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Proceedings of

38th Annual Horticulture Field Day

South Mississippi Branch Experiment Station
Coastal Research and Extension Center
Mississippi Agricultural and Forestry Experiment Station

MAFES

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Proceedings of

38th Annual Horticulture Field Day

Poplarville, Mississippi
October 6, 2011

South Mississippi Branch Experiment Station
Coastal Research and Extension Center
Mississippi Agricultural and Forestry Experiment Station

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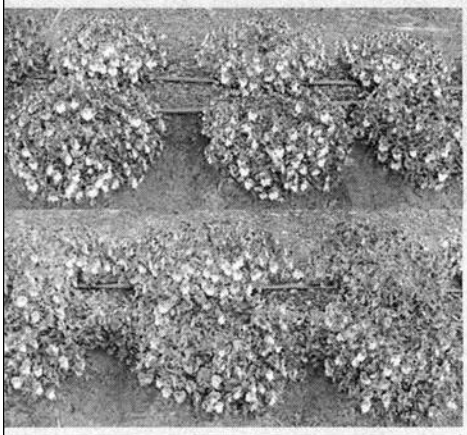
*Scheduled Presenter

Outstanding Ornamental Plants for 2011 at the South Mississippi Branch Experiment Station

Eugene K. Blythe, Michael Anderson, Debbie Murchison, David Lee, Louis DeJean, Scott Langlois, Christine Ladner, and Clay Mayeux
Mississippi State University, Coastal Research and Extension Center, South Mississippi Branch Experiment Station, Poplarville, MS

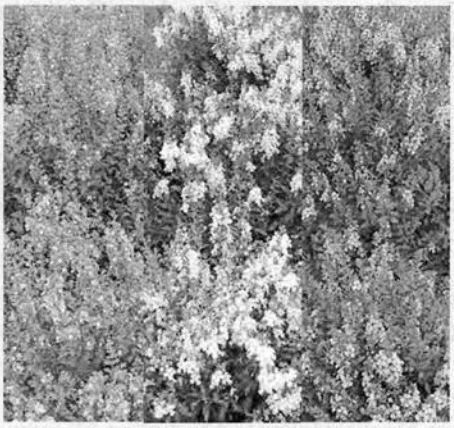


Plentifall series Pansy
[PanAmerican Seed]
Available from retail garden centers and mail-order seed companies.

Sorbet series Viola
[PanAmerican Seed]
Available from retail garden centers and mail-order seed companies.

***Incarvillea sinensis* 'Cheron Pink'**
[Kieft-Pro-Seeds]
Available from retail garden centers and mail-order seed companies.

'Wasabi' Coleus
[Ball FloraPlant]
Available from retail garden centers.

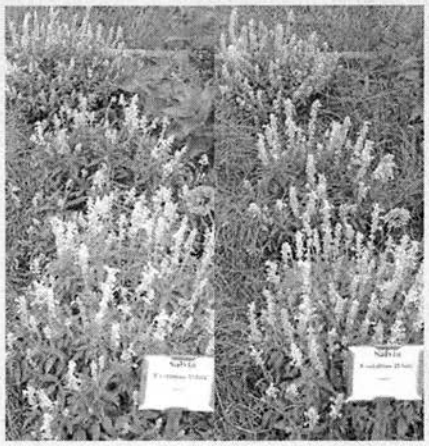


Archangel series Angelonia
[Ball FloraPlant]
Available from retail garden centers.

Suncatcher Pink Lemonade Trailing Petunia [Ball FloraPlant]
Available from retail garden centers.

MORE! Outstanding Ornamental Plants for 2011 at the South Mississippi Branch Experiment Station

Eugene K. Blythe, Michael Anderson, Debbie Murchison, David Lee, Louis DeJean, Scott Langlois, Christine Ladner, and Clay Mayeux
Mississippi State University, Coastal Research and Extension Center, South Mississippi Branch Experiment Station, Poplarville, MS



Salvia farinacea 'Evolution White' [Benary]

Available from retail garden centers and mail-order seed companies.

Rudbeckia hirta 'Denver Daisy' [Benary]

Available from retail garden centers and mail-order seed companies.

