Kauai Master Gardener Weed 2017

Joe DeFrank
UH-Manoa
Tropical Plant and Soil Science

Topics Covered

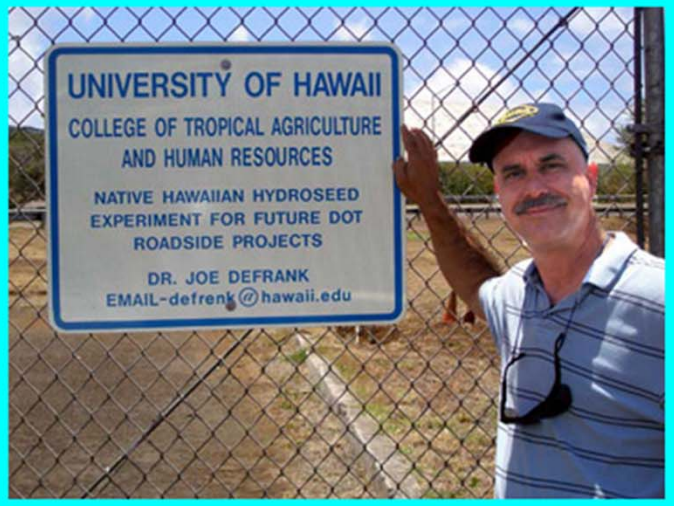
1. Web based resources for weed ID and control recommendations.
2. Nutsedge management options.
3. Turn the page farming-weed control possibility for organic crop production.
4. Sprayer calibration for home owner lawn weed control.

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

TPSS 365 Horticultural Practices with Dr. Joe DeFrank discussing air layering tropical ornamental hardwood trees on 10/23/15. (posted 10/26/15)

PEPS/TPSS 418 Turfgrass Pests and Management, Dr. DeFrank's lecture: Applied Weed Control Technology: Tropical turf grass management research to develop improved control of grassy weeds in Bermuda sport turf on 10/19/2015. (posted 10/20/15).

Turn the Page Farming, a non-chemical method of weed control for organic farmers. Laboratory lecture presented to students of the Weed Science class (TPSS/PEPS 481) ON 09/02/2015. (posted 10/11/15).

Weed Control in Tropical Turf and Roadside Landscapes Planted to Native Hawaiian Plants. Seminar presented at the 15th Annual Crop Protection Services Seminar and Tradeshow on May 15, 2015 (posted 05/18/15).

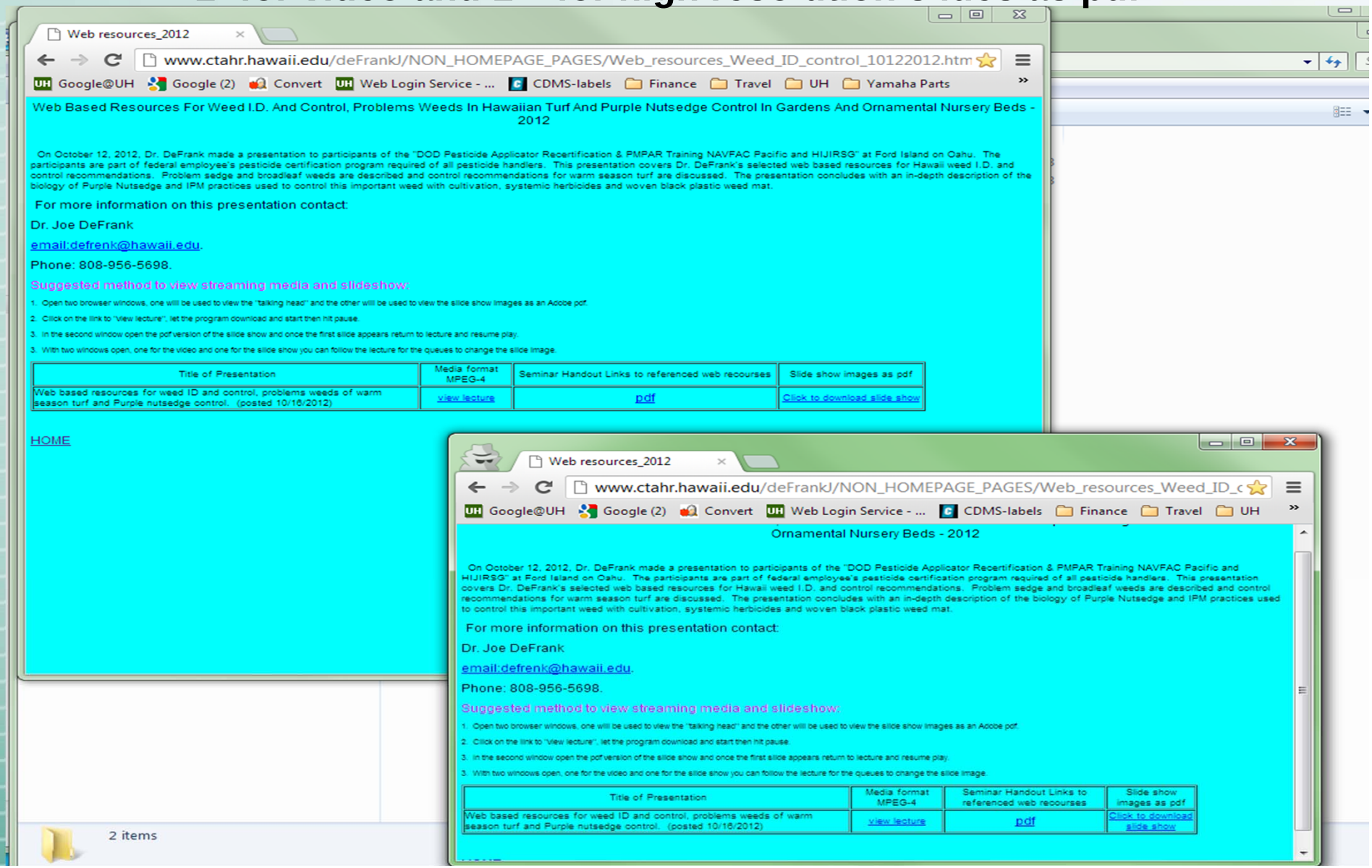
Master Gardening Training, Oahu: Weed Science-2015 (posted 03/30/15).

Weed Control in Tropical Cropping Systems. Departmental seminar in Tropical Plant and Soil Science. (posted 03/23/15).

Time of Year Considerations for Grassy Weed Control in Warm Season Turf. Seminar presented at the Pacific Agriculture Sales and Service Trade Show. (posted 02/03/15).

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.
Dr. DeFrank's selected list of web based resources as Word document

Web Based Resources for Weed Control Information. *(all links checked on good on 04/12/17)*

Prepared by Dr. Joe DeFrank, Weed Science, TPSS- UH Manoa.
Email: defrenk@hawaii.edu, phone: 808-956-5698.

1. **On-line version of "Handbook of Hawaiian Weeds URL:** http://www.flickr.com/photos/uhmuseum/sets/72157616041949833/. Line drawings and ID descriptions for common weeds in Hawaii.
2. **Weeds of Hawaii's Pastures and Natural Areas. URL:** http://www.ctahr.hawaii.edu/invweed/weedsHi.html. Good quick ID guide for weedy trees, shrubs and vines in with control measure provided.
3. **Plants of Hawaii. URL:** http://www.starrenvironmental.com/images/?o=plants A site for identifying many common plants found in Hawaii. This site contains 8000+ copyright free high resolution images of both native and non-native plants.
4. **Hawaii Plant ID. URL:** http://www.flickr.com/groups/hawaiiplantid/. Allows for free membership and submission of photos to ID plants.
5. **Hawaii Insect ID**. URL: http://www.flickr.com/groups/hawaii-insect-id/ Allows for free membership and submission of photos for insect ID.
6. **The National List of allowed and prohibited substances**. URL: https://www.ams.usda.gov/rules-regulations/organic/national-list . Identifies the synthetic substances that may be used and the nonsynthetic (natural) substances that may not be used in organic crop and livestock production. It also identifies a limited number of non-organic substances that may be used in or on processed organic products. Related to the National list is the "Petitioned Substances" list. URL: https://www.ams.usda.gov/rules-regulations/organic/national-list/e . This links provides the latest substances that have been submitted data to be added to the national list.
7. **Greenbook**. URL: http://www.greenbook.net/. Excellent free site for searching for pest control chemicals in specific sites. After completing user profile, allows for complex searches of pesticides based on crops and pests. Has section on organic production products. Many produce labels and MSDS available here .

Use the Word document to find sites listed on the handout.

All links good on 04/12/2017

Web resources for weed control.
On-line Handbook of Hawaiian Weeds
http://www.flickr.com/photos/uhmuseum/sets/72157616041949833/

Web resources for weed control.

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

University of Hawaii Muse... + Follow

Ipomoea obscura

MORNING-GLORY

Description:
A twining plant. Leaves ovate to heart-shaped, sharp pointed, entire, nearly smooth, 1 to 4 inches long. Flowers bell-shaped, about 1 inch long, on long stalks; sepals ovate; corolla yellow or cream with yellow bands, and with a purple base. Seeds velvety (1 1, 15).

Propagation:
By seed.

Habitat:
A weed in wastelands.

History:
Native to southern Asia and Mascarene Islands.

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].

