in turf.
4. Control of nutsedge in home gardens
5. Plastic weed mat for gardening and lawn renovation

For more information on topics covered

http://www.ctahr.hawaii.edu/deFrankJ/index.htm

WEED CONTROL IN HAWAII WITH DR. JOE DEFRANK

Professor of Weed Science - University of Hawaii Department of Tropical Plant and Soil Science



Weed Science 481-Fall 2011- Lecture notes and handouts

Weed ID Gallery - Economically Important weeds in vegetables, turf and potted ornamentals in Hawaii.

Streaming Media Content

Plants for People: Beverage Crops, Fall 2011 with Dr. Skip Bittenbender

ASHS 2011 WORKSHOP: Propagation Techniques of Select Tropical Ornamentals, Specialty Crops, and Native Plants in Hawaii

TPSS 491/711 Digital Tools for Scientific Content Fall 2012

For more information on topics covered

http://www.ctahr.hawaii.edu/deFrankJ/index.htm

Web based resources for weed I.D. and control, problems weeds in warm season turf & Purple nutsedge control for gardens and ornamental nursery beds. (posted 10/16/2012)

Weed control recommendations-home turf, landscapes and gardens (posted 06/01/2012)

Weed control in Aiea ball field, Waipio Soccer Field issues and new rules for Aquatic weed control - CPS 12th Annual Seminar and Tradeshow (posted 05/22/2012)

Weed control update for warm season turf in Hawaii - Pacifica Ag. Tradeshow (posted: 01/19/2012)

Weed control Considerations for Potted Tropical Ornamentals and Turf (posted: 02/09/2011)

Aiea Baseball field weed cleanup - 2010 (posted: 01/31/2011)

Pili Grass as a Living Mulch in Tropical Vegetable Crop Production in Hawaii 2009.

Weed Control in Native Hawaiian Plants

Native Plants on Hawaii's Roadways

Restoring Native Habitats in Hawaii

Student presentations for Weed Science Lab, TPSS/PEPS 481

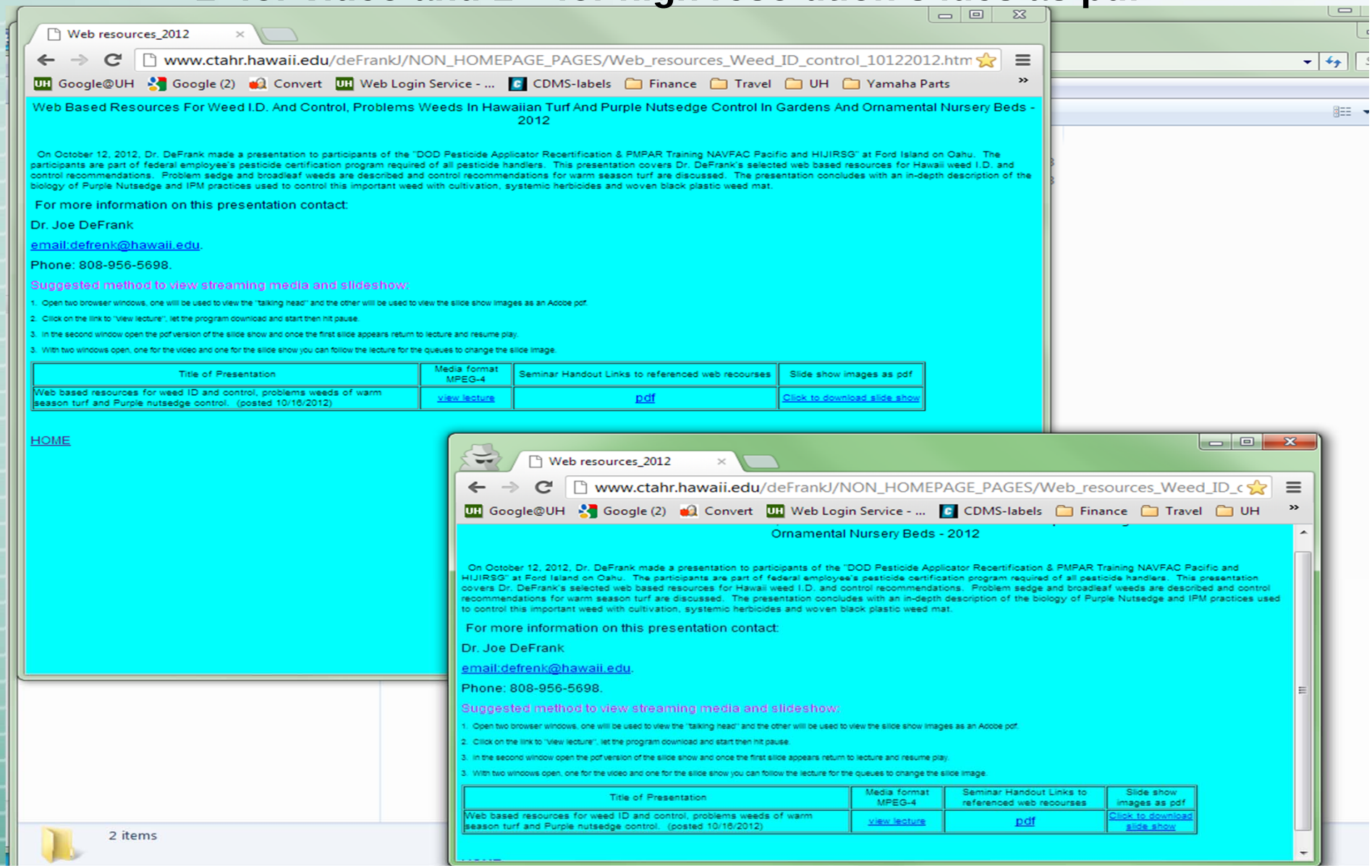
Herbicide and Growth Regulator Studies in Potted Ornamentals 2005 to 2007

Non-Weed Control Presentations (posted 06/21/2011)

HOME

For more information on topics covered

Viewing tips for live seminar presentations – Open 2 browser windows 1- for video and 1 – for high resolution slides as pdf



For more information on topics covered

Viewing tips for live seminar presentations – Open 2 browser windows 1- for video and 1 – for high resolution slides as pdf

Web resources for weed control.
On-line Handbook of Hawaiian Weeds

http://www.flickr.com/photos/uhmuseum/sets/72157616041949833/

University of Hawaii Museum > Collections > Joseph F. Rock Herbarium · Exhibits

Weeds of Hawaii

Thumbnails | Detail | Comments

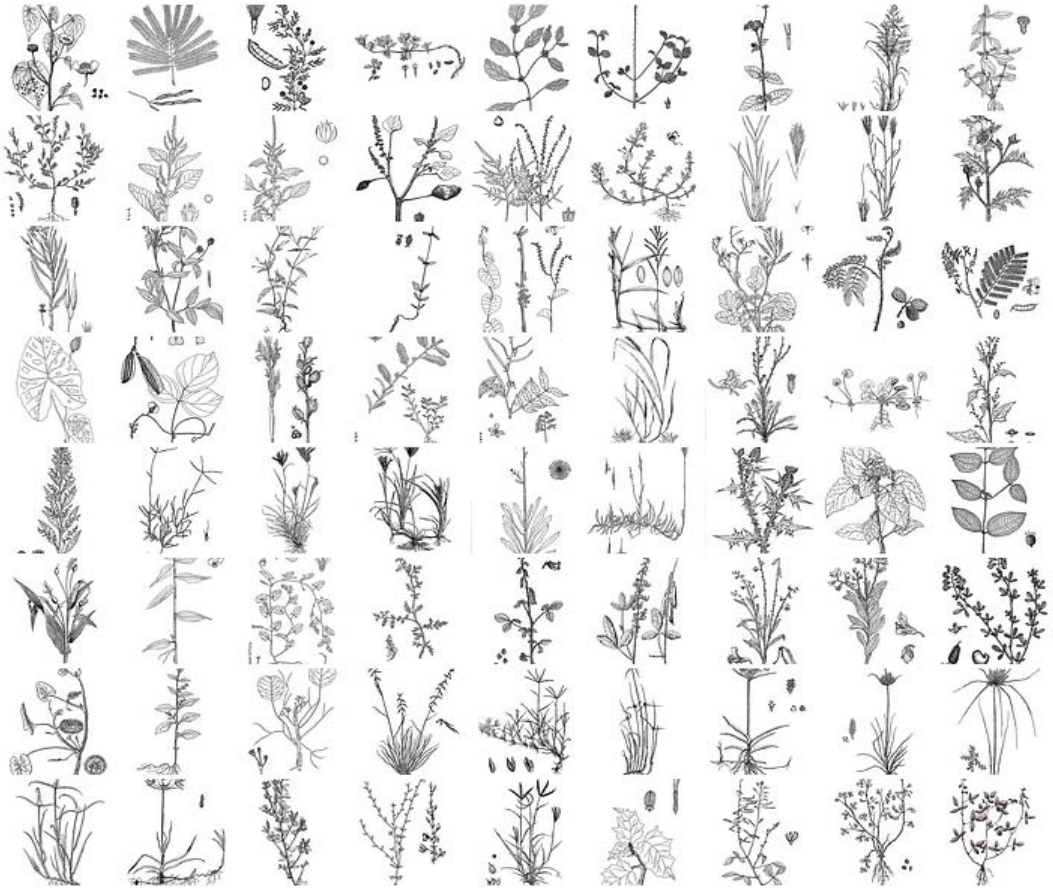
Slideshow More

Handbook of Hawaiian Weeds. Edited by E. L. Haselwood and G. G. Motter (1966).

Published for Harold Lyon Arboretum by University of Hawaii Press, Honolulu.

227 photos | 1,585 views

Items are from between 06 Jul 2006 & 03 Aug 2006.



Web resources for landscape weed control.

http://www.flickr.com/photos/uhmuseum/sets/72157616041949833/

Cuscuta sandwichiana

DODDER

Description:
A slender twining parasite. Stems threadlike, leafless, usually yellowish or orange but sometimes tinged with red. Leaves reduced to minute scales. Flowers white, yellow, or orange, tiny, occur in massed clusters; calyx 5-lobed, cupped; corolla 5-lobed, 1/6 inch across, cut halfway down; stamens 5; styles 2, extended. Fruit a capsule, nearly spherical, 1/6 inch in diameter, indehiscent, 2-celled. Seeds 4, each 1/12 inch in diameter, brownish in color (20).

Propagation:
By seed and creeping stems.

Habitat:
Found in arid and moist regions at lower to middle elevations.

History:
Endemic to Hawaii.

Notes:
Declared noxious in Regulation 2. It attaches itself to other plants by suckers.

Comments and faves

Cuscuta sandwichiana

DODDER

Description:
A slender twining parasite. Stems threadlike, leafless, usually yellowish or orange but sometimes tinged with red. Leaves reduced to minute scales. Flowers white, yellow, or orange, tiny, occur in massed clusters; calyx 5-lobed, cupped; corolla 5-lobed, 1/6 inch across, cut halfway down; stamens 5; styles 2, extended. Fruit a capsule, nearly spherical, 1/6 inch in diameter, indehiscent, 2-celled. Seeds 4, each 1/12 inch in diameter, brownish in color (20).

Propagation:
By seed and creeping stems.

Habitat:
Found in arid and moist regions at lower to middle elevations.

History:
Endemic to Hawaii.

Notes:
Declared noxious in Regulation 2. It attaches itself to other plants by suckers.

Web resources for weed control.

Weeds of Hawaii Pastures

URL: http://www.ctahr.hawaii.edu/invweed/weedsHi.html

College of Tropical Agriculture and Human Resources

Weed Management in Hawai'i

for agriculture and conservation

HOME | NREM | CTAHR | UH

- Info for Homeowners
- Info for Conservation
- Info for Farmers
- Info for Ranchers
- Weeds of Hawaii
- Videos
- Links

Contact CTAHR Scientists

- Dr. James Leary
- Dr. Joe DeFrank
- Dr. Ted Radovich

Weeds of Hawaii

Weeds of Hawaii's Pastures and Natural Areas; An Identification and Management Guide by P. Motooka, L. Castro, D. Nelson, G. Nagai, and L. Ching. ©2003, College of Tropical Agriculture and Human Resources, University of Hawaii at Manoa.