Zinnia elegans 'Queen Red Lime' [Benary]

Available from retail garden centers and mail-order seed companies.

Accent Premium series Impatiens [Syngenta Flowers]

Available from retail garden centers and mail-order seed companies.

Kauai series Torenia [PanAmerican Seed]

Available from retail garden centers and mail-order seed companies.

Hibiscus acetosella 'Mahogany Splendor' [PanAmerican Seed]

Available from retail garden centers and mail-order seed companies.

New Edible and Ornamental Vegetables for Landscape Planting and Container Growing from the 2011 Trial Garden

Eugene K. Blythe, Michael Anderson, Debbie Murchison, David Lee, Louis DeJean, Scott Langlois, Christine Ladner, and Clay Mayeux
Mississippi State University, Coastal Research and Extension Center, South Mississippi Branch Experiment Station, Poplarville, MS

'Field of Dreams' Ornamental Corn
[Floranova]
Available from retail garden centers and mail-order seed companies.

'Pot Black' Eggplant
[Vegetalis]
Available from retail garden centers and mail-order seed companies.

'Emerald Isle' Eggplant
[Vegetalis]
Available from retail garden centers and mail-order seed companies.

'Cherry Falls' Tomato
[Vegetalis]
Available from retail garden centers and mail-order seed companies.

'Loco' Hot Pepper **'Chenzo' Hot Pepper** **'Basket of Fire' Hot Pepper**
[Vegetalis]
Available from retail garden centers and mail-order seed companies.

2011 Update: All-America Selections at Mississippi State University – Trialing New Flowers and Vegetables for Superior Garden Performance

Eugene K. Blythe, Coastal Research and Extension Center, South Mississippi Branch Experiment Station, Poplarville, MS
Richard G. Snyder, Central Mississippi Research and Extension Center, Truck Crops Branch Experiment Station, Crystal Springs, MS

In Summer 2011, All-America Selections unveiled a new logo with a fresh, modern design.

Mike Murgiano of Syngenta Flowers, chair of the AAS task force responsible for the new image of All-America Selections (AAS) said, "Our new logo honors the past 80 years of AAS history by maintaining the familiar red, white and blue, but in updated tones. We also are embracing our future with the strong use of the AAS acronym that represents an easily identifiable connection to our organization and our winning plants and flowers."

Diane Blazek, AAS Executive Director, added "The words 'All-America Selections' encircling the acronym symbolizes how the organization embraces not only seed annual flowers and vegetables, but how we plan to embrace vegetatively propagated annuals and perennials in the future."

All-America Selections (AAS) was founded in 1932 by W. Ray Hastings as a way for home gardeners to learn which new varieties were significantly improved for better garden performance. AAS includes a network of over 40 trial grounds all over North America where new, never-before-sold varieties are grown and evaluated by skilled, impartial AAS Judges. Only the best performers are declared AAS Winners. AAS continues as the oldest, most established international testing organization in North America.

2011 AAS Winners:

1. Gaillardia 'Arizona Apricot'
2. Ornamental Kale 'Glamour Red' F1
3. Salvia 'Summer Jewel Red'
4. Viola 'Shangri-La Marina' F1
5. Pepper 'Orange Blaze' F1
6. Tomato 'Lizzano' F1
7. Tomato 'Terenzo' F1
8. Pumpkin 'Hijinks' F1

For more information on AAS winners, visit: **www.all-americaselections.org**

AAS Display Gardens are located at the South Mississippi Branch Experiment Station in Poplarville and at the Truck Crops Branch Experiment Station in Crystal Springs. AAS flower trials are conducted in Poplarville and AAS vegetable trials are conducted in Crystal Springs.