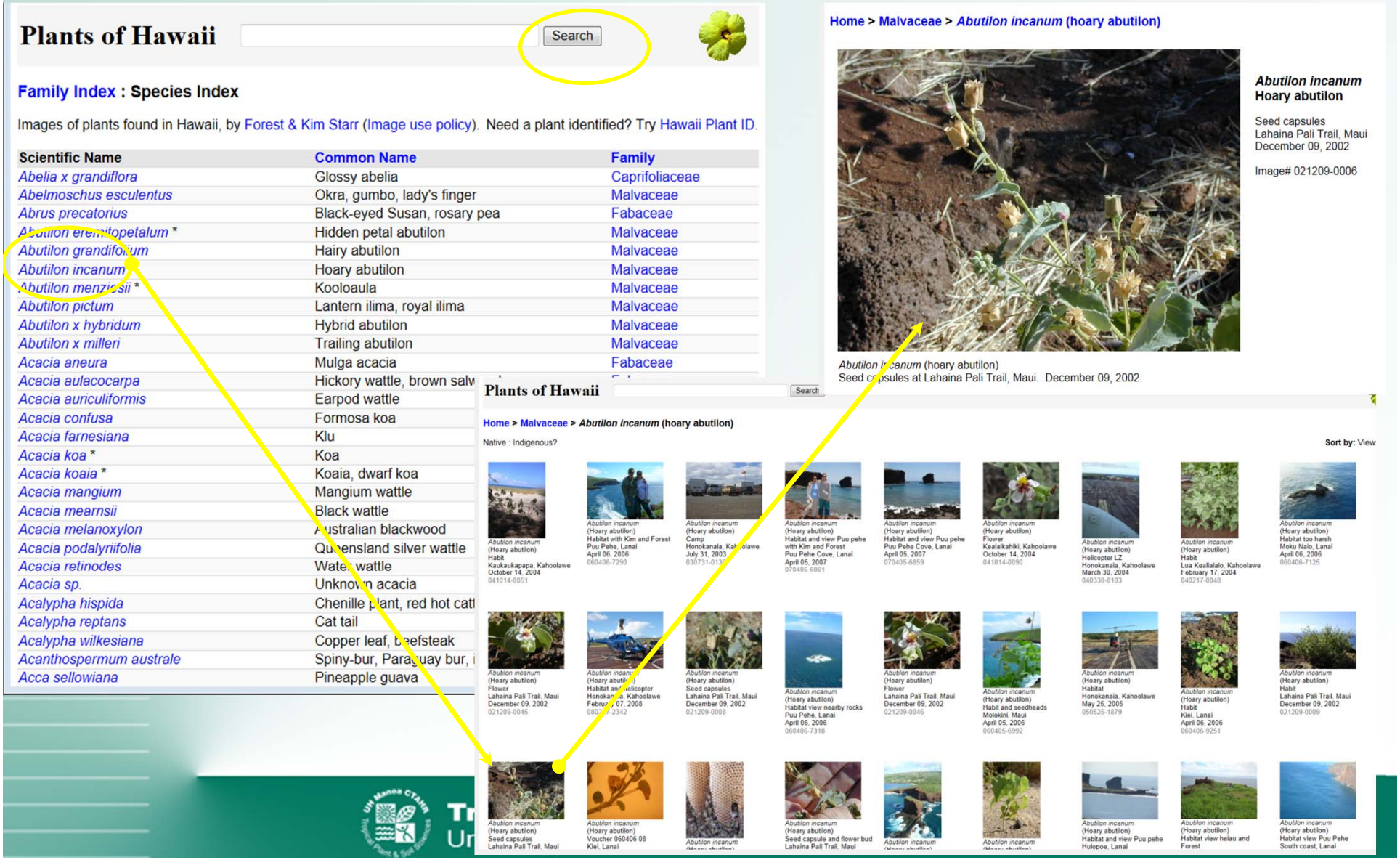
Environmental impact: Invades disturbed areas of forests.

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



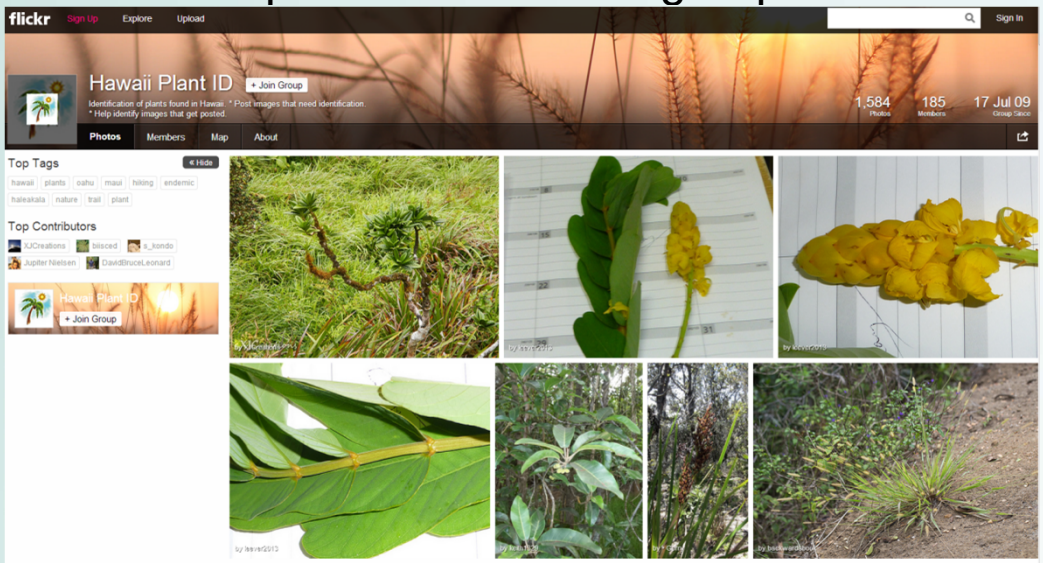
Web resources for weed control.

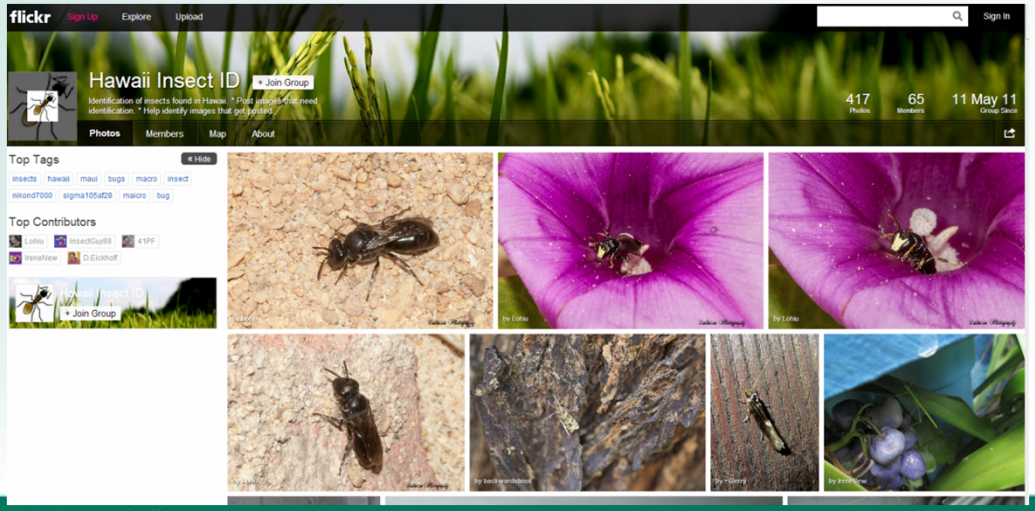
Hawaii Plant & Insect ID, join and submit photos, explore gallery

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 Requires a Yahoo account





Web resources for weed control.

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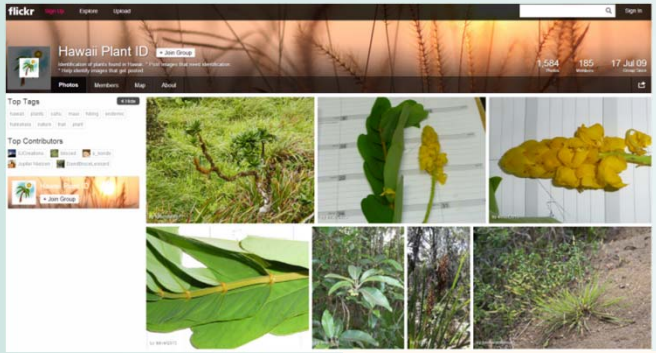
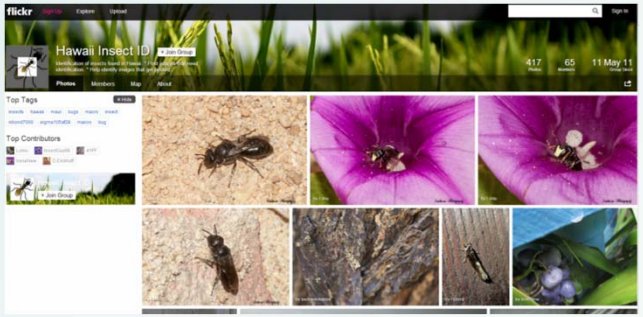
Plant ID =**http://www.flickr.com/groups/hawaiiplantid/**

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





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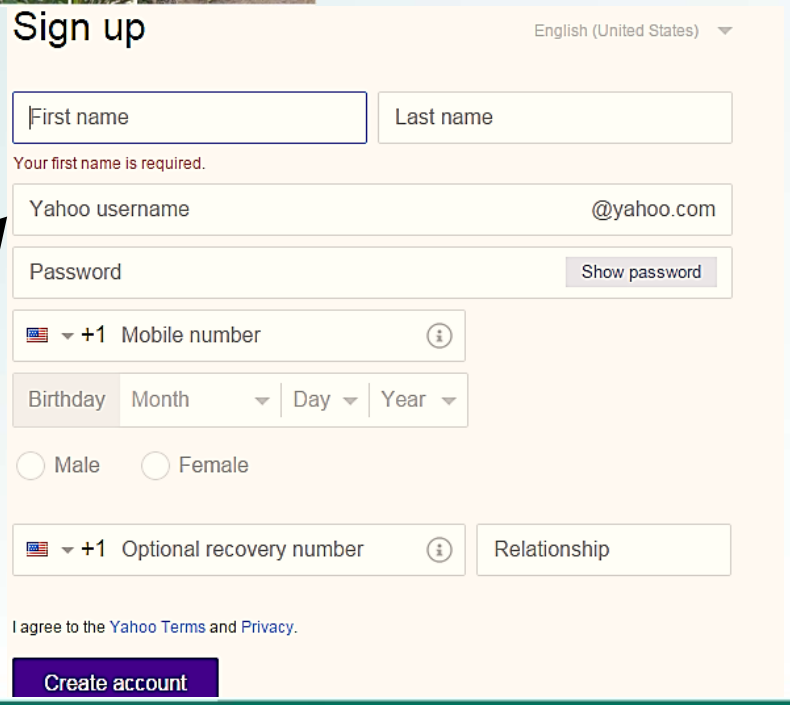
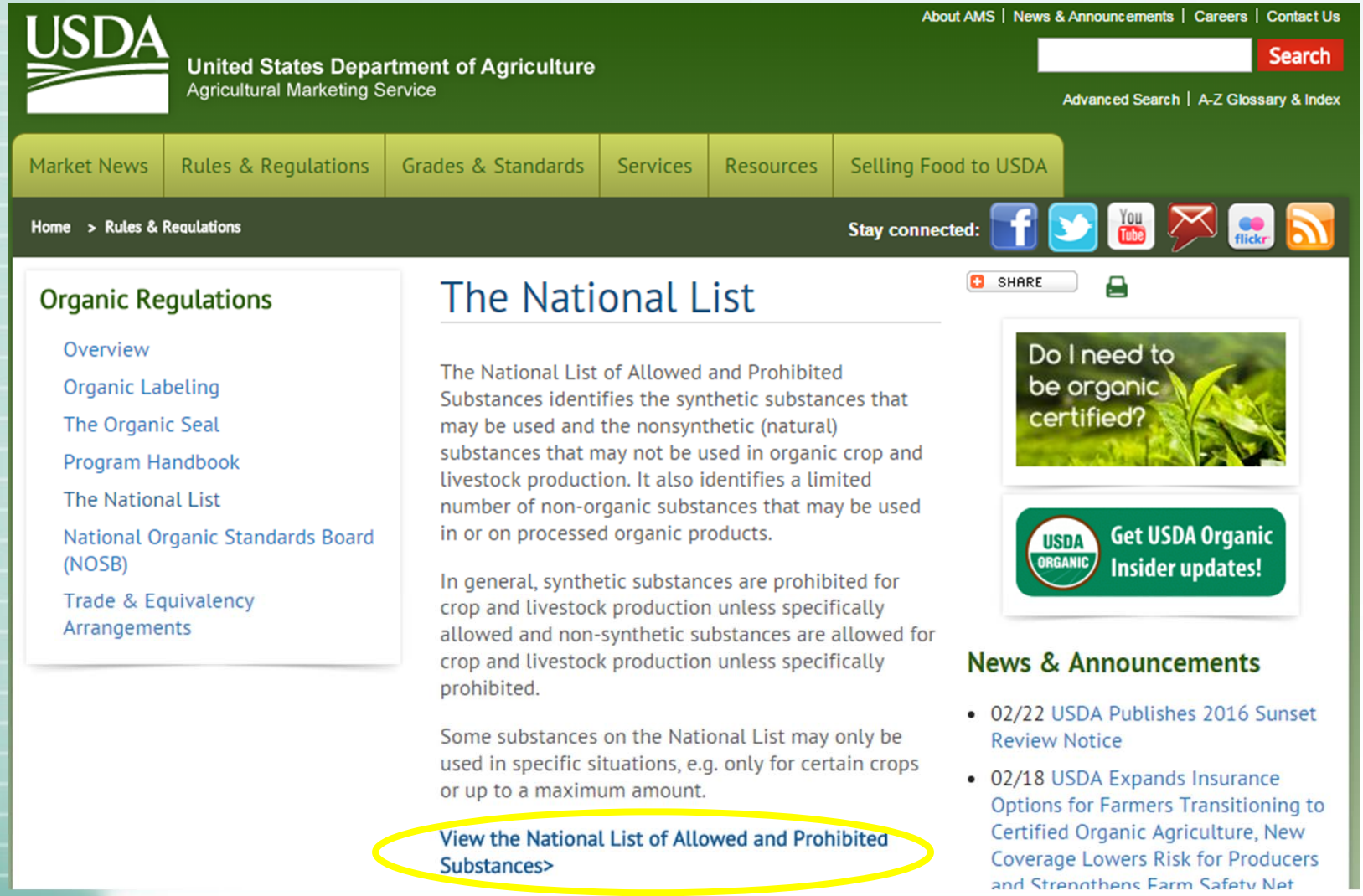