Available for sale from CTAHR, this book includes a quick visual key to help quickly identify weedy trees, shrubs, vines, herbs and grasses found in Hawaii. Individual fact sheets from the publication are available below (.pdf).

- *Abrus precatorius*, Precatory bean, black-eyed susan, bead vine, rosary pea
- *Acacia confusa*, Formosa koa, small Phiilppine acacia, yanangi (Belau)
- *Acacia farnesiana*, Klu, huisache
- *Acacia mearnsii*, Black wattle
- *Ageratina adenophora*, Maui pamakani
- *Ageratum conyzoides*, Tropic ageratu
- *Amaranthus spinosus*, Spiny amaranth, pigweed
- *Andropogon virginicus*, Broomsedge
- *Ardisia elliptica*, Shoebutton ardisia
- *Arthrostema ciliatum*, Arthrostema
- *Asclepias physocarpa*, Balloon plant
- *Asystasia gangetica*, Chinese violet, coromandel
- *Axonopus fissifolius*, Narrowleaved carpetgrass
- *Bambusa vulgaris*, Feathery bamboo, common bamboo
- *Batis maritima*, Pickle weed, akulikulikai
- *Bidens pilosa*, Hairy beggartick, Spanish needle
- *Blechnum occidentale*, Blechnum fern
- *Bocconia frutescens*, Bocconia, plume poppy, tree poppy
- *Boerhavia coccinea*, Red spiderling
- *Brachiaria mutica*, Paragrass, californiagrass, panicumgrass, buffalograss
- *Buddleia asiatica*, Dog tail, huelo ilio
- *Buddleia madagascariensis*, Smoke bush
- *Caesalpinia decapetala*, Catsclaw, popoki, wait-a-bit, Mysore thorn, puakelekino
- *Casuarina equisetifolia*, Ironwood, Australian pine, horsetail casuarina, coast she-oak, whistling pine, horsetail beefwood, Australian oak, swamp oak, toa (Samoa)
- *Cenchrus ciliaris*, Buffelgrass
- *Cenchrus echinatus*, Common sandbur

Buddleia asiatica

Dog tail, huelo 'ilio

Buddleia asiatica Lour.

Family: Buddleiaceae

Description: Shrub to 20 ft tall. Young stems hairy. Leaves opposite, alternate higher on the stem, 2–12 inches long by 3 inches wide, margins finely serrate. Flowers small, white or lavender, or greenish, in drooping tail-like inflorescence. Fruits are dry capsules, 0.2 inches long. Seeds tiny, winged on both ends. Genus named in honor of Rev. Adam Buddle, 17th–18th century English vicar and botanist[70]; *asiatica*, of Asia[69].

Distribution: Native to south Asia, Taiwan, and Malaysia. Very common in mesic to wet pastures, forests, roadsides, and waste areas of O'ahu, Moloka'i, Maui, and Hawai'i up to 4000 ft elevation. Collected on O'ahu in 1908[70].

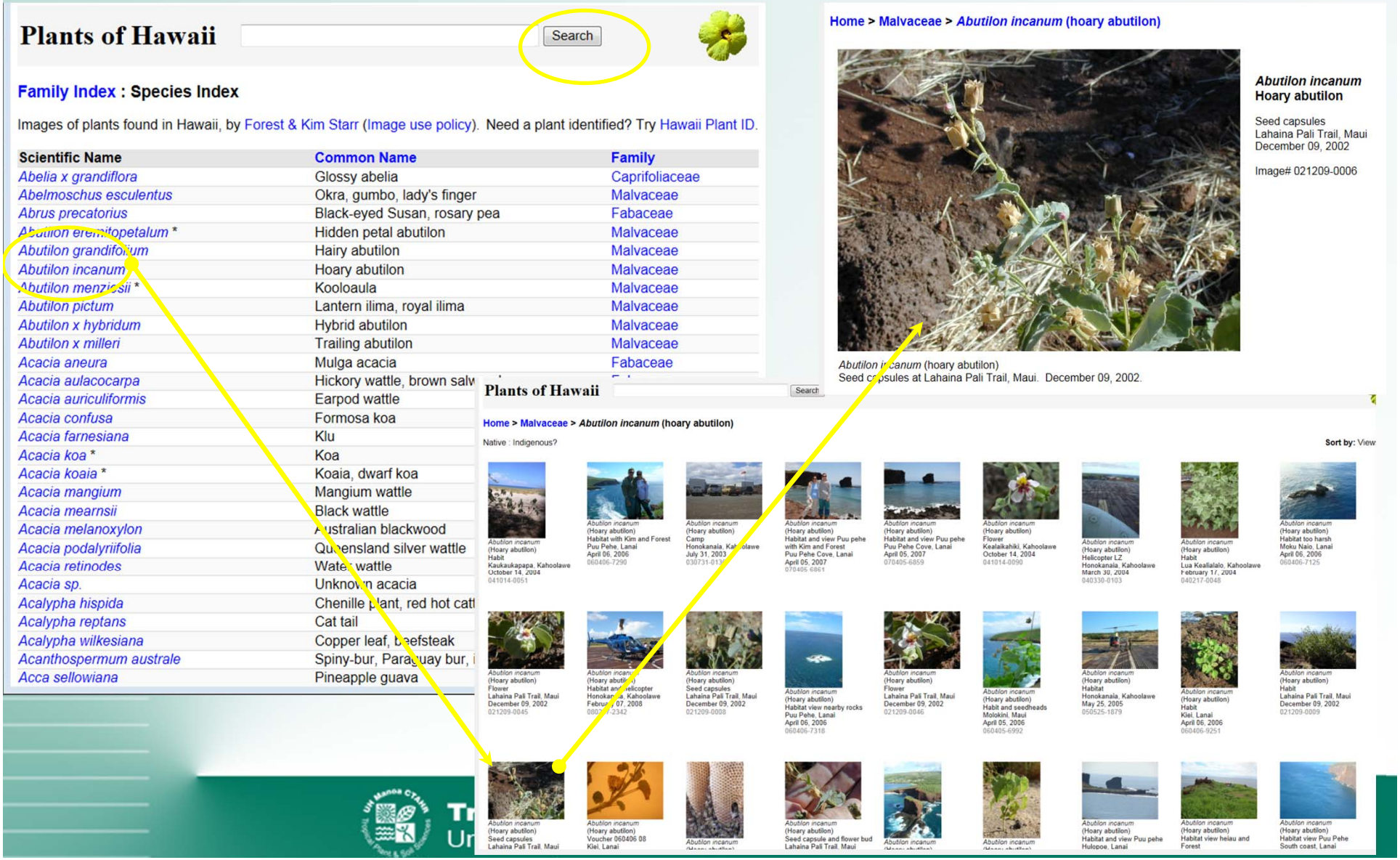
Environmental impact: Invades disturbed areas of forests.

Management: Sensitive to glyphosate and hormone-type herbicides. Very sensitive to triclopyr ester applied to basal bark (10% product in oil) and triclopyr amine in foliar application at 2% product in water.

Web resources for weed control.

Plants of Hawaii – by Forest & Kim Starr

URL: http://www.hear.org/starr/images/?o=plants



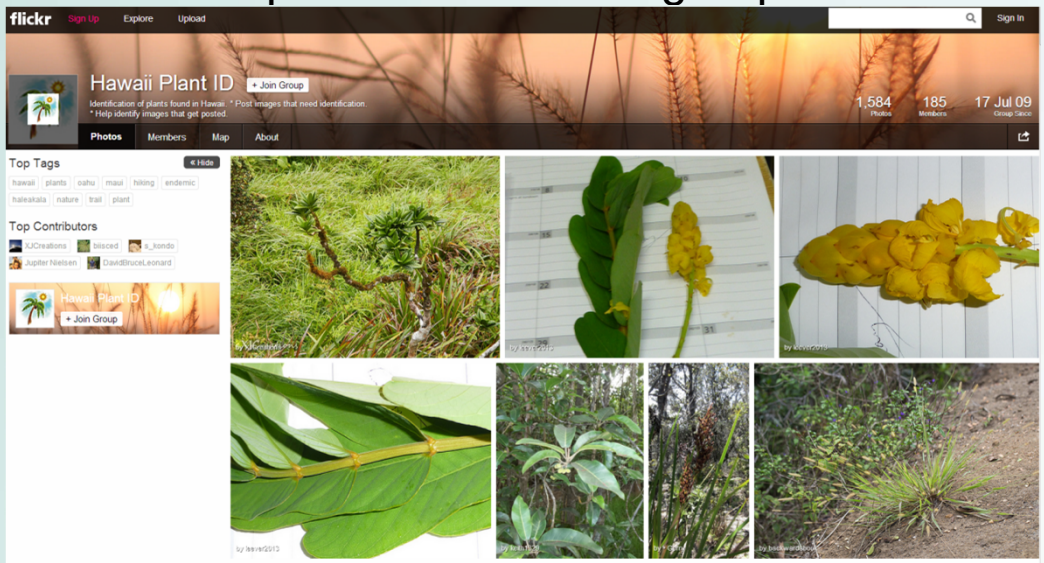
Web resources for weed control.

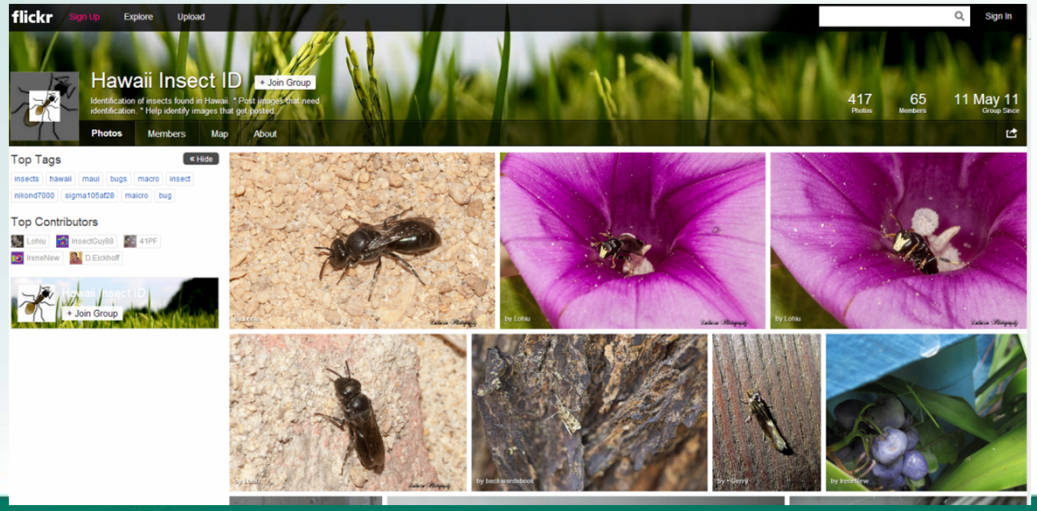
Hawaii Plant & Insect ID, join and submit photos, explore gallery

Plant ID =**http://www.flickr.com/groups/hawaiiplantid/**

Insect ID = http://www.flickr.com/groups/hawaii-insect-id/

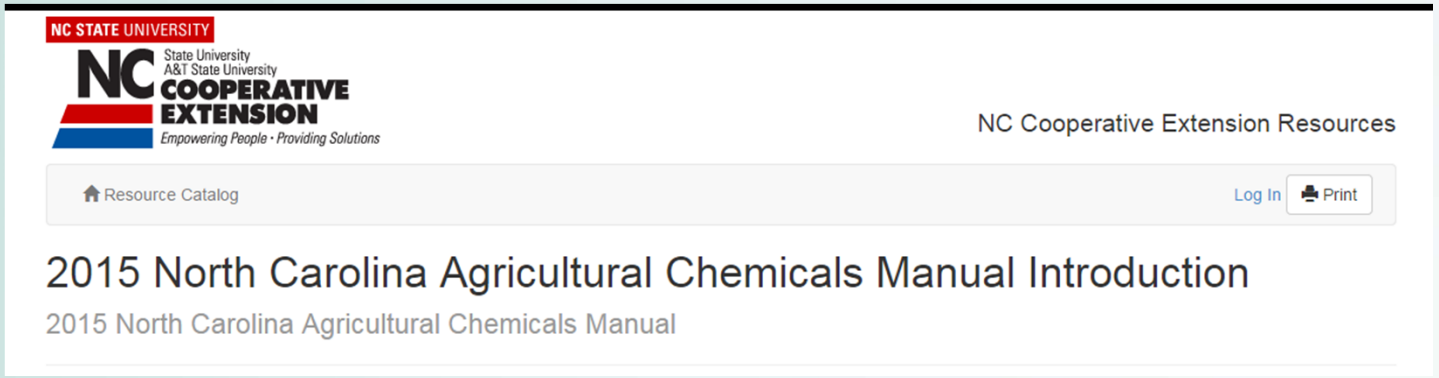
Free to join and submit images for ID





Web resources for landscape weed control.