AAS flower trial grounds in Poplarville

AAS vegetable trial grounds in Crystal Springs

Essential Oils from the Ornamentals *Artemisia abrotanum* and *A. pontica*: Chemical Composition and Mosquito Repellent Activity

Tabanca N[1], Demirci B[2], Blythe EK[3], Bernier UR[4], Ali A[1], Wedge DE[5], Wang M[1], Khan IA[1,6,7], Baser KHC[8]

[1]National Center for Natural Products Research, The University of Mississippi, University, MS 38677 USA; [2]Department of Pharmacognosy, Faculty of Pharmacy, Anadolu University, 26470 Eskişehir, Turkey; [3]Coastal Research and Extension Center, Mississippi State University, South Mississippi Branch Experiment Station, Poplarville, MS 39470 USA; [4]USDA-ARS Center for Medical, Agricultural, and Veterinary Entomology, Gainesville, FL 32608 USA; [5]USDA-ARS Natural Products Utilization Research Unit, University of Mississippi, University, MS 38677 USA; [6]Department of Pharmacognosy, School of Pharmacy, The University of Mississippi, University, MS 38677 USA; [7]Department of Pharmacognosy, College of Pharmacy, King Saud University, 11451 Riyadh, Saudi Arabia; [8]Department of Botany and Microbiology, College of Science, King Saud University, 11451 Riyadh, Saudi Arabia

Abstract

Mosquito-borne diseases such as malaria, encephalitis, and Yellow, Dengue, and Rift Valley fevers are diseases that result in significant morbidity and mortality in humans and livestock globally. Currently, the development of natural product-based insecticides and repellents is under exploration to increase and improve our ability to protect humans from mosquito bites, and ultimately to reduce the incidence of mosquito-borne illnesses. We have undertaken a collaborative research project to discover new natural compounds for personal protection and control of mosquitoes. *Artemisia abrotanum* L. leaves have reportedly been used as a moth and insect repellent. Therefore, we evaluated *Artemisia abrotanum* and *A. pontica* L. (Asteraceae) essential oils for mosquito repellent activity against *Aedes aegypti* L. *Artemisia* essential oils obtained by hydrodistillation of aerial parts were analyzed by gas chromatography (GC) and gas chromatography–mass spectrometry (GC-MS). The main *Artemisia* oil constituents were as follows: *A. abrotanum:* 32.6% 1,8-cineole, 13.5% borneol, 10.2% presilphiperfolan-9α-ol and 8.0% *p*-cymene; *A. pontica:* 35.6% artemisia ketone, 30.1% α-thujone, 22.3% 1,8-cineol and 3.7% β-thujone. *Artemisia abrotanum* oil showed repellent activity down to a minimum effective dosage of 0.219 (± 0.143) mg/cm² using cloth patch assay whereas *A. pontica* oil exhibited no repellent activity at the highest concentration tested (0.375 mg/cm²). Our continuing research into exploring the repellency of specific compounds in the *A. abrotanum* oil will continue and be expanded to include other mosquito vectors and pesticide-resistant mosquito strains.

Introduction

Mosquitoes are arthropods of public health importance because many species are vectors of diseases. The primary approach used for mosquito control relies on chemical control. However, frequent use of synthetic insecticides for vector control can lead to non-target effects and the development of insecticide resistance. Therefore, there is an urgent need to develop alternative insecticides to supplement synthetic insecticides for control of a wide variety of insect-vectored diseases.

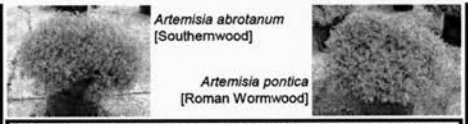
Essential oils and plant extracts could be new candidate products for control of wide variety of insect vectors. Much effort has recently been recently focused on plant extracts or phytochemicals as potential sources of commercial mosquito-control agents and bioactive chemical compounds. Taking into account the necessity of developing new mosquito control agents with more favorable environmental properties, we studied the repellent and larvicidal activities of *Artemisia abrotanum* and *A. pontica* essential oils against *Aedes aegypti*. The purpose of our research was to investigate the chemical composition of *A. abrotanum* and *A. pontica* by GC-FID and GC-MS and to conduct bioassay-guided isolation, and to identify biologically active compounds. To the best of our knowledge, we report for the first time here the mosquito repellent and larvicidal activity of *A. abrotanum* and *A. pontica* essential oils.