Web resources for organic crop weed control.

National List, substances for organic crop production:
https://www.ams.usda.gov/rules-regulations/organic/national-list



Web resources for organic crop weed control.

National List, substances for organic crop production:
https://www.ams.usda.gov/rules-regulations/organic/national-list

Sodium Carbonate Peroxyhydrate (PDF)

- Date Petition Received: 12/20/05
- Petition Area and Use: Crop: Add to 205.601 as algicide
- Technical Evaluation Report (2014) (PDF)
- Technical Advisory Panel Report (2006) (PDF)
- NOSB Meeting Petition Review: November-07
- NOSB Formal Recommendation (PDF)
- NOSB Committee Recommendation (PDF)
- Status: Added to the National List, section 205.601 (a), with annotation; 75 FR 77521

Web resources for organic crop weed control.

National List, substances for organic crop production:
https://www.ams.usda.gov/rules-regulations/organic/national-list

Sodium carbonate peroxyhydrate – algae control –wetland taro

GreenCleanPRO

BROAD SPECTRUM ALGAECIDE/FUNGICIDE • OXIDIZER
Treats, Controls, and Prevents Algae Growth

AGRICULTURAL AND HORTICULTURAL USES:
Agricultural Commodities and Crops, Field Grown Crops, Tree Crops, Crops Grown in Commercial Greenhouses and Plastic Houses

FOR ALGAE CONTROL IN RICE/WILD RICE FIELDS AND PADDIES:
After the field has been flooded to a depth of 4-6 inches, apply 10-25 lbs. of GreenCleanPRO per acre as a broadcast or aerial spread by plane or other professional device at the first signs of algae. Applications are most effective when made before algae rises to the water surface. Reapply as needed in accordance with General Treatment Notes.

Web resources for organic crop weed control.

National List, substances for organic crop production:
https://www.ams.usda.gov/rules-regulations/organic/national-list

Sodium carbonate peroxyhydrate – algae control –wetland taro

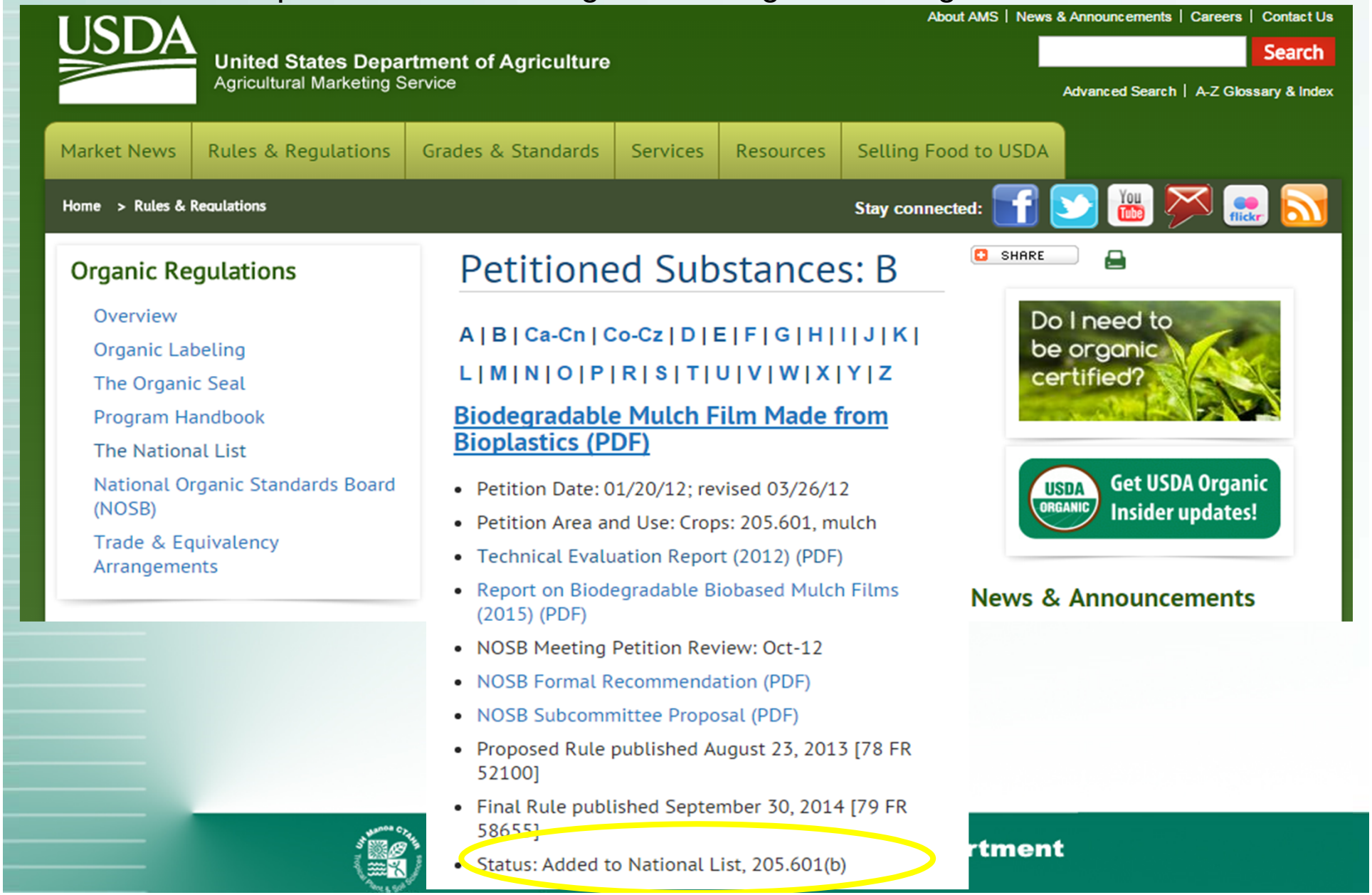
Soap based herbicides – farmstead maintenance and ornm. crops
Mulches

- **News paper, recycled paper, non-glossy or colored inks**
- **Plastic other than polyvinyl chloride (PVC), polypropylene-OK**
- **Biodegradable bio based mulch films, restrictions on materials**
  1. **PLA: made from plant starch, corn or wheat**
  2. **AAC: joining lactic acid produced by bacterial fermentation of sugars and starches.**
  3. **PHA: a polymer derived from fermentation of sugars and fats.**

Web resources for organic crop weed control.

Petitioned Substances, substances for addition to National List.

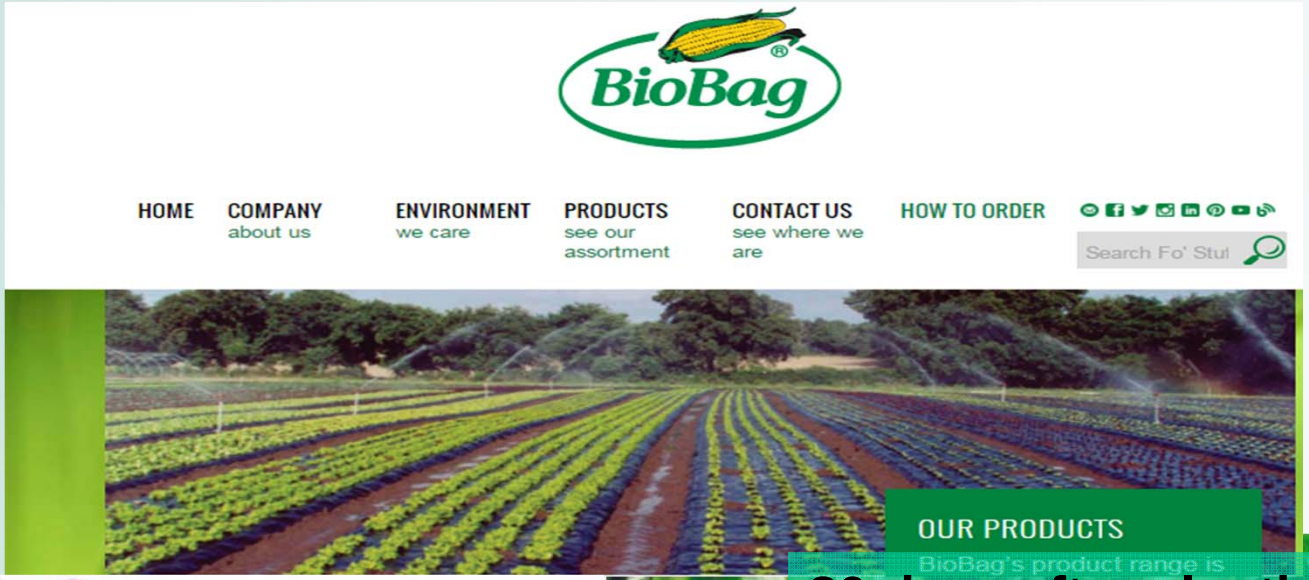
URL: https://www.ams.usda.gov/rules-regulations/organic/national-list/b



Web resources for organic crop weed control.