2015 North Carolina Ag. Chemical Manual http://ipm.ncsu.edu/Agchem/agchem.html



VII. CHEMICAL WEED CONTROL

Weed Control in Field Crops: Corn, Cotton, Peanuts, Sorghum, Soybeans, Sunflowers, Tobacco, and Wheat, Barley, Oats, Rye, and Triticale; Glyphosate Formulations; Herbicide Resistance Management; Weed Control in Clary Sage
Fruit Crops; Hay Crops and Pastures; Lawns and Turf; Ornamentals; Vegetable Crops; Forest Stands; Aquatic Weeds; Specific Weeds; Woody Plants; and Total Vegetation Control in Noncropland

Web resources for landscape weed control.

2015 North Carolina Ag. Chemical Manual http://ipm.ncsu.edu/Agchem/agchem.html

VII — CHEMICAL WEED CONTROL

Chemical Weed Control in Field Corn 228
Weed Response to Preemergence Herbicides — Corn 235
Weed Response to Postemergence Herbicides — Corn 236
Chemical Weed Control in Cotton 237
Weed Response to Preplant, Preemergence, and Postemergence Overtop Herbicides in Cotton 247
Weed Response to Postemergence Directed Herbicides in Cotton 248
Weed Response to Burndown Herbicides for Conservation Tillage Cotton 249
Chemical Weed Control in Peanuts 250
Weed Response to Preplant Incorporated, Preemergence, and At-Cracking Herbicides in Peanuts 255
Weed Response to Postemergence Herbicides in Peanuts 256
Chemical Weed Control in Sorghum 257
Chemical Weed Control in Soybeans 260
Weed Response to Preplant Incorporated and Preemergence Herbicides in Soybeans 269
Weed Response to Postemergence Herbicides in Soybeans 270
Chemical Weed Control in Sunflowers 271
Chemical Weed Control in Tobacco 272
Weed Response to Herbicides in Tobacco 274
Chemical Weed Control in Wheat, Barley, Oats, Rye, and Triticale 275
Weed Response to Herbicides in Small Grains 279
Glyphosate Formulations 280
Herbicide Resistance Management 281
Herbicide Modes of Action for Hay Crops, Pastures, Lawns and Turf 285
Chemical Weed Control in Clary Sage 288
Chemical Weed Control in Small Fruit Crops 289
Chemical Weed Control in Tree Fruit Crops 295
Chemical Weed Control in Hay Crops and Pastures 302
Chemical Weed Control in Lawns and Turf 308
Chemical Weed Control in Ornamentals 320
Chemical Weed Control in Vegetable Crops 323
Chemical Weed Control in Forest Stands 348
Forest Site Preparation, Stand Conversion, Timber Stand Improvement 350
Aquatic Weed Control 355
Biological Control of Aquatic Weeds with Triploid Grass Carp 357
Chemical Control of Aquatic Plants 357
Pond Dyes 362
Chemical Control of Specific Weeds 364
Chemical Control of Woody Plants 367
Total Vegetation Control in Noncropland 369

ces Department

Web resources for landscape weed control.

2015

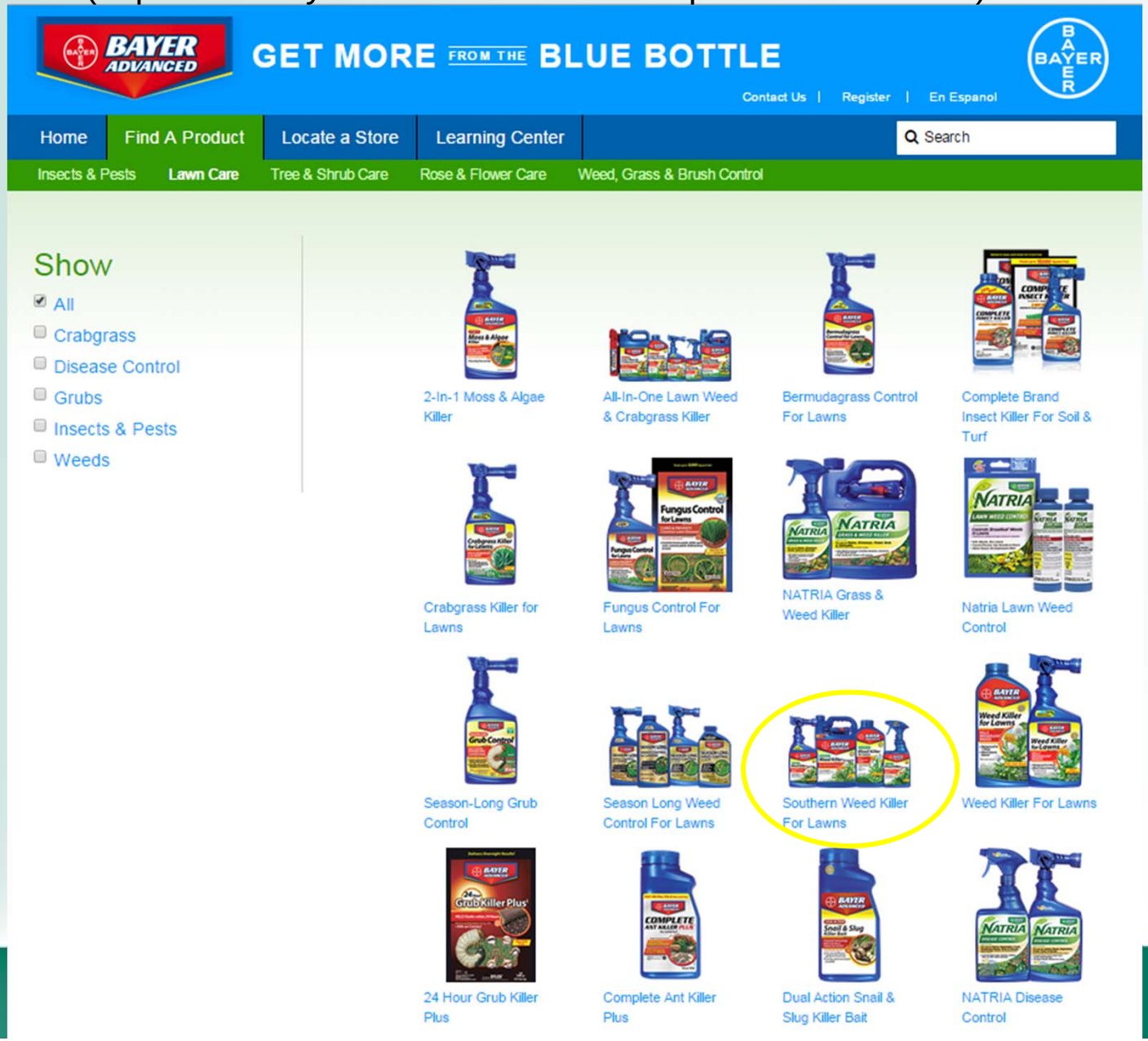
North Carolina Ag. Chemical Manual http://ipm.ncsu.edu/Agchem/agchem.html

Table 7-14. Chemical Weed Control in Lawns and Turf

Herbicide and Formulation	Amount of Formulation Per 1,000 sq ft	Amount of Formulation per Acre	Pounds Active Ingredient per Acre	Precautions and Remarks
Postemergence Control, Purple and Yellow Nutsedge, Kyllinga Species				
flazasulfuron, MOA 2 (Katana) 25 DG	0.034 to 0.069 oz	1.5 to 3 oz	0.023 to 0.0469	For use on well established bermudagrass, zoysiagrass, centipedegrass and seashore paspalum grown on nonresidential turf including golf course fairways, roughs and tees, and industrial parks, tank-sod- and seed farms, cemeteries, athletic field and commercial lawns. Apply a maximum of 1.5 ounces per acre on fully green centipedegrass and seashore paspalum. 3 ounces per acre needed for perennial nutsedge and some annual sedge species control. Repeat applications in 2 to 6 weeks when nutsedge or sedge growth is evident. 1.5 to 2.25 ounces per acre will control kyllinga species. Maintain a 25 feet nontreated border beside susceptible turf species. Can overseed in 2 weeks if applied up to 1.5 ounces per acre. Wait 4 weeks if applied more than 1.5 ounces per acre. Include a nonionic surfactant at 0.25% by volume.
imazaquin, MOA 2 (Image 70 DG) 70 DG	0.128 to 0.256 oz	0.357 to 0.714 lb	0.25 to 0.5	Use on bermudagrass, centipedegrass, St. Augustinegrass, and zoysiagrass. Do not apply during spring greenup. Temporary yellowing may occur. Add a nonionic surfactant at 2 pt per 100 gal of spray solution. Addition of MSMA at 1.5 lb active per acre will improve sedge control in MSMA tolerant turfgrasses.
halosulfuron, MOA 2 (Sedgehammer or Prosedge) 75 WDG	0.9 g	0.67 to 1.33 oz	0.031 to 0.062	May be applied to established residential and commercial bermudagrass, bahiagrass, zoysiagrass, centipedegrass, St. Augustinegrass, creeping bentgrass, Kentucky bluegrass, perennial ryegrass, tall fescue, and fine fescue. Apply broadcast when sedges have reached the 3- to 8-leaf stage. Use lower rate for light infestations and higher rate for heavy infestations. A second treatment will usually be required 6 to 10 weeks after the initial treatment. Use an 80% active nonionic surfactant at 2 quart per 100 gal of spray solution (0.5% by volume). Do not exceed 1 to 2 pint of surfactant per acre. Do not apply to putting greens. Sedgehammer and Prosedge only suppress green kyllinga.
MSMA, MOA 17 (various brands)		several concentrations	2 to 3	See remarks for MSMA above. Will require at least 2 applications 7 to 10 days apart.
sulfosulfuron, MOA 2 (Certainty) 75 DG	0.017 to 0.029 oz	0.75 to 1.25 oz	0.035 to 0.059	May be applied to certain ornamental native grasses and also bermudagrass species, zoysiagrass, centipedegrass, St. Augustinegrass, and kikuyugrass grown on sod farms, golf courses (excluding greens), commercial and residential turf that is highly managed, and other noncrop areas. Use 0.75 to 1.25 ounces per acre, and repeat in 4 to 10 weeks if needed. Use a nonionic surfactant at 0.25% by volume.

Web resources for landscape weed control.