Materials and Methods

Plant material: Shoots of *A. abrotanum* and *A. pontica* were harvested from greenhouse, container-grown plants, using a single vegetatively propagated clone of each species. Harvested shoots were dried indoors at room temperature for 2 weeks, packed loosely into cardboard boxes, and stored until oil extraction.

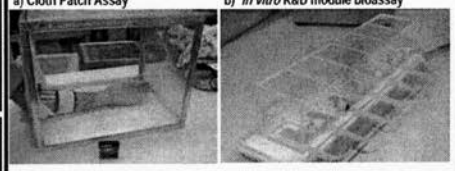
Extraction: Oils obtained for 3 h using a Clevenger-type apparatus to obtain essential oils in 0.5% (*A. abrotanum*) and 0.15% (*A. pontica*) dry weight yield.

GC/FID and GC-MS conditions: Chemical composition of *Artemisia* oils were analyzed by capillary GC and GC/MS using an Agilent GC/MSD system. The same column and analysis conditions were used for both GC and GC/MS.



Mosquito Repellent Assay: Repellency of both *Artemisia* oils was evaluated by topical cloth patch assay, in which human volunteers inserted their product-treated arm into a 60,000 cm³ cage containing approximately 500 laboratory-reared female *Aedes aegypti* (Figure 1a). Treated patches acquired <5 bites during 1 min were recorded as passing at that level. To evaluate the minimum effective dosage (MED), a series of dosages were used. The MED was recorded as the passing value or the compound was noted as ineffective if 5 or more mosquitoes bites were obtained at the highest concentration tested. Each sample was tested by 5-6 individuals. Systematic bioassay-guided fractionation of *A. abrotanum* oil was performed to identify active repellent compounds using an *in vitro* Klun & Debboun (K&D) module bioassay system. This bioassay method determines specifically measured biting (feeding) deterrent properties of the chemicals. The test compounds were randomly applied to six 4-cm × 5-cm areas of organdy cloth and positioned over the membrane-covered CPDA-1+ATP solution with a separator placed between the treated cloth and the six-celled module. A K&D module containing 5 females per cell were positioned over cloth treatments covering the six membrane wells, and trap doors were opened to expose the treatments to these females. The number of female mosquitoes biting through cloth in each cell was recorded after a 3-min exposure (Figure 1b) and females were prodded back into the cells. A set of 5 replications was conducted on different days using new lots of mosquitoes. DEET (*N,N*-diethyl-*m*-methylbenzamide was used as used as a positive control in both repellent assays.

Figure 1. Mosquito repellent bioassays



Scheme 1. Bioassay guided fractionation of *A. abrotanum* oil using repellent bioassay

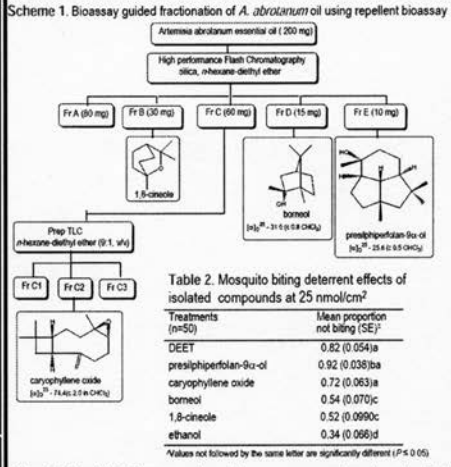


Table 2. Mosquito biting deterrent effects of isolated compounds at 25 nmol/cm²

Treatments (n=50)	Mean proportion not biting (SE)[z]
DEET	0.82 (0.054)a
presilphiperfolan-9α-ol	0.92 (0.038)ba
caryophyllene oxide	0.72 (0.063)a
borneol	0.54 (0.070)c
1,8-cineole	0.52 (0.0990c
ethanol	0.34 (0.066)d

[z]Values not followed by the same letter are significantly different ($P \leq 0.05$)

Mosquito Larvicidal Bioassays. Larval bioassays were performed as described previously. A. abrotanum and A. *pontica* oil was diluted in dimethyl sulfoxide (DMSO) and serial dilutions were performed at 125, 62.5 and 31.25 ppm. *A. pontica* oil showed higher larvicidal activity against *Ae. aegypti* larvae than *A. abrotanum* oil. Larvae assays were performed in 24-well plates using 5 first instar-larvae in each well. Each well contained 1000 µL of water, 50 µL of larvae food solution, and 11 µL of DMSO (control) or 11 µL of serially diluted test samples. Mortality data were recorded 24 h post-exposure.