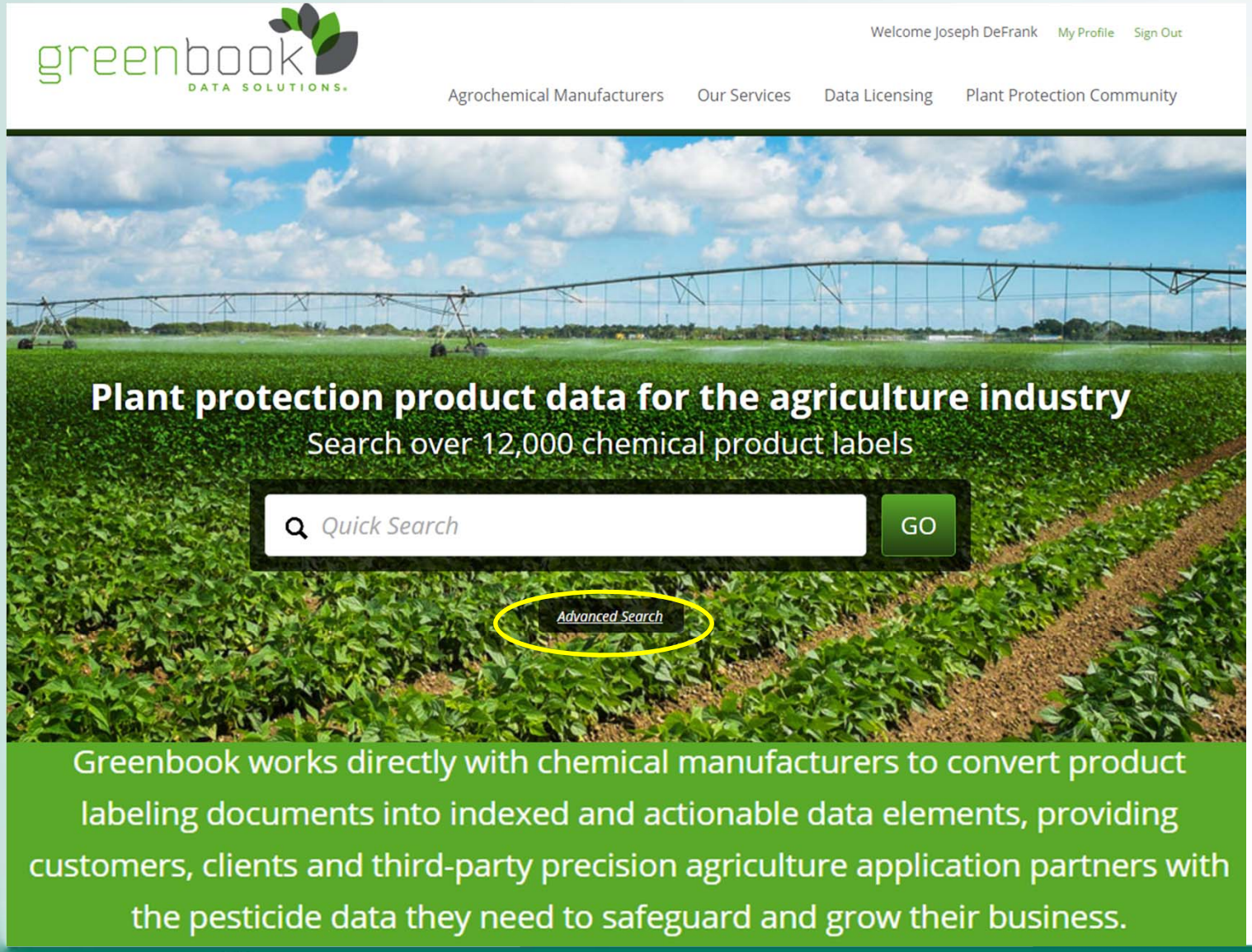
Biodegradable plastic mulch for organic weed control

URL: http://biobagusa.com/products/agricultural-film/



Web resources for Ag-crops weed control.

Greenbook.com search for labels and related info (http://www.greenbook.net/)



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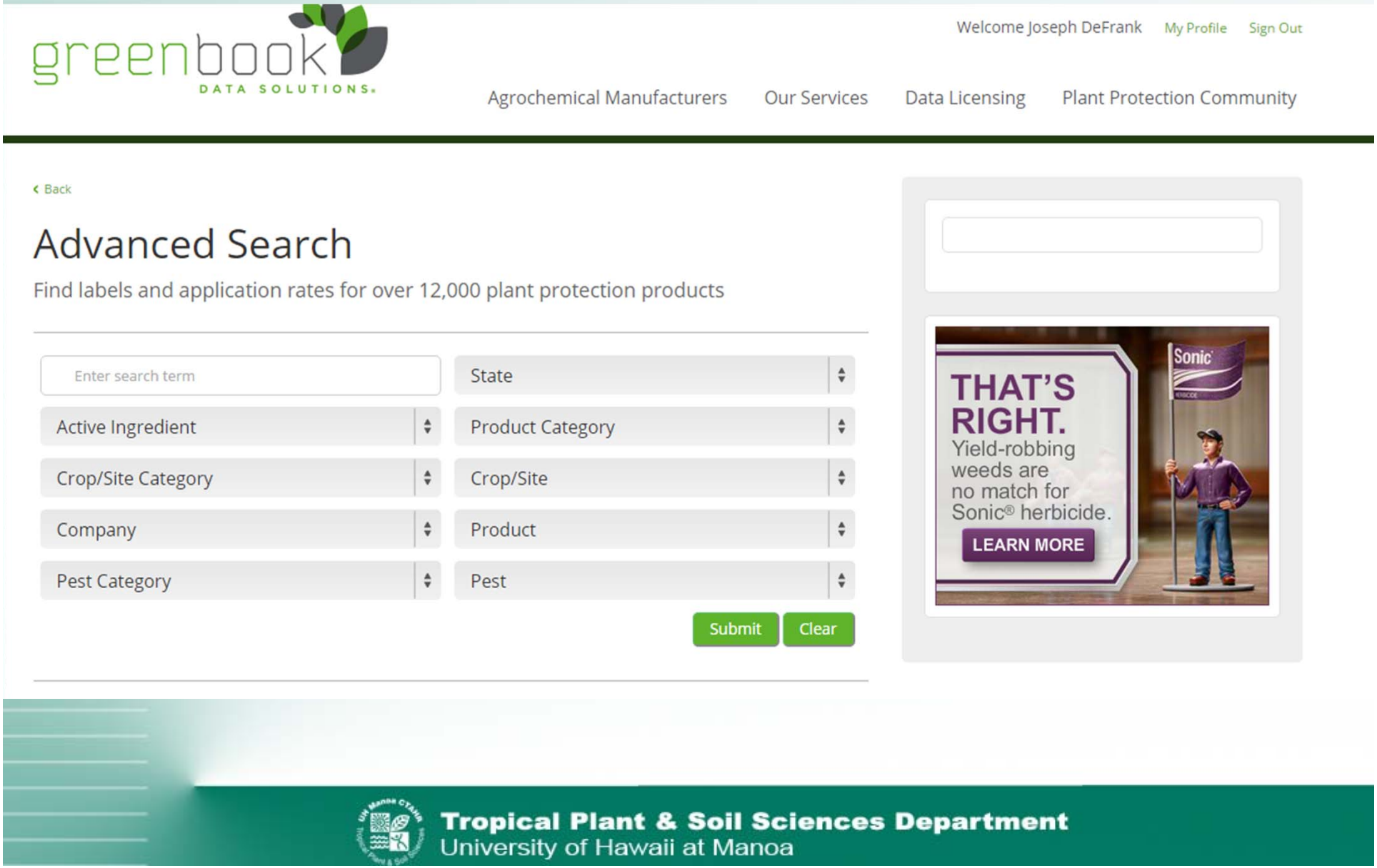

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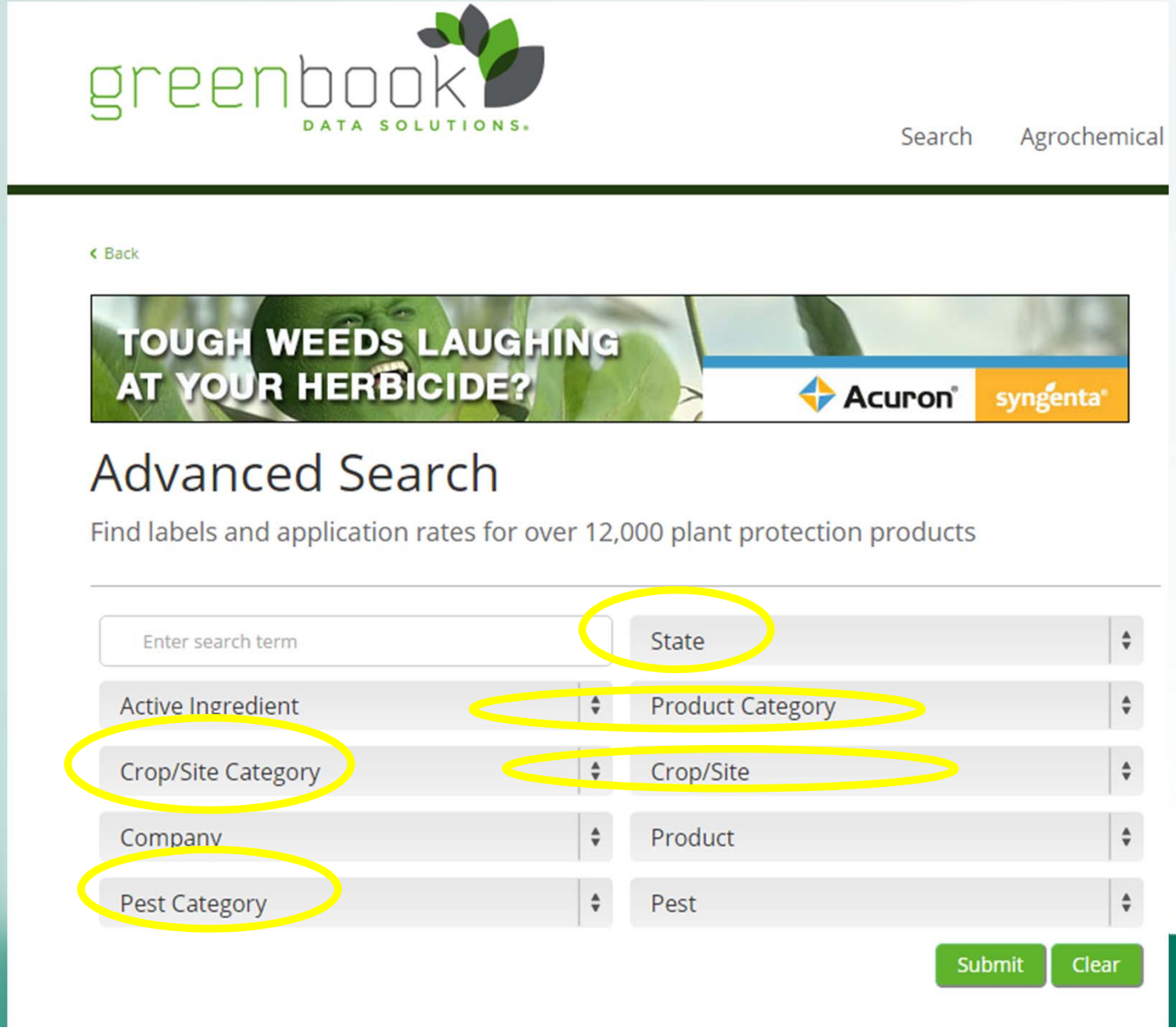