Bayer Advanced – products for homeowners
(http://www.bayeradvanced.com/find-a-product/lawn-care)



Factors for a healthy lawn

A healthy lawn is the best form of weed control

Automated irrigation essential to a healthy lawn

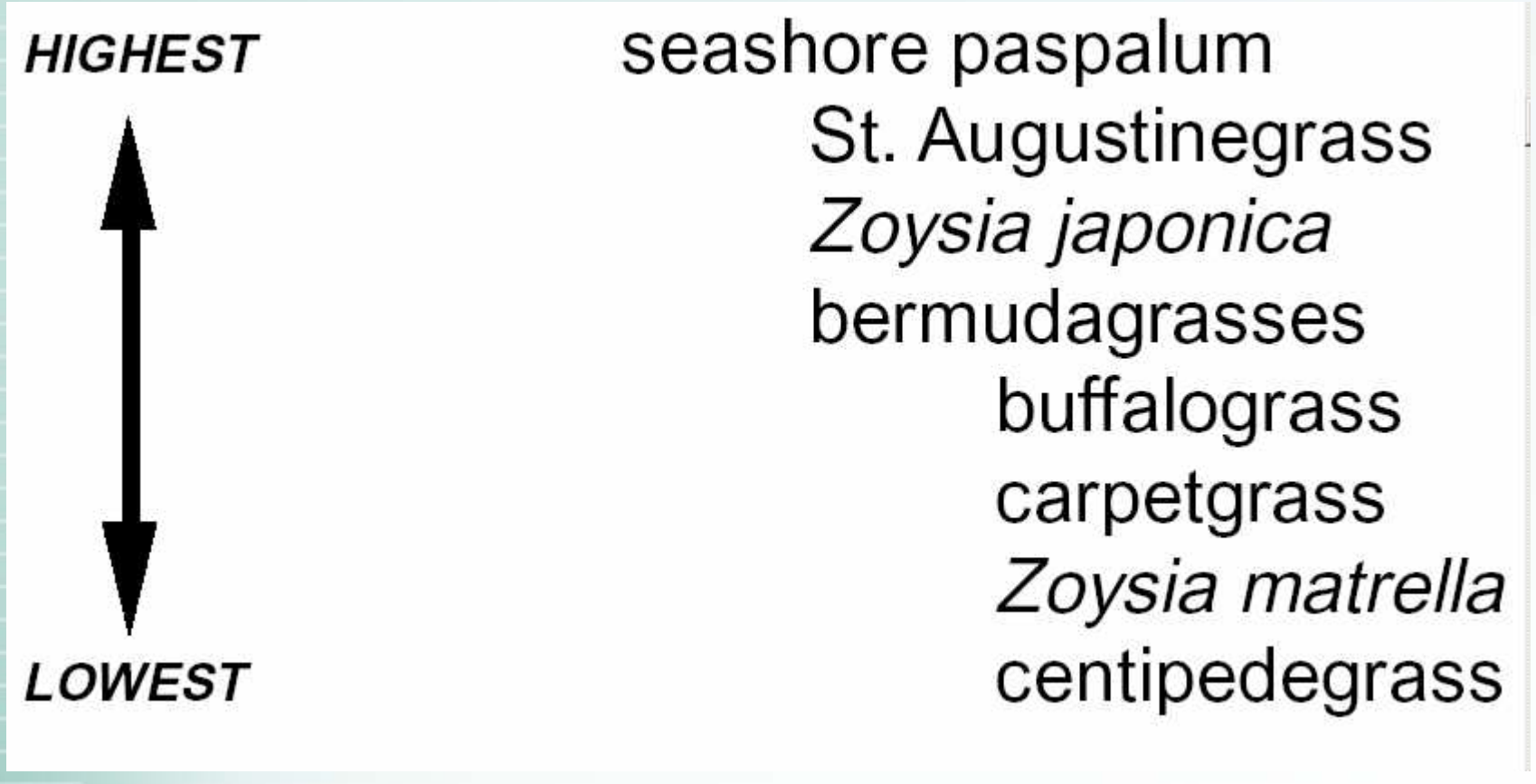
Factors for a healthy lawn

Proper growth:

- **Water - automated, amount, coverage**
- **Water quality - salty or fresh**
- **Light - full sun vs shade**

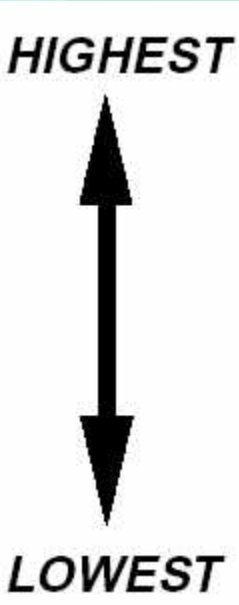
Factors for a healthy lawn

WATER QUALITY - SALTY OR FRESH



Factors for a healthy lawn

LIGHT - FULL SUN VS SHADE



St. Augustinegrass
zoysiagrasses
carpetgrassss
centipedegrass
seashore paspalum
bermudagrasses
buffalograss

PROBLEM BROADLEAF WEEDS

Legumes :creeping indigo, desmodiums, clovers

Spurges: prostrate, garden and graceful

Misc brd lf.: Amaranths, ground ivy, oxalis

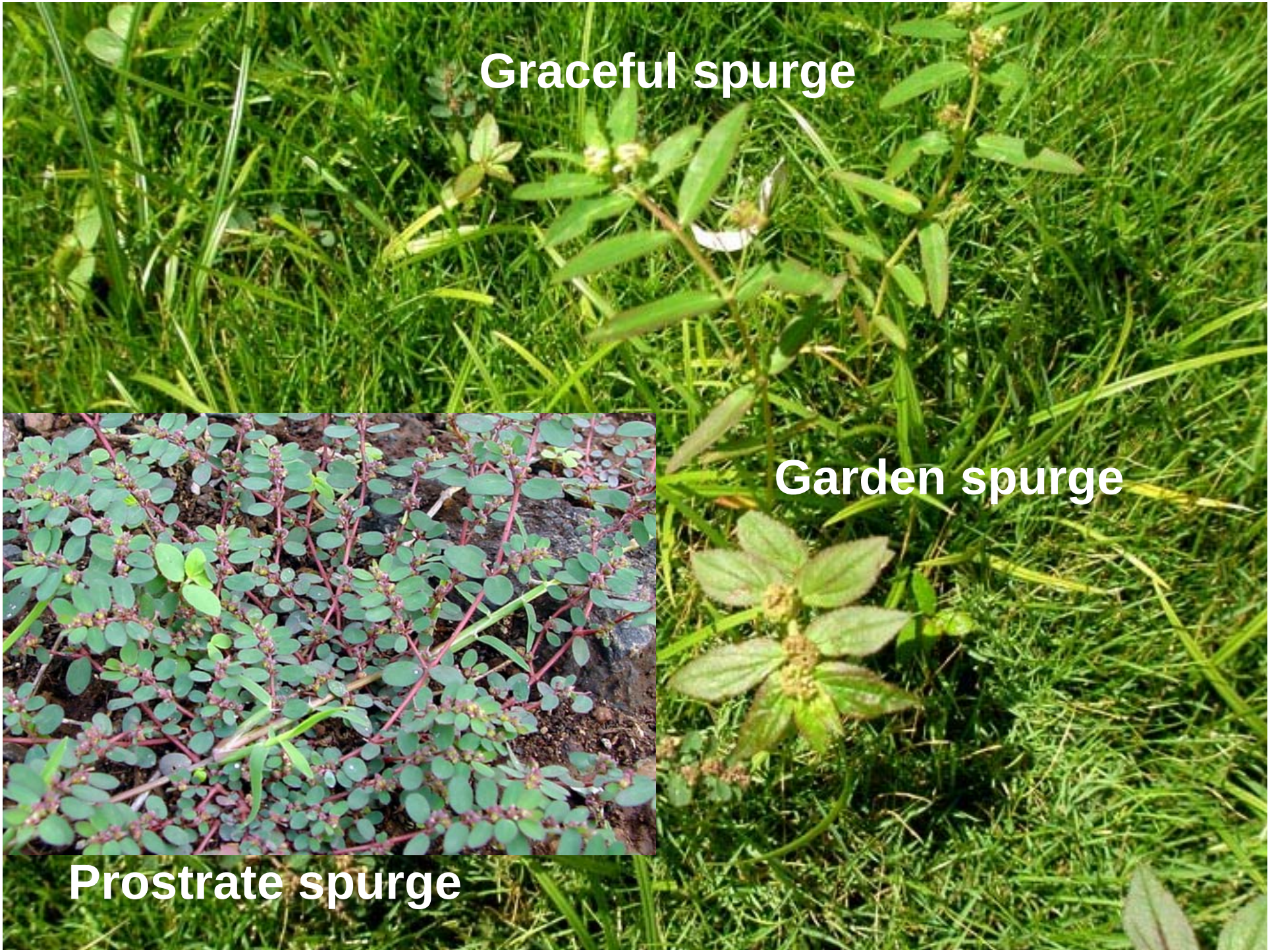

Creeping indigo


Desmodium triflorum – beggar weed


Button weed


Khaki weed


Ground ivy


Graceful spurge
Garden spurge
Prostrate spurge

Sprawling Horse Weed

Tropical Plant & Soil Sciences Department
University of Hawaii at Manoa

Conyza bonariensis (hairy horseweed)

Commonly used Postemergence Broadleaf herbicides

Trimec Southern

- Mixture of 3 herbicides, no MSMA
- Use on Bermuda, zoysia grass, St. Aug. & Centipedegass
- Seashore paspalum not on label

Commonly used Postemergence Broadleaf herbicides

SpeedZone

- Mixture of 4 herbicides, no MSMA
- Common and hybrid Bermuda and zoysia grass
- Seashore paspalum not on label
- Adds carfentrazone to Trimec for faster activity

Commonly used Postemergence Broadleaf herbicides

SpeedZone Southern

- **Mixture of 4 herbicides, less 2,4-D for reduced injury to warm season turf**
- **Common and hybrid Bermuda, zoysia grass, Centipede, Kikuyugrass, Seashore paspalum and St. Aug. (see label for excluded cultivars)**

Commonly used Postemergence Broadleaf herbicides

Confront

- Mixture of 2 herbicides, trade names of Lontrel and Turflon
- Use on Bermuda, zoysia grass and centipedegrass
- Seashore paspalum not on label
- User can determine suitability for species not on label
- Good activity on legume type weeds

Commonly used Postemergence Broadleaf herbicides

Manor

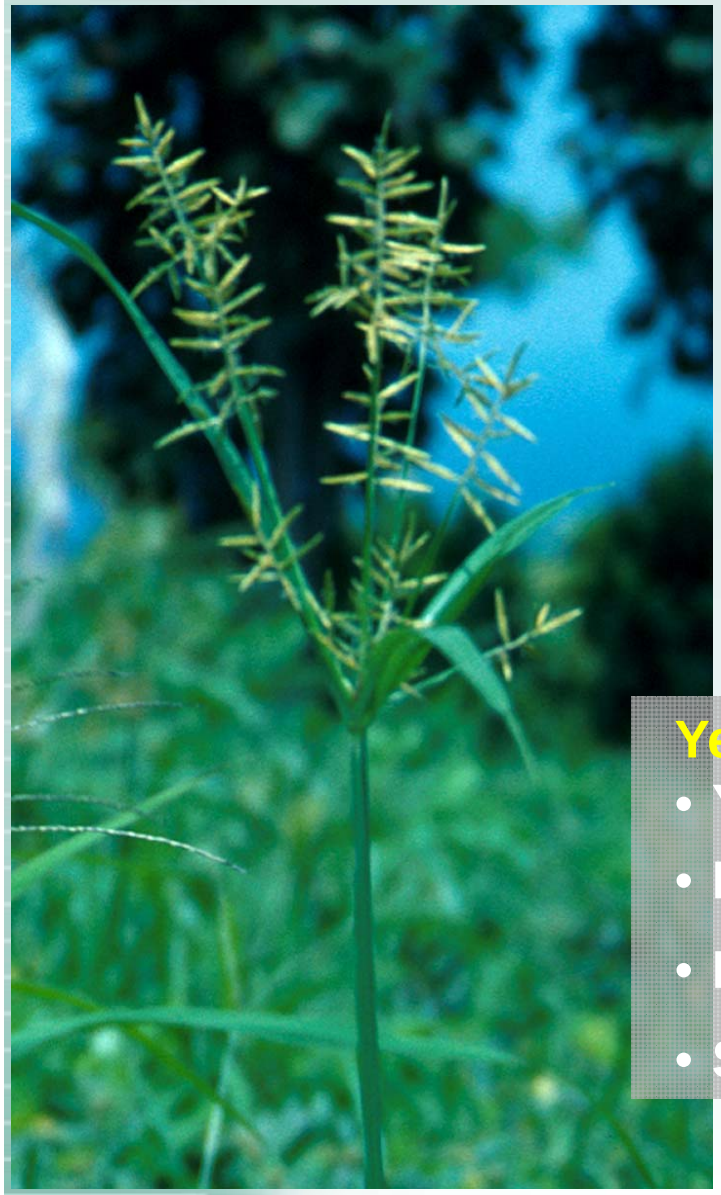
- Single product
- Use on Bermuda, St. Aug., zoysia grass and centipedegrass
- Seashore paspalum not on label
- Very good activity on spurges
- Controls Bahiagrass, a paspalum species related to Seashore

Sedge Weeds in Hawaiian Landscapes

Purple nutsedge
Yellow nutsedge
Green Kyllinga
White Kyllinga

Purple Nutsedge

- Brown narrow spikes in flower head
- Tubers in chains
- Seed not viable
- Spreads by vegetative parts = tubers



PURPLE NUTSEDGE

Yellow Nutsedge

- Yellowish-Brown or straw colored flower head
- Round tubers at the end of rhizomes, sweet
- Does not form chains, seed not viable
- Spreads by vegetative parts= tubers

White Kyllinga

- White single round flower heads
- No tubers
- spreads by seed and underground stems


White kyllinga

Green Kyllinga

- Green single round/oval flower heads
- No tubers
- Spreads by seed and underground stems


Green kyllinga


INCHES
VAN WATERS & ROGERS
METRIC

Eleocharis spp.