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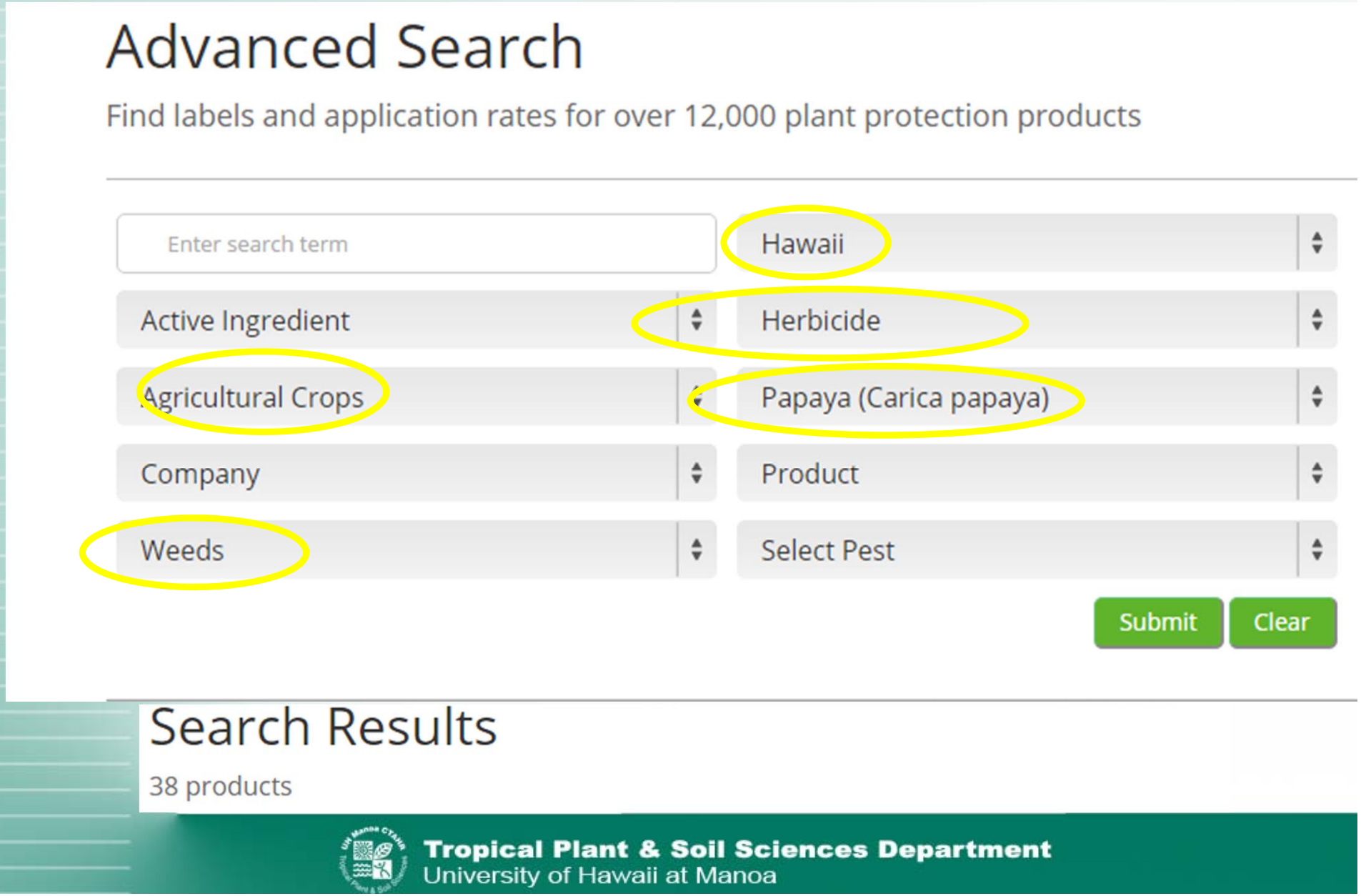


Web resources for landscape weed control.

Greenbook.com for herbicide labels and safety info (http://www.greenbook.net/)

Crop/Site = Papaya

Aim EC

FMC Corporation

Active Ingredients: Carfentrazone-ethyl

Goal 2XL

Dow AgroSciences

Active Ingredients: Oxyfluorfen

GoalTender

Dow AgroSciences

Active Ingredients: |

Roundup WeatherMAX

Monsanto Company

Active Ingredients: Glyphosate Potassium Salt

Classification: Group G Herbicide

Chateau

Valent

Active ingredient: Flumioxazin

Diuron 4 L

Makhteshim Agan of North America, Inc.

Active Ingredients: Diuron

Scythe

Gowan Company

Active Ingredients: Pelargonic Acid

http://npirspublic.ceris.purdue.edu/state/state_menu.aspx?state=HI

NPIRS – Pesticides registered in HI.

NPIRS National Pesticide Information Retrieval System

About Us Outre

SEARCH HAWAII STATE PESTICIDE PRODUCTS

Search for pesticide products currently registered in a state using *one* of the following methods: EPA Registration Number, State Product Name, State Company Name or Active Ingredient. Only a single keyword ie., lemongrass or keyword set ie., lemon oil, may be used as your search criterion.

EPA REGISTRATION NUMBER

Search by the two-part EPA registration number using the following format: company number-product number.

PRODUCT NAME

Search by the full or partial name of a product registered in a state.

Chateau

COMPANY NAME

Search by the full or partial name of a company registering products in a state.

ACTIVE INGREDIENT

Search by the PC code, Chemical Abstract Services Number (CAS) or the full or partial chemical name.

Search Hawaii Pesticide Data

Learn more about these STATE search options and other available product information.

NPIRS National Pesticide Information Retrieval System

About Us Outr

HAWAII STATE PRODUCT REPORT

Product Name Keyword: chateau
Number of Currently Registered Products: 1

EPA View the label in the US EPA Pesticide Product Label System (PPLS).

ALSTAR View the label in the Accepted Labels State Tracking and Repository (ALSTAR).

CHATEAU HERBICIDE SW
EPA Registration Number: 59639-99 HI Product Number: 9556.108

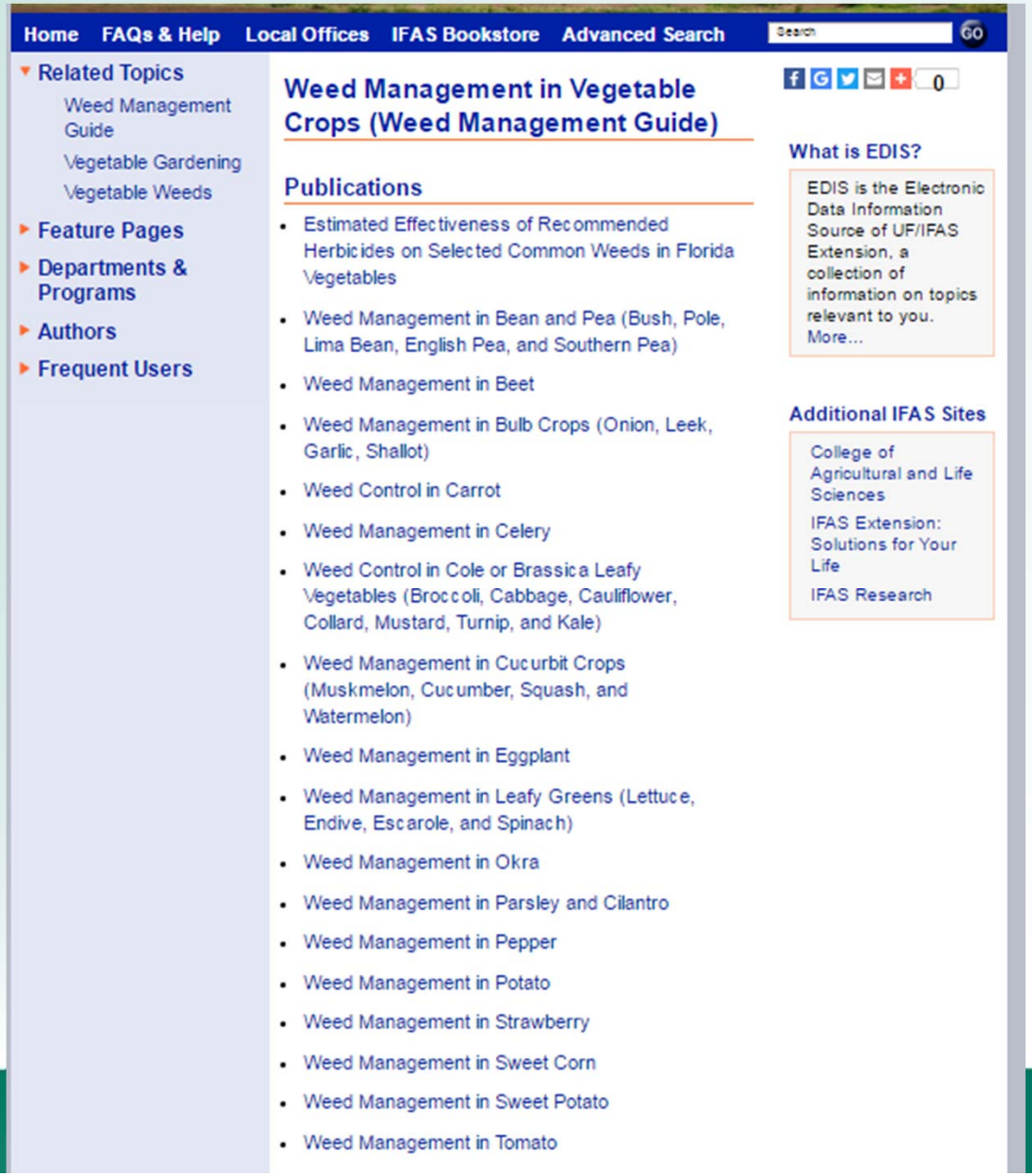
Company Number: 9556
VALENT U.S.A. CORPORATION
P.O. BOX 8025,
WALNUT CREEK CA 94596-8025