Commonly used herbicides for selective sedge control in turf

Manage/Sedgehammer/Sedge Pro

Certainty

Monument

Commonly used Postemergence Sedge herbicides

Manage/SedgeHammer/SP

- Single product
- Use on Bermuda, St. Aug., zoysia grass, centipede grass, Seashore paspalum and Kikuyugrass
- Primarily used for purple nutsedge
- Less effective on Kyllingas
- Little to no injury on turf – OK for residential use.

Commonly used Postemergence Sedge herbicides

Certainty

- Single product, very low use rate .25 – 2.0 dry oz/a
- Use on Bermuda, St. Aug., zoysia grass, centipedegrass, Seashore paspalum and Kikuyugrass
- Used for purple nutsedge and Kyllingas
- Controls some selected /grass & broadleaf weeds (Wth. Clover, Crowfoot Grass, Ground Ivy, Dandelion)
- Little to no injury on turf
- Root absorbed, citrus very sensitive be aware of tree roots, Residential OK.

Commonly used Postemergence Sedge herbicides

Monument

- Single product
- Use on Bermuda, zoysia grass, St. Augustine-sod production only.
- Controls sedges and selected grass and broadleaf weeds
- Suppression of Crab, Dallis and Torpedograss
- Controlls Creeping Indigo, Khakiweed, Oxalis and Black medic
- OK for residential, sold in .5 gram pack (2gal/1000 ft^2)
- With caution near tree roots.

Grassy Weeds in Hawaiian Turf

Australian Carpet Grass

Hilo Grass

Goose grass

Dallisgrass

Love grass

Henry's and Blanket CG

Star Grass

Smut grass

Dominate weedy grasses

Australian carpet grass

Axonopus compressus

Forest Starr & Kim Starr

Hilo grass

Paspalum conjugatum

Dominate weedy grasses

Dominate weedy grasses

Goose grass

Eleusine indica

Dallisgrass

Paspalum dilatatum

Tropical Plant & Soil Sciences Department
University of Hawaii at Manoa

Love grass

Eragrostis amabilis
Eragrostis tenella

Carolina Love grass

Eragrostis pectinacea

Forest & Kim Starr

Tropical Plant & Soil Sciences Department
University of Hawaii at Manoa

Henry's Crabgrass

Digitaria ciliaris

Forest & Kim Starr

Tropical Plant & Soil Sciences Department
University of Hawaii at Manoa

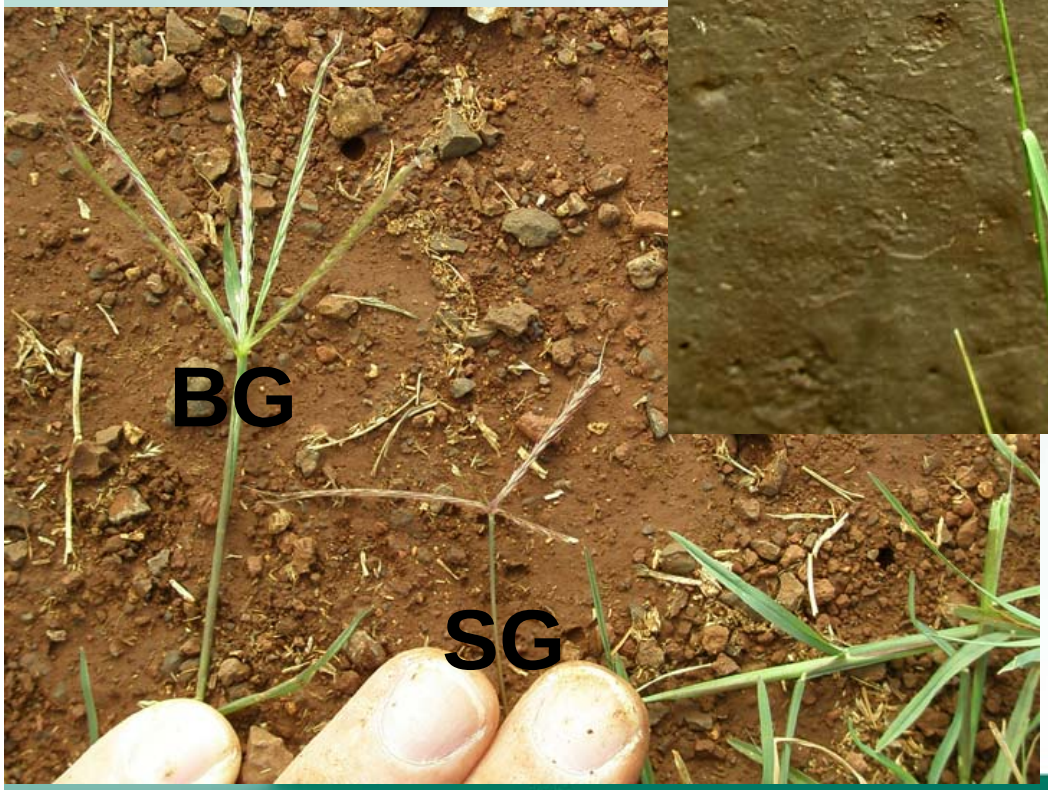
India Crabgrass

Digitaria longiflora

Tropical Plant & Soil Sciences Department
University of Hawaii at Manoa

Star Grass

Chloris divaricata



Tropical Plant & Soil Sciences Department
University of Hawaii at Manoa

Star Grass

Tropical Plant & Soil Sciences Department
University of Hawaii at Manoa

Commonly used Postemergence for Grassy weed control

Sencor 75DF

- Single product
- Use on Bermuda
- Control for goosegrass in HI,
- On bare ground has good preemergence activity
- Pre ban mixed with MSMA for wider spectrum grass and purple nutsedge control

Commonly used Postemergence for Grassy weed control

Tenacity

- Single product with selective pre and post activity
- Use on dormant Bermuda
- Other grass sensitive are: zoysia, seashore paspalum and kikuyugrass
- Primary use on Tall fescue, Kentucky blue grass
- Safe warm season grass: Centipedegrass and St. Aug.
- Weed controll: crabgrasses, goosegrass, love grass, yellow nutsedge and many broadleaf weeds


Untreated Common Bermuda grass sport turf
Waipio Soccer Complex on Oahu 12/03/13


22 DAS02 Tenacity(4 oz/a)+Sencor (8 oz/a) – 01/06/14

13 days later – 01/26/14

Control of Goose grass & Love grass
2 hard to control weedy grasses
5oz Tenacity + 8oz Sencor/a
Apply 2X's

102 DAS02 - 08/09 to 12/03/13

Spot treatment with Roundup on fine turf

Non-selective Wiper in non-crop areas

Selectivity based on height

Wiper for tall weeds in turf

Improved weed wick for stubborn grasses

Tropical Plant & Soil Sciences Department
University of Hawaii at Manoa

Wiper in between row areas and for weeds above crops

Alley Cat Farm Equipment, URL: http://weedwipe.com

Rotowiper, URL: http://rotowiper.co.nz/site/index.php?p=1

Factors for wiper applications

1. Pre application growth activation of weeds and turf.
2. Sufficient height difference between weeds & turf.
3. Glyphosate at 15-20% (20-25 oz/gal) for wiping weeds.
4. 2-3 day delay mowing and irrigation after app.



Hand pulled wiper with modified drip irrigation reel dispenser

$C0_2$ gas to move systemic herbicide, PSI – 2-3.

Hand pulled weed wiper
Aiea Field
11/29/2013

Wiper Ht. = 4 in.


Spray
marker used
to show
contact


11/29/13


12/10/13-39 11DAW


11/29/13


12/11/13-11 DAW


11/29/13-wiper app.
12/11/13-11 DAW

12/11/13-11 DAW

01/07/14-39 DAW


11/29/13-0 DAW
01/07/14-39 DAW

Alley Cat Farm Equipment
Monte DuBois - 561-603-8909
Mark DuBois - 561-441-0495

ALLEY CAT
FARM EQUIPMENT

Home Page | My Account | Contact Us | Photos

Shopping Cart

0 Items
$0.00

Categories

- Row Middle Wipers
- Broadcast Wipers
- Wiper Parts
- ScrubnGo

Information

- Photos
- Pull Behind Wiper
- About Us
- Wiper User Guide
- Contact Us
- Shipping & Returns
- Privacy Notice

Join our Newsletter

Weed Wipers That Work!

Our Alley Cat Weed Wipers are an economical and effective way to control weeds. Alley Cat Weed Wipers can be used in fields, pastures, row crops or just about anywhere weeds grow.

Alley Cat Weed Wipers come in a variety of styles that can be used in plastic mulch or fields and pastures. Alley Cat Weed Wipers are hand made in the USA.