Registration Year: 2016

Percent	Active Ingredient
51.0000	Flumioxazin (129034)

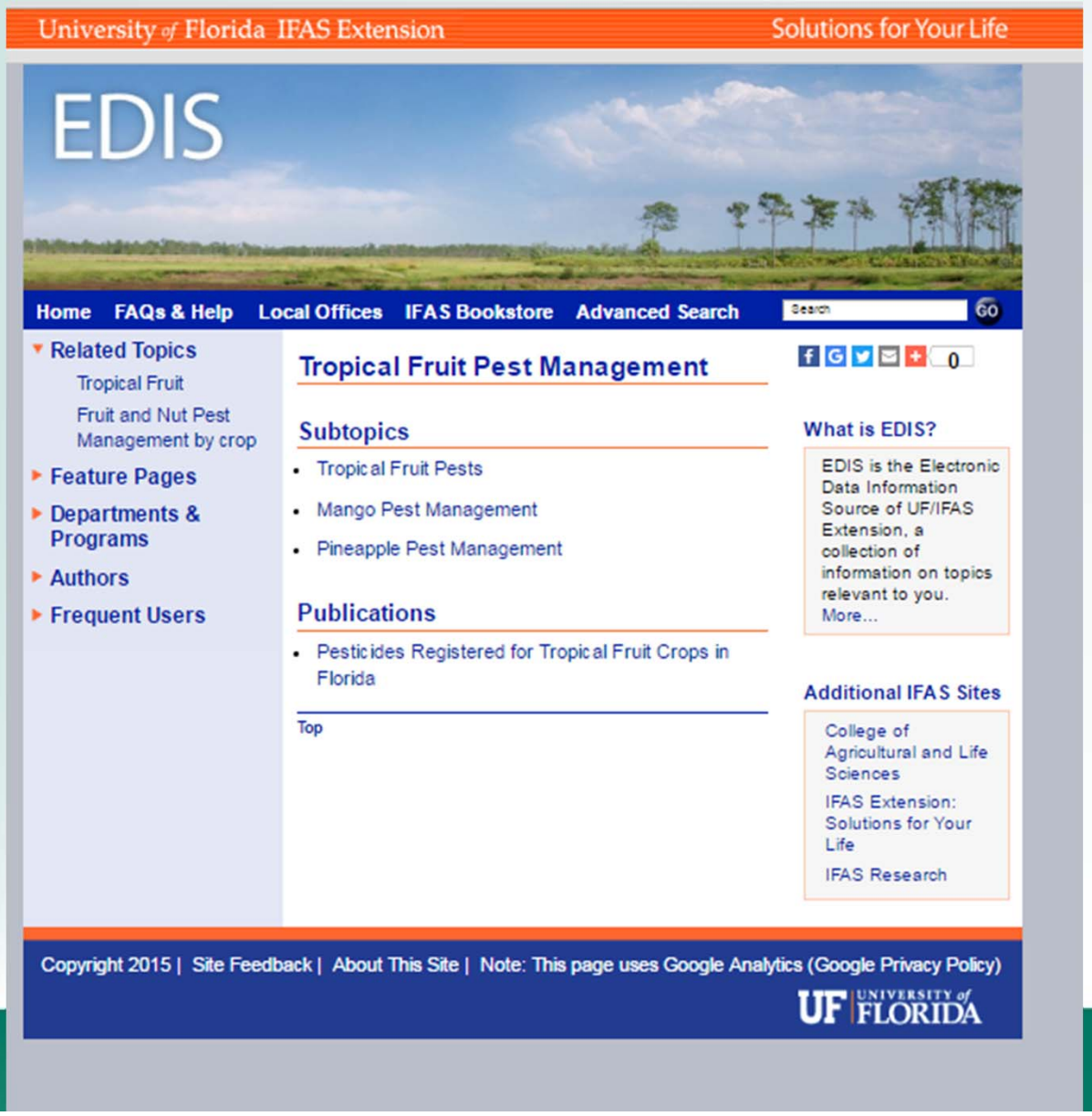
Weed Management in Vegetable Crops (Weed Management Guide)

http://edis.ifas.ufl.edu/topic_guide_wg_weed_management_in_vegetable_crops



Tropical Fruit Pest Management

http://edis.ifas.ufl.edu/topic_tropical_fruit_ipm



Web resources for Ag-crops weed control.

2016 North Carolina Ag. Chemical Manual
URL: https://content.ces.ncsu.edu/north-carolina-agricultural-chemicals-manual

Table of Contents **MANY CROP PRODUCTION TOPICS ARE LISTED**

Web resources for Ag-crops weed control.

2017

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

Chapter VII — 2016 N.C Agricultural Chemicals Manual

Table 7-16. Chemical Weed Control in Vegetable Crops

Weed	Herbicide, Mode of Action Code* and Formulation	Amount of Formulation Per Acre	Pounds Active Ingredient Per Acre	Precautions and Remarks
Greens (Collard, kale, mustard, and turnip greens or roots), Preplant				
Emerged broadleaf and grass weeds	pelargonic, (Scythe) 4.2 EC	3 to 10% v/v		Apply as preplant burndown rged weeds. See lable for instruction. May also be used as a banded spray between row middles. Use a shielded sprayer directed to the row middles to reduce drift to the crop.
Contact kill of all green foliage, stale bed application	paraquat, MOA 22 (Firestorm, Parazone) 3 SL (Gramoxone SL) 2 SL	1.3 to 2.7 pt 2 to 4 pt	0.5 to 1	**Collard and turnip only.** Apply in a minimum of 10 gallons spray mix per acre to emerged weeds before crop emergence or transplanting as a broadcast or band treatment over a preformed row. Use sufficient water to give thorough coverage. Row should be formed several days ahead of planting and treating to allow maximum weed emergence. Use a nonionic surfactant at a rate of 16 to 32 ounces per 100 gallons spray mix or 1 gallon approved crop oil concentrate per 100 gallons spray mix.
Annual and perennial grass and broadleaf weeds, stale bed application	glyphosate, MOA 9 (numerous brands and formulations)	See labels	See labels	Apply to emerged weeds before crop emergence. Do not feed crop residue to livestock for 8 weeks following treatment. Perennial weeds may require higher rates of glyphosate. Consult the manufacturer's label for rates for specific weeds. Certain glyphosate formulations require the addition of surfactant. Adding nonionic surfactant to glyphosate formulated with nonionic surfactant may result in reduced weed control.
Annual grasses and small-seeded broadleaf weeds	trifluralin, MOA 3 (Treflan) 4 EC	1 to 1.5 pt	0.5 to 0.75	Do not use on turnip greens for fresh market. Apply preplant and incorporate into the soil 2 to 3 inches within 8 hr using a rototiller or tandem disk. Do not use if turnip roots are to be consumed.
	bensulide, MOA 8 (Prefar) 4 EC	5 to 6 qt	5 to 6	Also labeled for rape greens. Not labeled for turnip. Apply preplant or preemergence after planting. With preemergence application, irrigate immediately after application. See label for more directions.
	DCPA, MOA 3 (Dacthal) W-75 (Dacthal) 6 F	6 to 10 lb 6 to 10 pt	4.5 to 7.5	Also labeled for broccoli raab (raab, raab salad), mizuna, and hanover salad. Apply immediately after seeding. May also be incorporated.
Greens, Postemergence				

Table 7-16. Chemical Weed Control in Vegetable Crops

Weed	Herbicide, Mode of Action Code* and Formulation	Amount of Formulation Per Acre	Pounds Active Ingredient Per Acre	Precautions and Remarks
Greens (Collard, kale, mustard, and turnip greens or roots), Preplant				
Annual grasses and small-seeded broadleaf weeds	trifluralin, MOA 3 (Treflan) 4 EC	1 to 1.5 pt	0.5 to 0.75	Do not use on turnip greens for fresh market. Apply preplant and incorporate into the soil 2 to 3 inches within 8 hr using a rototiller or tandem disk. Do not use if turnip roots are to be consumed.
	bensulide, MOA 8 (Prefar) 4 EC	5 to 6 qt	5 to 6	Also labeled for rape greens. Not labeled for turnip. Apply preplant or preemergence after planting. With preemergence application, irrigate immediately after application. See label for more directions.
	DCPA, MOA 3 (Dacthal) W-75 (Dacthal) 6 F	6 to 10 lb 6 to 10 pt	4.5 to 7.5	Also labeled for broccoli raab (raab, raab salad), mizuna, and hanover salad. Apply immediately after seeding. May also be incorporated.

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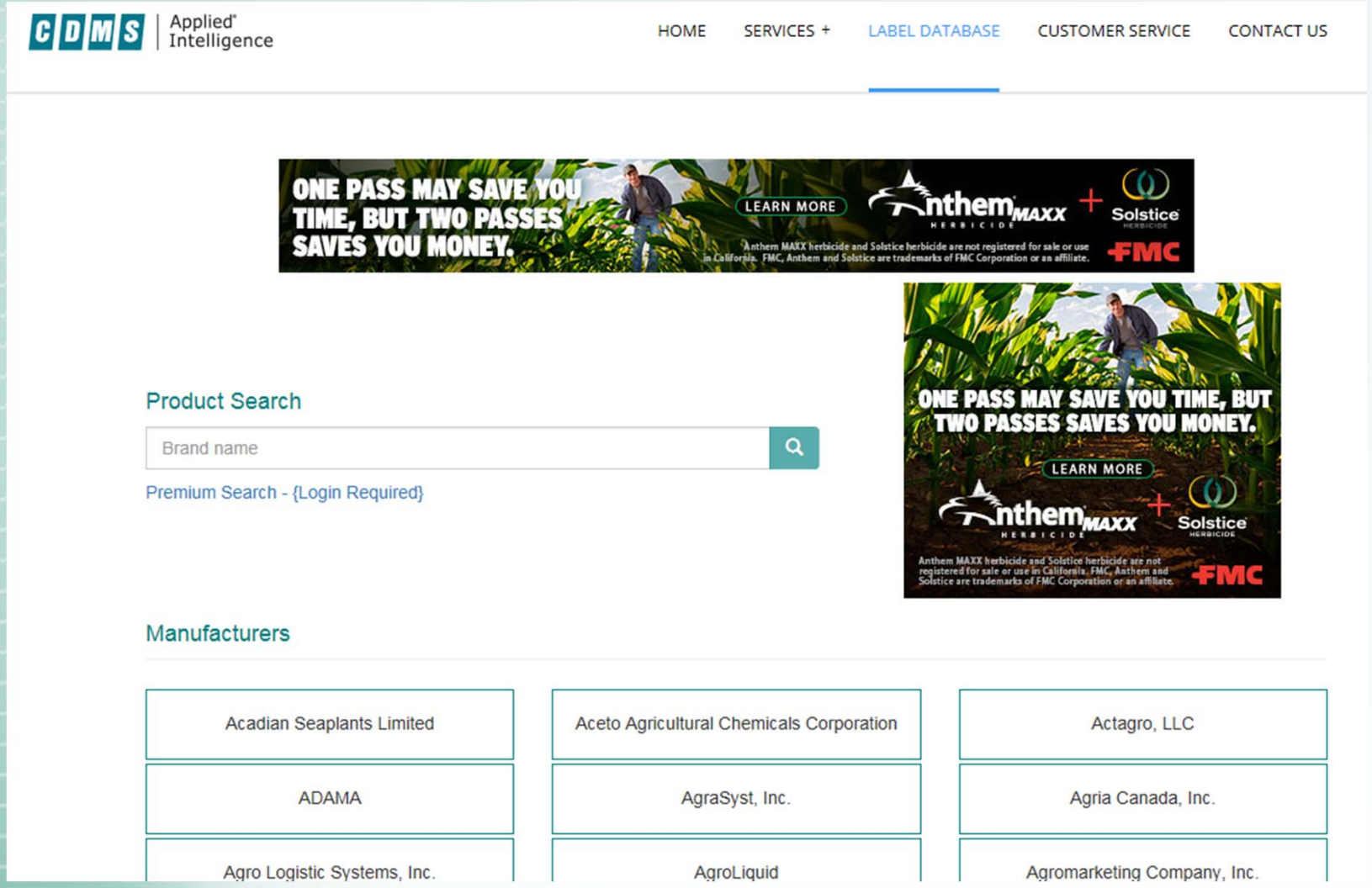
Also labeled for broccoli raab (raab, raab salad), mizuna, and hanover salad. Apply immediately after seeding. May also be incorporated.