“Lights Out” for sport turf renovations

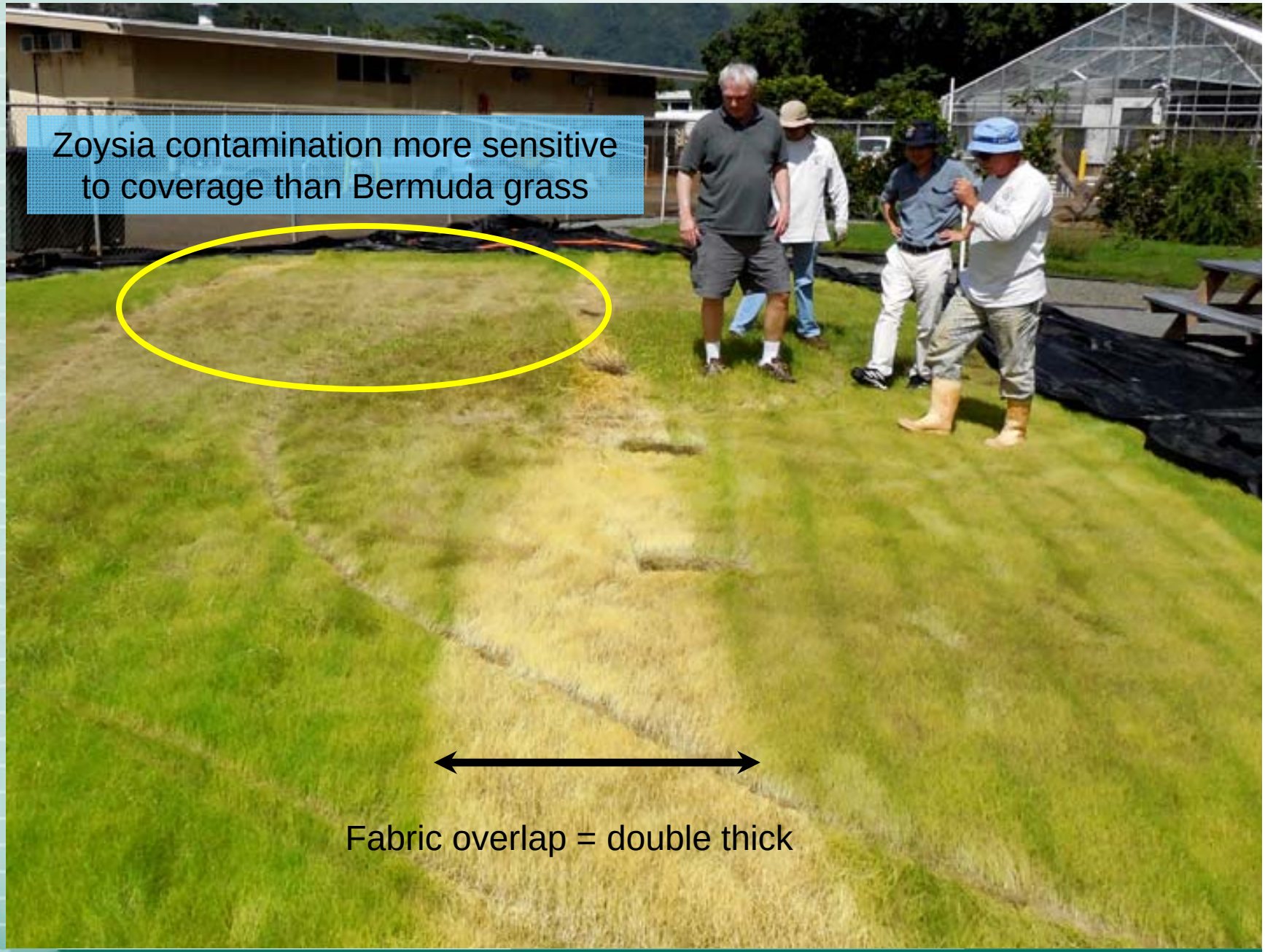
“Lights Out”
Weed control and turf renovation without herbicides

Appropriate Sites and Concept

1. Public parks, school fields & private residences
2. Eliminate herbicides for turf and weed removal during turf renovation
3. Use geotextile woven plastic weed fabric for weed/old turf kill.
4. Requires time, irrigation & fertilizer to accelerate renovation process

“Lights Out” for sport turf renovations

Tropical Plant & Soil Sciences Department
University of Hawaii at Manoa


Zoysia contamination more sensitive to coverage than Bermuda grass
Fabric overlap = double thick

Selective weed control is possible with light exclusion
Gr. Kyllinga and Zoysia contamination suppressed
P. nutsedge and Bermuda grass recover and fill the space

Tropical Plant & Soil Sciences Department
University of Hawaii at Manoa

Chain drags to breakup thatch

Improve Soil Conditions


SWEEPER 80


GOOSSEN VERSA-VAC


GOOSSEN VERSA-VAC
Goossen


TORO
TORO


TORO

Following tarping and thatch removal

1. Fertilize to stimulate weed seed germination
2. Weeds grow 2-3 weeks
3. Reapply tarp for 7-10 days all annuals dead.
4. Replant with sprigs or hydro seed.
5. Old Bermuda from below ground and new planting material to provide rapid fill in and stable playing surface.
6. Time table:
   a) Kill weedy thatch 25-30 days
   b) Remove thatch and fertilize 2-3 days
   c) Weeds grow from seeds-3 weeks
   d) Cover to kill weeds 7 days
   e) Fill in post planting 2 months
   f) Total 4-5 months: apply mat to fill in

Following tarping and thatch removal

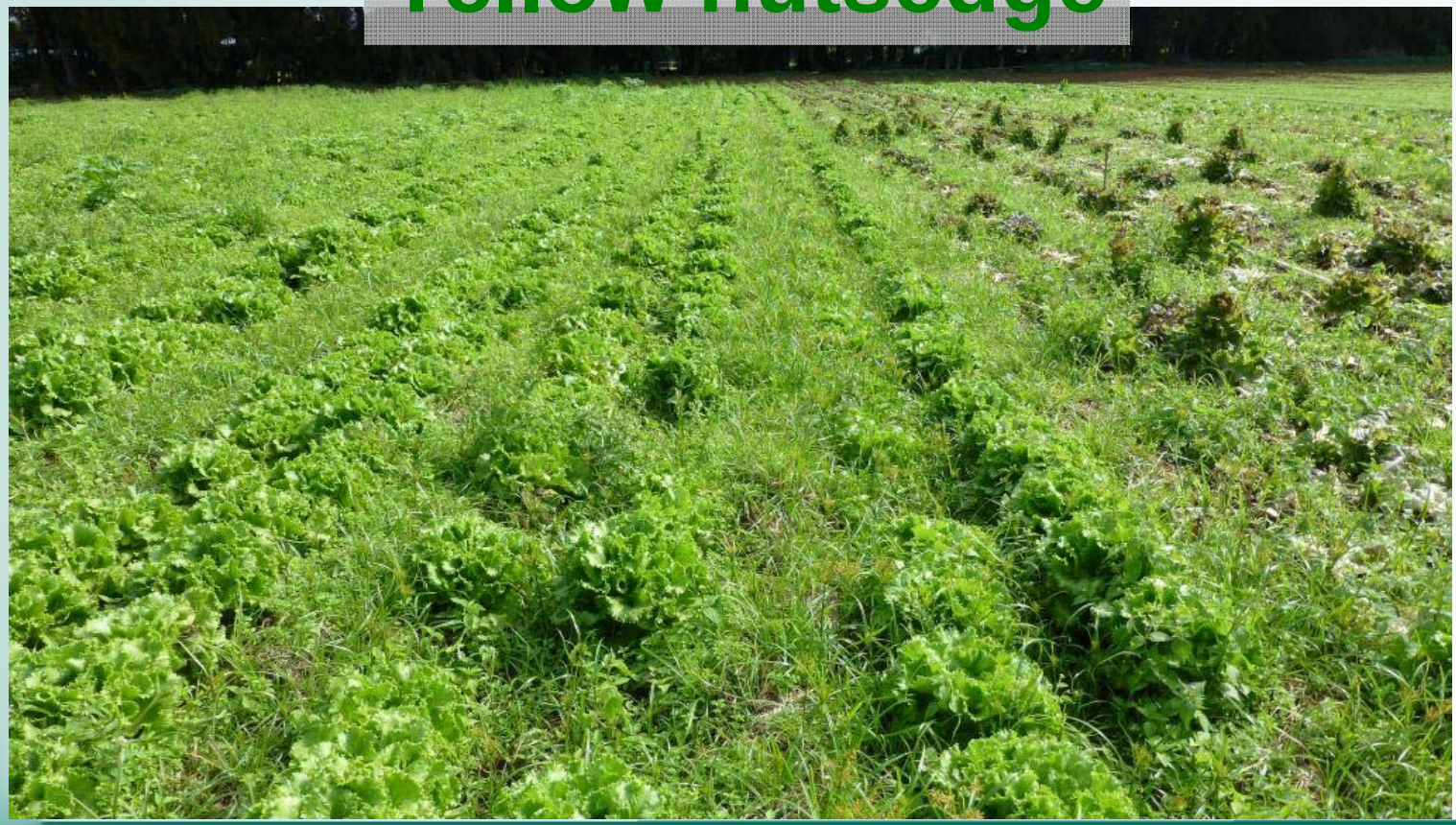
1. Fertilize to stimulate weed seed germination
2. Weeds grow 2-3 weeks
3. Reapply tarp for 7-10 days all annuals dead.
4. Replant with sprigs/hydro cap or hydro seed.
5. Old Bermuda fills from below ground and new planting material provides rapid fill in and stable playing surface.
6. Time table:
   a) Kill weedy thatch-25 to 30 days
   b) Remove thatch and fertilize 2-3 days
   c) Weeds grow from seeds-3 weeks
   d) Cover to kill seedling weeds-7 days
   e) Fill in post planting-2 months
   f) Total 4-5 months: apply mat to fill in

Lights Out research topics

1. Weed mat cover duration to kill weeds & minimize impact or existing turf species
2. Fertilizer types and rates to maximize weed seed germ.
3. Duration for weed seed germination and growth prior to 2nd weed mat cover.
4. W/hydro seeding: cultivars, seeding rates, growth additives.
5. Time to initiate mowing after seeding.
6. Best type of covering for selective weed control and long term durability. Colored films and thicker sheets for better light exclusion.

Sedge Weed Management in Hawaiian Farms and Gardens

Purple nutsedge
Yellow nutsedge



Tropical Plant & Soil Sciences Department
University of Hawaii at Manoa

Controlling Purple & Yellow Nutsedge

Mechanical – dry soil and cultivation

Chemical – irrigation, weed growth and chemical control

IPM approach - makes use of water, weed mat and time

Biology of Purple Nutsedge

- Seeds – Very few, not often source of new plants
- Underground tubers and corms are the primary source of infestation
- Undisturbed will spread underground several yards a year

  a) 1 plant can produce 100+ tubers in 100 days

  b) 80-95% of tubers in top 6 inches of soil

  c) some as deep as 18 inches

- Contamination & spread from infested soil on equipment, boots & soil on harvested crops.

Nutsedge persistence

- **Dormancy of tubers prevents complete emergence of all plants**
- **Dormancy allows constant/staggered emergence when conditions are right**

  a) moisture & soil heating

  b) Deeper tubers germinate later = more time required to heat soil profile.


Purple nutsedge
Nutsedge persistence

Yellow Nutsedge

Tropical Plant & Soil Sciences Department
University of Hawaii at Manoa

Strategies for nutsedge control

Preplant mechanical cultivation

1. In very dry soil, tubers on soil surface 10-12 days will dry out and die
2. Sequential cycles of tuber exposure will lower soil population of tubers


GOODYEAR

Mixed tool harrow
Mix soil
Lift tubers and
Smooth seed bed

Strategies for nutsedge control

Chemical weed control

1. Prepare seedbed
2. Irrigate to allow NS to germinate and grow
3. The key issue is the presence of living connective tissue, and the maximum sprouting of the tuber reservoir in the soil prior to glyphosate application.

SYSTEMIIC HERBICDES MOST EFFECTIVE AT THIS STAGE OF GROWTH

With flowers present =

Maximum tuber emergence
+
Tubers attached to leaves

Conduit for systemic Movement to underground parts

Chemical control of yellow and purple nutsedge

Topical application of glyphosate for selective weed control by placement

Glyphosate formulated at 41%

- **Apply 33-100 % solution**

Wiper in between row areas and for weeds above crops

Wiper in between row areas and for weeds above crops

Alley Cat Farm Equipment, URL: http://weedwipe.corecommerce.com/

Rotowiper, URL: http://rotowiper.co.nz/site/index.php?p=1

Solarization for improved tuber kill

1. Involves use of clear plastic and irrigation
2. Deep soil heating reduces time for maximum tuber germination
3. Increased and more uniform bud break exposes a higher % of tubers to systemic herbicides.
   a) Maximum kill with glyphosate possible
   b) Nutsedge control best with flowers showing
      (1) Spray before this age not all tubers germinated
      (2) When flowers show, nutsedge moves systemic herbicides to attached underground tubers

Clear plastic stimulates growth and provides more uniform bud break from tubers due to deeper heating

Solarization for improved tuber kill

1. Involves use of clear plastic and irrigation
2. Deep soil heating reduces time for maximum tuber germination

3. Increased and more uniform bud break exposes a higher % of tubers to systemic herbicides.

a) Maximum kill with glyphosate, try summer season for deepest soil heating and max tuber emergence

b) Nutsedge control best with flowers showing

(1) Spray before this age not all tubers germinated

(2) When flowers show, nutsedge moves systemic herbicides to attached underground tubers

Strategies for purple/yellow nutsedge control in commercial vegetable fields

IPM approach

1. Use of knowledge of growth habit
2. Deep soil heating for maximum tuber germination
3. Use light exclusion for non-chemical kill
4. Prevent infestation with notill/hydroseeding to provide close plantings for rapid canopy closure
5. Notill post crop & weed kill, eliminate tuber spread

Review data sheet prior to larger purchase of weed mat – Note UV Res.