CDMS – Trade name search for pesticide labels

http://www.cdms.net/Label-Database



Search feature requires no-cost registration

Topical application of herbicide to inter row areas

http://weedwipe.corecommerce.com/

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
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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.

Topical application of herbicide to inter row areas

http://weedwipe.corecommerce.com/

Topical application of herbicide to inter row areas

http://www.rotowiper.co.nz/

ROTOWIPER®

ROTOWIPER® -The Original Rotowiping System

Do you want Weed Control

without damaging your pasture or crop?

Sedge Weed Management

Purple nutsedge
Yellow nutsedge

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,

option for chemical use too.

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 due to infested soil on equipment, boots & harvested root 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 deeper 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

Tropical Pla
University of Ha

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 systemic herbicide 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

Problems with this approach

1st cycle of flushing works well since nutsedge emerges rapidly from shallow soil location.

2nd & 3rd flushes from deeper soil profile, has problems!

Annual weeds overgrow nutsedge foliage before proper growth stage.

What, nutsedge needs weed control too?

Light exclusion approach for purple/yellow nutsedge control

IPM approach

1. Uses of knowledge of growth habit
2. Deep soil heating for maximum tuber germination
3. Use light exclusion for non-chemical kill
4. Prevent spreading tubers with notill/hydroseeding & close crop plantings for rapid canopy closure
5. Compatible with organic farming systems.

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

Style 876

Product Data Sheet

December 2011

OK for organic crops - PVC plastic not allowed

A woven geotextile fabric, produced from polypropylene slit-film tapes, which will meet or exceed the following MARV's. This fabric has UV protection to 3500 hours in a Xenon Weatherometer.

Property	Test Method	English Units			SI Units		
		Typical Value			Typical Value		
Mass per Unit Area	ASTM D-5261	5.8		oz/yd^2	197		g/m^2
		MARV			MARV		
		MD	CD		MD	CD	
Grab Tensile Strength	ASTM D-4632	270	285	lbs	1202	1268	N
Grab Tensile Elongation	ASTM D-4632	20	15	%	20	15	%
Trapezoid Tear	ASTM D-4533	110	105	lbs	490	467	N
Puncture	ASTM D-4833	155		lbs	690		N
Permittivity	ASTM D-4491	0.04		sec^{-1}	0.04		sec^{-1}
A.O.S.	ASTM D-4751	45		U.S. Sieve	0.355		mm
UV Resistance (3500 hrs)	ASTM D-4355	70		%	70		%
Water Flow Rate	ASTM D-4491	4		$gal/min/ft^2$	163		$l/min/m^2$

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. 3-6 months tubers exhausted and die
4. Irrigation very important to maximize tuber germination via heat transfer to deeper soil profile

Unexpanded leaf tip easily pokes through tight film or down weighted areas of weed cloth

Pins to loosely secure fabric to soil = holes

Water filled hoses to eliminate holes in plastic

Better sealing of edges

No rocks or soil on plastic
Down weight allows shoots poke through woven fabric


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

Weed cloth inflates with each successive flush of tubers from increasingly deeper soil levels.

Combine weed flushing with weed mat & chemical kill to accelerate tuber purging from deep soil profiles, cover for more flushes.

- **Using irrigation on open fields is OK for the first round of tuber germination and kill.**
- **Problem with 2nd & 3rd, deeper tubers = more time = weed interference with spray applications.**
- **Monitoring tuber emergence and annual weed death under weed mat**
- **Weed free nutsedge grows out for improved spray effectiveness.**

Monitoring for annual weed seed germination and death followed by nutsedge growth in 2nd & 3rd flushes

TURN THE PAGE FARMING

NON-HERBICIDE NOTILL FARMING METHOD

1. No-till farming without herbicides
2. Potential for organic farming systems
3. Not currently used for large scale production
4. Innovation and interest to upscale technique

Considerations for
Large scale use of woven weed mat
For commercial scale vegetable production
Note to organic farmers

In the Organic Foods Production Act, Title 7, Section 6508 of the U.S. Code, "Prohibited crop production practices and materials," plastic mulches are listed in subsection (c)(2). The section states that, "For a farm to be certified under this chapter, producers on such farm shall not -" "(2) use plastic mulches, unless such mulches are removed at the end of each growing or harvest season;"

Mature weeds covered and killed. Plant tissue break down rapidly under fabric with good moisture provided with drip tubing

Stale seed bed = site prep, weeds grow, cover to kill then plant.


21 days of weed growth
0-day
Cover 1-wks
14-day
7-day

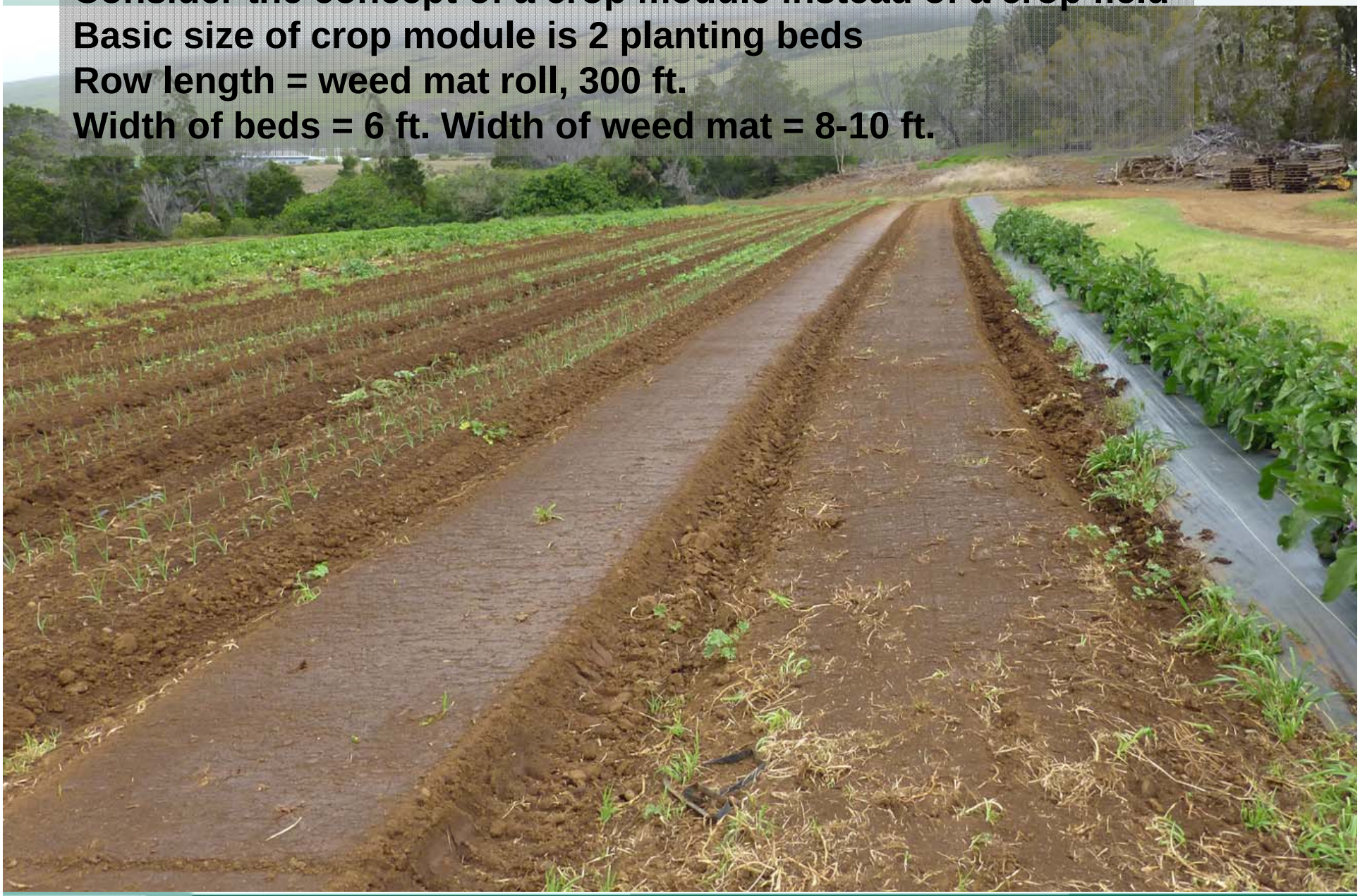
Good weed kill w/ 1-week of cover

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

Weed mat remains in place until ready to plant

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

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.