Style 1859

Ground Cover (18-20 mil)

Product Data Sheet

December 2011

A woven agricultural fabric, produced from polypropylene slit-film tapes, which will meet or exceed the following MARV's. This fabric has UV protection to 2500 hours in a Xenon Weatherometer.

Property	Test Method	English Units			SI Units		
		MARV			MARV		
		MD	CD		MD	CD	
Grab Tensile Strength	ASTM D-4632	170	85	lbs	757	378	N
Grab Tensile Elongation	ASTM D-4632	20	15	%	20	15	%
Trapezoid Tear	ASTM D-4533	75	60	lbs	334	267	N
Puncture	ASTM D-4833	95		lbs	423		N
Permittivity	ASTM D-4491	0.080		sec^{1}	0.080		sec^{-1}
Water Flow Rate	ASTM D-4491	6		$gal/min/ft^2$	244		$l/min/m^2$
A.O.S.	ASTM D-4751	30		U.S. Sieve	0.600		mm
UV Resistance (2500 hrs) *	ASTM D-4355	70		%	70		%

Preplant kill of nutsedge tubers

1. Weed cloth held loosely to soil surface
2. No soil, rocks or mulch on mat surface
2. Nutsedge grows rapidly and snags in weave
3. 2-3 months tubers exhausted and die
4. Irrigation with weed mat fabric important to maximize emergence and transfer heat deeper into soil

Pins to loosely secure fabric to soil = holes

Water filled hoses to eliminate holes in plastic

No rocks or soil on plastic shoots poke through

Unexpanded leaf tip easily pokes through tight film


Loose debris free woven mat snags shoot tips


Purple Nutsedge
Yellow Nutsedge
Expanded leaf tips snag in woven weed mat
Extra heat speeds up growth


Weeds proliferate in uncovered areas


Weeds proliferate in gaps of weed mat

Pins and nails poke holes in that reduces useful life of weed mat

Points of down pressure allow sedge leaf tips to poke through

Tropical Plant
University of Hawa

Maximizing flush of nutsedge tubers for more complete purging from the soil

- Prepare site for 3-4 months before planting
- Compost, nutrients, tilling and irrigation
- Cover with clear plastic for 2-3 weeks-full sun, good soil moisture needed for deep heating
- Remover clear and cover with black woven weed mat
- Secure without making holes, water filled hose
- Maintain good moisture levels under weed mat
- Allow multiple weed flushes, see mat rise and fall
- Remove weed mat, apply mulch layer
- Plant seeds or transplants, minimize open space

Aggressive plant competition to slow return of high nutsedge levels

1. **Nutsedge thrives when other plants are removed**
2. **Healthy fast growing crops provide canopy closure to exclude nutsedge**
3. **Heavy shade prevents nutsedge proliferation**

Large scale use of woven weed mat For Commercial scale vegetable production

1. Use long sheets of weed mat
2. Secure one side in trench
3. Flip sheet to kill weeds and cover crops
4. Hold mat down with water filled lay flat hose

Weed control in vegetable crops Has always been challenging

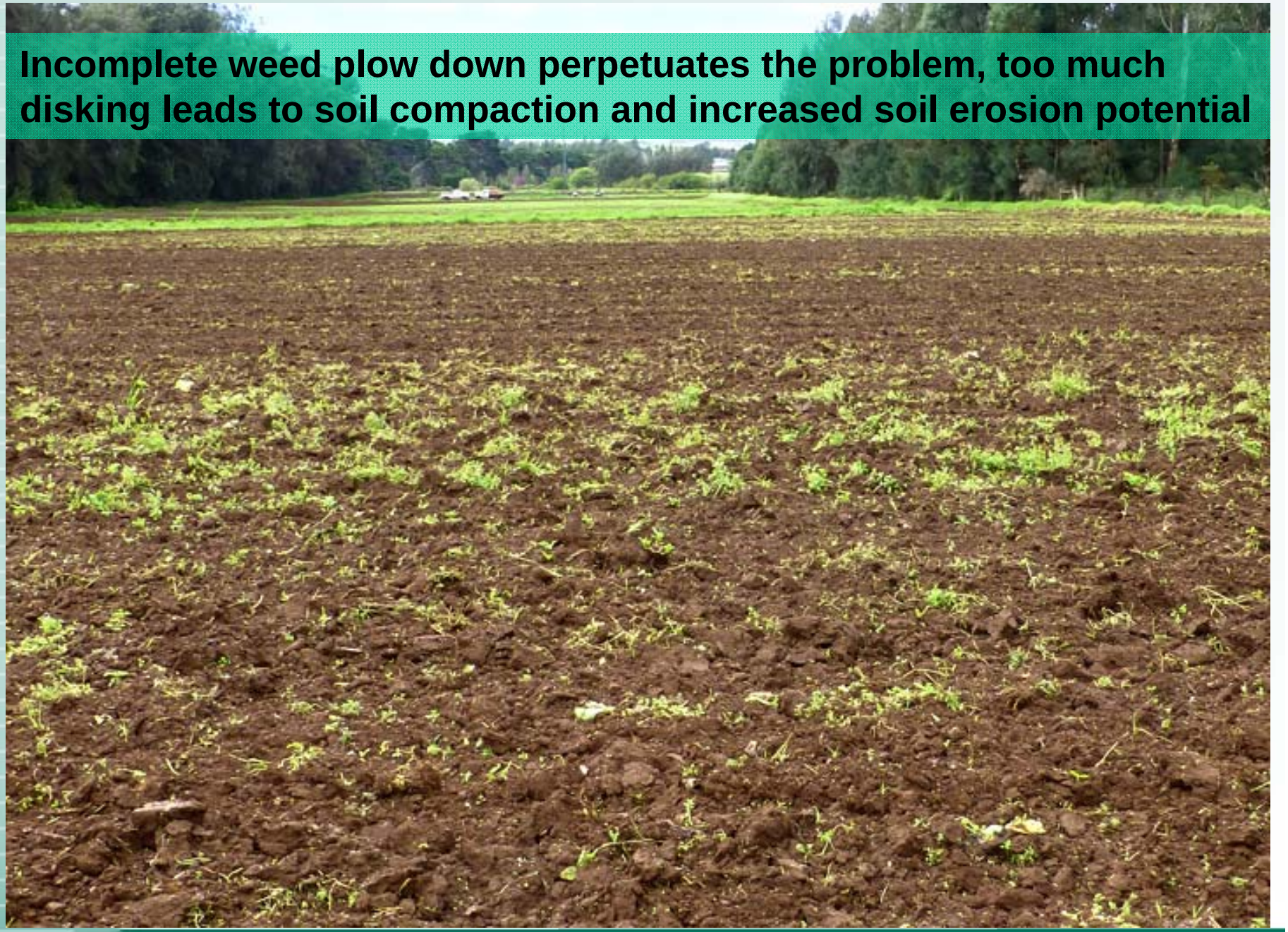
Herbicide choices are limited

Post harvest weed destruction requires plow down and disking during busy times

Cover crop b/w cash crop cycle
Requires site prep involving:

Weed plow down,
Seedbed preparation
Seeding and cover crop growth
Repeat all this to plow down the cover crop

Incomplete weed plow down perpetuates the problem, too much disking leads to soil compaction and increased soil erosion potential



An alternative approach to vegetable crop Site preparation

1. Requires a significant change in farming concepts

2. Requires the use of woven black plastic mulch on a commercial scale

3. Opportunity to develop hydro seeding for crop establishment

4. Allows for no-till planting of cover crops and cash crops

5. Allow for no-till destruction of post harvest crop residue and weeds

Referred to as "Turn the Page Farming"

Extending the wiggle wire beyond the clip base results in puncture holes

Mature weeds covered and killed
Plant tissue break down rapid


7-day
14-day
0-day
14 days of weed growth

Women work while men watch

Good weed kill w/ 1-week of cover

14 days of weed growth

14 days weed growth + 1-wk cover

3-wks weed growth

With small annual weeds or short term cover crops
1-2 weeks of cover provide weed free site preparation
Use hydro seeding or conventional transplanting w/minimal soil disturbance

Tropical Plant & Soil Sciences Department
University of Hawaii at Manoa

Tropical Plant & Soil Sciences Department
University of Hawaii at Manoa

Tropical Plant & Soil Sciences Department
University of Hawaii at Manoa

Weed mat remain in place until ready to plant

An alternative approach to vegetable crop Site preparation

1. Requires a significant change in farming concepts
2. Requires the use of woven black plastic mulch on a commercial scale
3. **Opportunity to develop hydro seeding for crop establishment**
4. Allows for no-till planting of cover crops and cash crops
5. Allows for no-till destruction of post harvest crop residue and weeds

Referred to as “Turn the Page Farming”

Hydro seeding has traditionally been used to seed road cuts or other hard to reach sites

Hydro seeding mix includes seeds, mulch (recycled paper + processed straw), tacifier, nutrients and growth stimulants.

Components:
Tank
Trash pump
Hoses
Manifold
Uses hydraulic Agitation from pump

Small 50 gallon hydro seeder = $2400.00

Seeds not suitable for incorporation into hydromulch mix, place on soil surface and cap with hydromulch to prevent bird damage and blowing w/wind.

What crops and or cover crops can be adapted to this form of seeding?