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

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

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

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.
<u>What about mulching to improve weed control?</u>

Restriction to the use of raw animal manures for organic food crops
Grow mulch crop off site from food crop production aera

Title 7 → Subtitle B → Chapter I → Subchapter M → Part 205 → Subpart C → §205.203

Title 7: Agriculture
PART 205—NATIONAL ORGANIC PROGRAM
Subpart C—Organic Production and Handling Requirements

(1) Raw animal manure, which must be composted unless it is:

(i) Applied to land used for a crop not intended for human consumption;

(ii) Incorporated into the soil not less than 120 days prior to the harvest of a product whose edible portion has direct contact with the soil surface or soil particles; or **e.g. potatoes, carrots, taro corms**

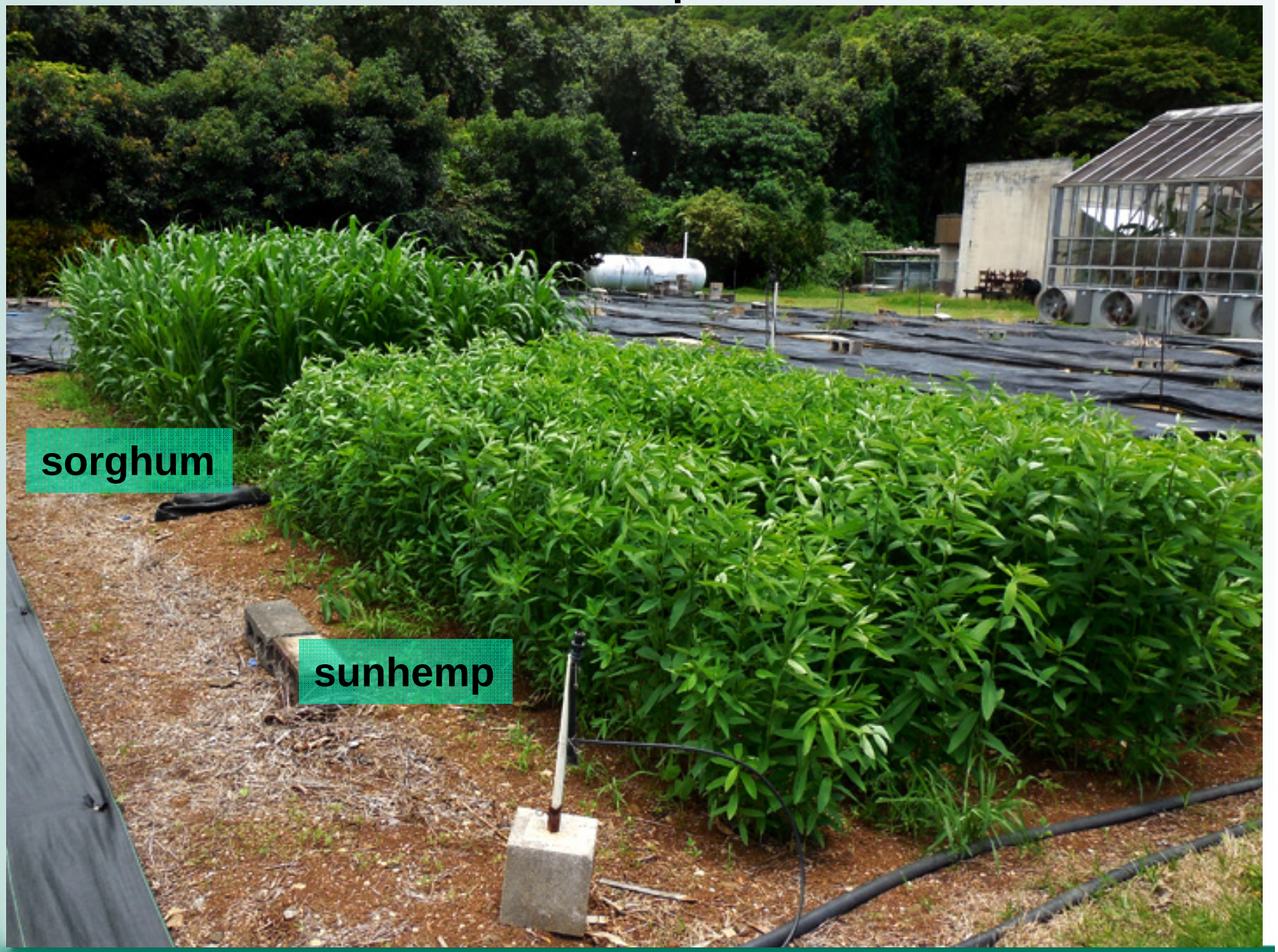
(iii) Incorporated into the soil not less than 90 days prior to the harvest of a product whose edible portion does not have direct contact with the soil surface or soil particles; **e.g. tomatoes, squash, taro leaf**

Raw animal manures cannot be used in NO-TILL organic farming

Raw manures to grow mulch

Planting mulch crops on 07/27/2016.

Mulch crops 35 DAP on 08/26/16



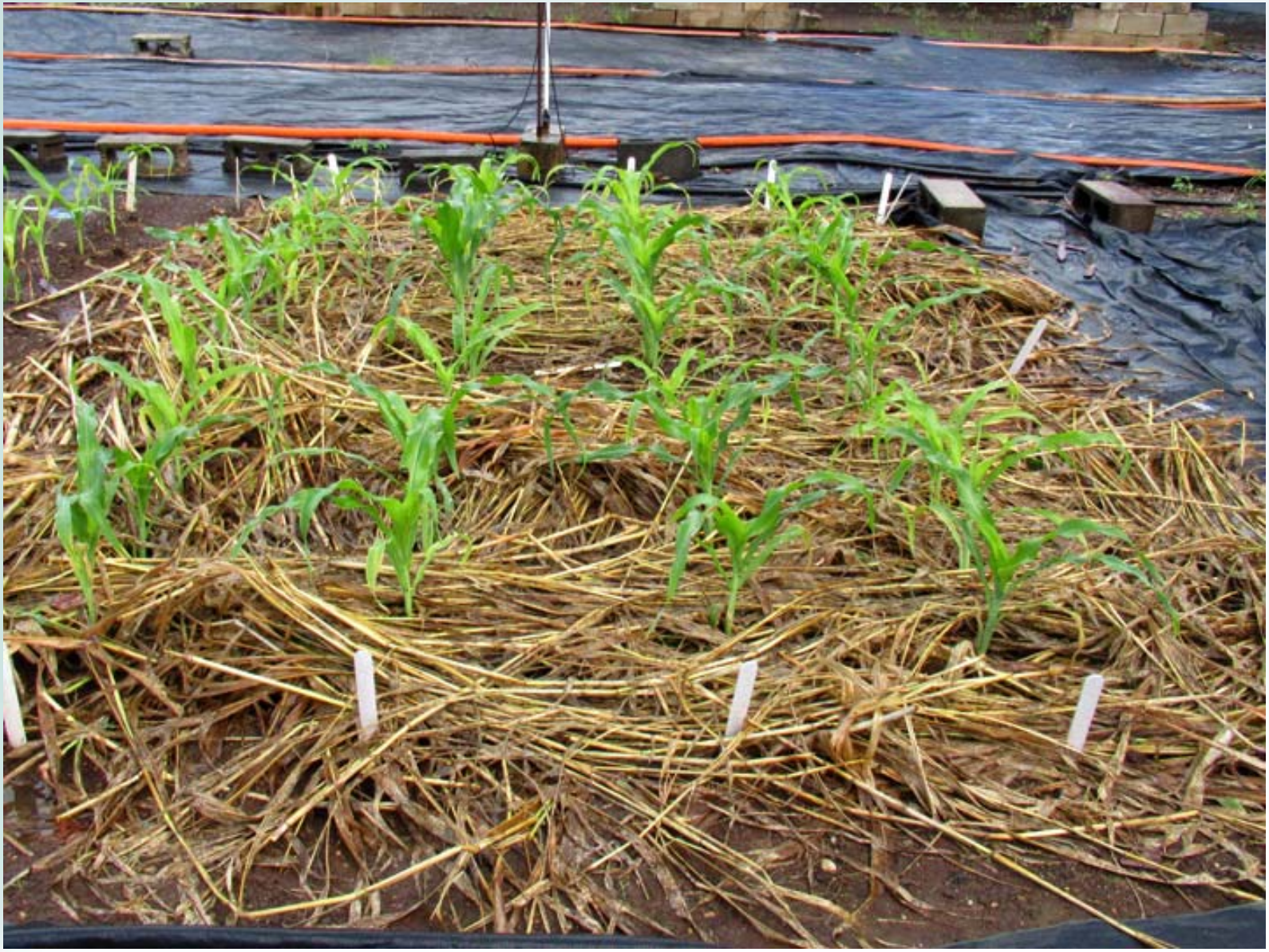
The mulch crop can be produced with animal manures and used on clean beds in TTP organic farming system

Larger scale farms use equipment to cut and haul mulch to new crop planting

Weed cloth removed , add transplants and mulch to weed free crop production area.

Mulch provides slow release of nutrients and weed suppression between crop rows.

Sorghum mulch 2 weeks after planting



Sun hemp mulch 2 weeks after planting

No mulch 2 weeks after planting

Weeds in sorghum mulch production area.

Turn the page on living sorghum and weeds, expose sunhemp stumps with extra sorghum mulch.

Turn the page on living sorghum and weeds, expose sunhemp stumps with extra sorghum mulch.

Turn the page on living sorghum and weeds, expose sunhemp stumps with extra sorghum mulch. Water filled hose to secure weed mat

Weed free sun hemp stumps + sorghum mulch ready for more crops

Corn transplanted into sun hemp stumps and sorghum mulch

Turn the Page Farming - ideas for organic farming

1. Cover weeds to kill and prep fields for planting
2. Kill weeds and cover crops = mulch for no till plantings
3. Heavy mulch keeps down soil splash with overhead irrigation and rain
4. Cover trap-crop after nematode penetration, kill both.
5. Grants for large scale use of TTP

Sprayer calibration for Home owner turf weed control

1. Setup application equipment that matches real-time sprayer delivery conditions
2. Measure test area to be treated during calibration.
3. Determine spray volume applied to test area.
4. Convert volume applied to test area to volume applied to a 1000ft^2 area = standard home owner dimension for lawns.
5. Identify amount of herbicide recommended in product label.
6. Identify the volume of spray to be prepared for field use.
7. Spray volume in tank = area to be treated
8. Herbicide into tank = label recommended amount (units/1000 ft^2)

Sprayer calibration for home lawn broadleaf weed control

HOW MUCH TO USE

- Measure area to be sprayed. Calculate 'square feet' by multiplying length times width.
- For best results, use spray solution immediately. If it is necessary to store, shake vigorously before use. Do not store for more than 3 days.
- **Bermudagrass, Buffalograss, Fescue, Kentucky Bluegrass, Perennial Ryegrass, Zoysiagrass: 3.2 fl. oz. (6 1/2 TBS) in 2 gallons of water treats 500 sq. ft.**
- **Bahiagrass, Centipedegrass, St. Augustinegrass (not for use on improved varieties of St. Augustinegrass, such as Floratam) or mixtures containing one or more of these grasses: 1.6 fl. oz. (3 1/4 TBS) in 2 gallons of water treats 500 sq. ft.**
- Food utensils, such as tablespoons and measuring cups, must not be used for food purposes after use with any pesticide.
- The maximum application rate of this product is 6.4 fl. oz. per 1,000 sq. ft. per application per site. The maximum number of broadcast applications per treatment site is 2 per year.

Hands on sprayer calibration exercise

1. Setup test area
2. Volunteer to spray test area
3. Determine volume to test area
4. Find calculator App on your smart phone
5. In class to do math using 5-step data sheet

For more information

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