Precision seeding for banding crops over drip lines

Seeding width based on nozzle type

Tractor mounted for Longer rows

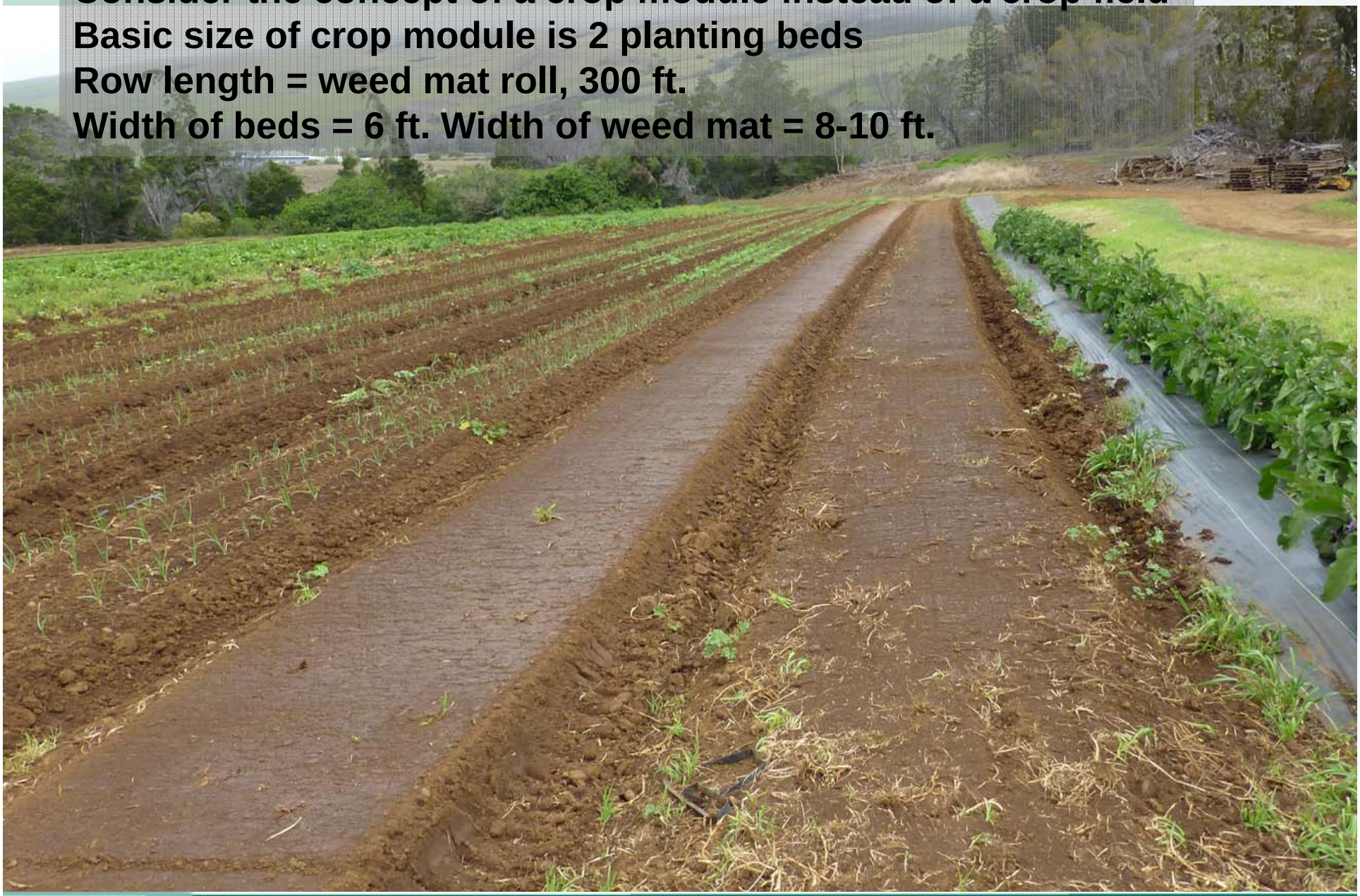
Consistent delivery of seed/mulch mix

An alternative approach to vegetable crop Site preparation

1. Requires a significant change in farming concepts
2. Requires the use of woven black plastic mulch on a commercial scale
3. Opportunity to develop hydro seeding for crop establishment
4. **Allows for no-till planting of cover crops and cash crops**
5. **Allow for no-till destruction of post harvest crop residue and weeds**

Referred to as “Turn the Page Farming”

Consider the concept of a crop module instead of a crop field
Basic size of crop module is 2 planting beds
Row length = weed mat roll, 300 ft.
Width of beds = 6 ft. Width of weed mat = 8-10 ft.



Weed mat left edge secured in trench, right side secured with water hose

Hydroseed seed cover crop or lets weeds grow on the left side.

Cover weeds/cover crop and reveal weed free side ready to plant.

Crop planted with transplants or using hydro seeding, avoid soil disturbance, sub-soil has weed seeds!

Post harvest weeds and crop residues are covered as preparation for next crop

Clean bed ready for a new cash or cover crop

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

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

High mulch levels provided by sweet corn stalks helps with weed control in leaf vegetable crops

Low mulch levels in old zucchini area allows more weeds in next crop

Research can identify cover crops that enhance pest control, add nitrogen or provide persistent mulch for the following cash crop

Pre-made cover crop mixes can provide commercial growers with a multi-objective mulch for notill planting post weed mat removal

Coll
Univ

Cover crops can be mowed, covered to kill understory weeds and then cash crop planted into nutrient rich organic mulch.

R. Hamasaki-2015

Cover crop: This is a commercial mix containing 15% oats, 30% bell beans, 20% purple/hairy vetch mix, and 35% Magnus peas.

Production of Native Hawaiian Plant Seeds & Installation of Native Dry-Land Plants On Hawaii's Roadside areas

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

Statutory justification for the use of native vegetation as roadside vegetation.

The Clean Water Act - cannot discharge polluted runoff to "Waters of the United States"

- Section 402(a) of the CWA provides for a system of permitting known as the
- National Pollution Discharge Elimination System.

- Authorized states may issue permits that allow the discharge of any pollutant directly into navigable waters of the U.S

- The term pollutant includes: solid waste, sewage, garbage, rock, and industrial, municipal, and agricultural waste.

- HI DOH has been authorized by the EPA to administer the NPDES program for the state of Hawaii pursuant to Section 402(b) of the CWA

The NPDES permits issued to HDOT require the composition and enforcement of a Storm Water Management Plan

Oahu Storm Water Management Program Plan

State of Hawaii Department of Transportation
Highways Division

PROTECT OUR WATER
MĀLAMA I KA WAI
March 2007

SWMP has BMP's for
chemical application to roadways

CHAPTER 9 Pollution Prevention and Good Housekeeping 9-1
9.1 Debris Control BMP Program 9-1
9.1.1 Street Sweeping and Storm Drain Cleaning 9-1
9.1.1.1 Street Sweeping 9-2
9.1.1.2 Storm Drain Cleaning 9-9
9.1.2 Management System 9-11
9.1.3 Informational Placards 9-11
9.1.4 Training 9-13
9.1.5 Organizational Structure 9-14
9.2 Chemical Applications BMP Program 9-16
9.2.1 Application of Chemicals 9-16
9.2.2 Training 9-16
9.2.3 Non-Chemical Solutions 9-18
9.2.4 Organizational Structure 9-18

Native vegetation as roadside ground covers
= compliance to SWMP

9.2.3 Non-Chemical Solutions

In order to develop sustainable and durable landscapes with an Hawaiian sense of place, HDOT Highways is developing a Statewide Sustainable Landscape Master Plan, which is scheduled to be completed by the end of 2009. The objective of the plan is to develop a list of plants that can be used in highway landscaped areas that have a lifespan of 15-plus years, are durable, and where their natural form is preferred. These plants would require little or no maintenance (e.g., little or no application of fertilizers and herbicides), no irrigation, are cost effective, and reflect Hawaii's sense of place. Native species meeting these criteria will be prioritized in the list, which will be categorized by annual rainfall and typical locations. Once completed, the plan will be distributed to HWY-OM and HDOT Highways design managers, and be made available to landscape architects working on HDOT Highways projects.

DOT-Funded Projects 2013-2016

Project Objectives

1. Develop establishment and maintenance protocol for plantings of Native HI plants on roadside areas.
2. Describe seed harvest index and seed cleaning protocols for 4 grass and 5 broadleaf species.
3. Install 8,000 ft^2 plantings of 5 broadleaf native HI plants for roadside seed producing at Halawa.
4. Install roadside demonstration planting to simulate native dry land ecosystem on roadside area

Install roadside demonstration plantings to simulate native dry land ecosystem on roadside areas. - Molokai Land Trust Exclusion Area

Recommendations for all DOT contracts
For large scale establishment on roadways

1. Protocol for dryland ecosystem installation starts with weed eradication period, then 4 phase approach
2. **Phase 1**: drop seed on drip line and cap
3. **Phase 2:** fertilize and mow develops plant structure for seed production
4. **Phase 3:** seed laden mulch to populate between row space
5. **Phase 4:** Into clean stand of Pili grass, plant native broadleaf plants into heavy mulch.

Irrigation to grow weeds and then apply herbicides for kill of perennials, 6-9 months

Weed free site ready for foundation species = Pili grass

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

Phase 1: drop seed on drip line and cap

Phase 1: drop seed on drip line and cap

1/2 lbs./100 linear ft – at least 2 live seed per linear foot

Phase 1: drop seed on drip line and cap

Phase 1: drop seed on drip line and cap – Pili grass seedling 2-wks

Phase 1: drop seed on drip line and cap

Use hydro mulch applicator to apply pre-herbicide to between row space
Apply Ronstar 50 WP 2.5 lbs./a

Phase 1: drop seed on drip line and cap

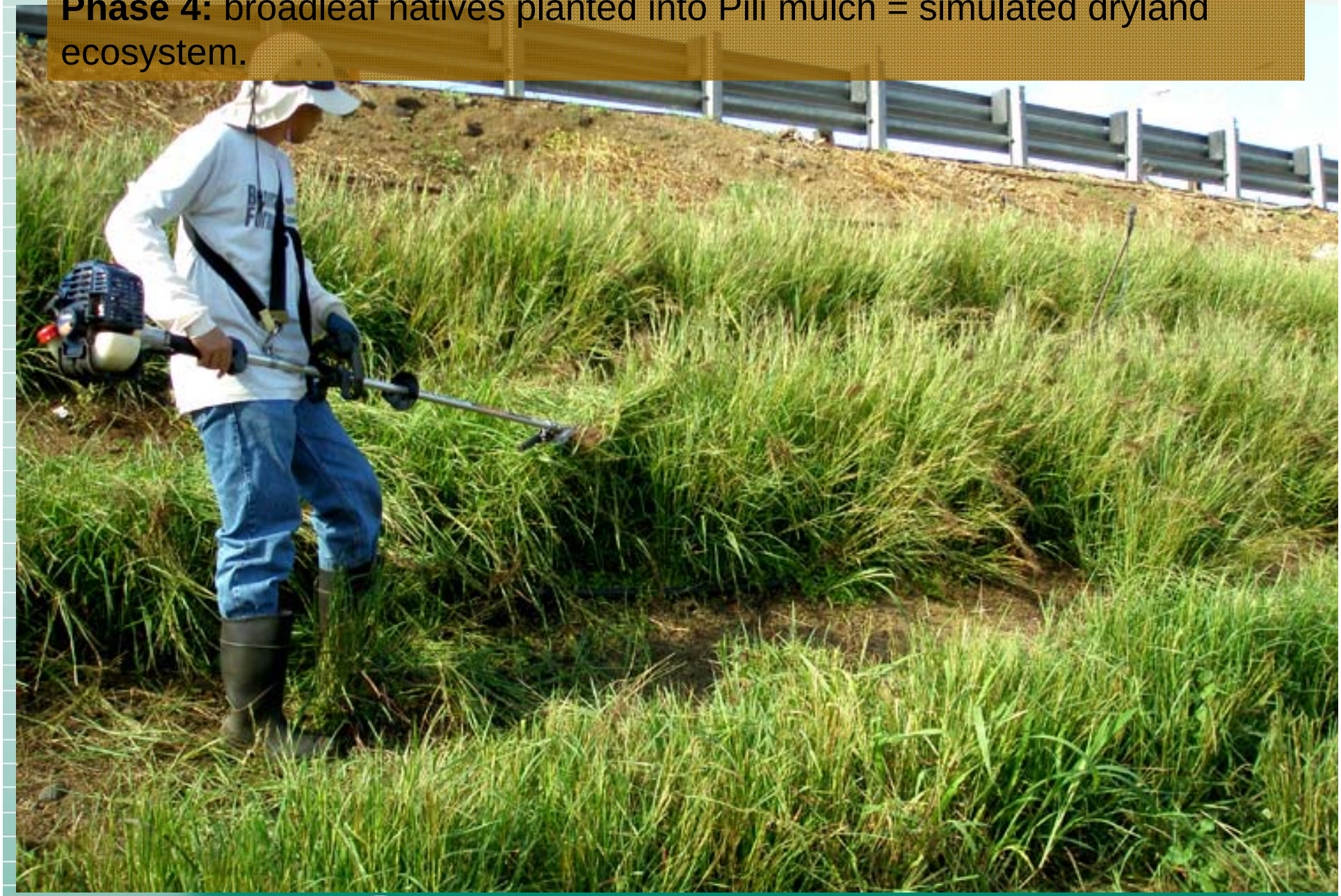
Phase 1: drop seed on drip line and cap
Broadleaf weeds removed with selective herbicides

Phase 2: fertilize and mow grass. Adds mulch and conditions plants for heavy seed production.

Phase 3: seed laden mulch to populate between row space.

Phase 4: broadleaf natives planted into Pili mulch = simulated dryland ecosystem.

Phase 4: broadleaf natives planted into Pili mulch = simulated dryland ecosystem.



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

For more information

Dr. Joe DeFrank
Email: defrenk@hawaii.edu
Ph: 808.956.5698

HI Weed ID:
http://www.ctahr.hawaii.edu/deFrankJ/index.htm