Acknowledgments

The authors thank Ms. Natasha Elegalde, Mr. Nathan Newton, Mr. Greg Allen and Ms. Sumi Weerasooriya for their valuable assistance with the mosquito bioassays. Special thanks to Dr. Graham B. White, CAPT Stanton E. Cope and Dr. Dan. A. Strickman for their continued support. This study was supported by a grant from the Deployed War-Fighter Protection (DWFP) Research Program and the U.S. Department of Defense through the Armed Forces Pest Management Board (AFPMB) and by a Special Research Initiative grant from the Mississippi Agricultural and Forestry Experiment Station.

Scheme 2. Bioassay guided fractionation of *A. abrotanum* oil using larval bioassay.

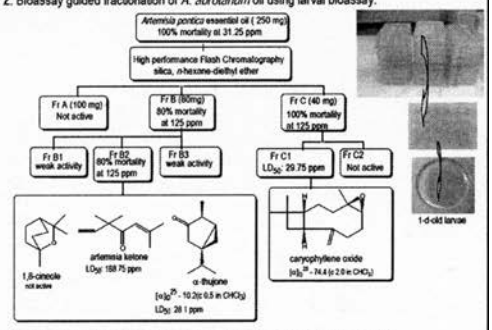


Table 1. Composition of the essential oils of *Artemisia abrotanum* and *A. pontica*.

RRI	Compound	Aa (%)	Ap (%)	RRI	Compound	Aa (%)	Ap (%)
1014	Tricyclene	0.2	-	1588	Bornyl formate	0.1	-
1032	α-Pinene	0.2	-	1591	Bornyl acetate	0.6	-
1035	α-Thujene	0.1	-	1611	Terpinen-4-ol	2.5	0.4
1076	Camphene	3.5	-	1612	β-Caryophyllene	-	0.5
1118	β-Pinene	0.2	-	1638	*cis-p*-Menth-2-en-1-ol	0.5	-
1176	α-Phellandrene	0.4	-	1648	Myrtenal	0.2	-
1188	α-Terpinene	0.8	-	1668	(Z)-β-Farnesene	-	0.1
1213	1,8-Cineole	32.6	22.3	1670	*trans*-Pinocarveol	0.4	-
1255	γ-Terpinene	0.5	-	1282	δ-Terpineol	0.3	0.1
1280	*p*-Cymene	8.0	0.4	1289	*trans*-Piperitol	0.2	-
1290	Terpinolene	0.1	-	1706	α-Terpineol	0.3	-
1358	Artemisia ketone	-	35.6	1719	Borneol	13.5	-
1403	Yomogi alcohol	-	1.0	1726	Germacrene D	0.4	0.2
1431	7α-(H)-silphiperfol-5-ene	0.3	-	1751	Carvone	0.3	-
1437	α-Thujone	-	30.1	1758	*cis*-Piperitol	0.1	-
1451	β-Thujone	-	3.7	1804	Myrtenol	0.1	-
1452	α,*p*-Dimethylstyrene	0.2	-	1864	*p*-Cymen-8-ol	0.2	-
1452	1-Octen-3-ol	0.2	-	2006	Silphiperfol-5-en-3-one A*	1.6	-
1454	7β-(H)-silphiperfol-5-ene	0.2	-	2008	Caryophyllene oxide	0.6	1.9
1501	Silphiperfol-6-ene	0.4	-	2030	Presilphiperfolan-9α-ol	10.2	-
1510	Artemisia alcohol	-	0.2	2032	Silphiperfol-5-en-3-one B*	3.9	-
1532	Camphor	4.8	-	2131	Hexahydrofarnesyl acetone	-	0.2
1571	*trans-p*-Menth-2-en-1-ol	0.7	-	2144	Spathulenol	-	0.4
1586	Pinocarvone	0.2	-		Total	86.6	97.1

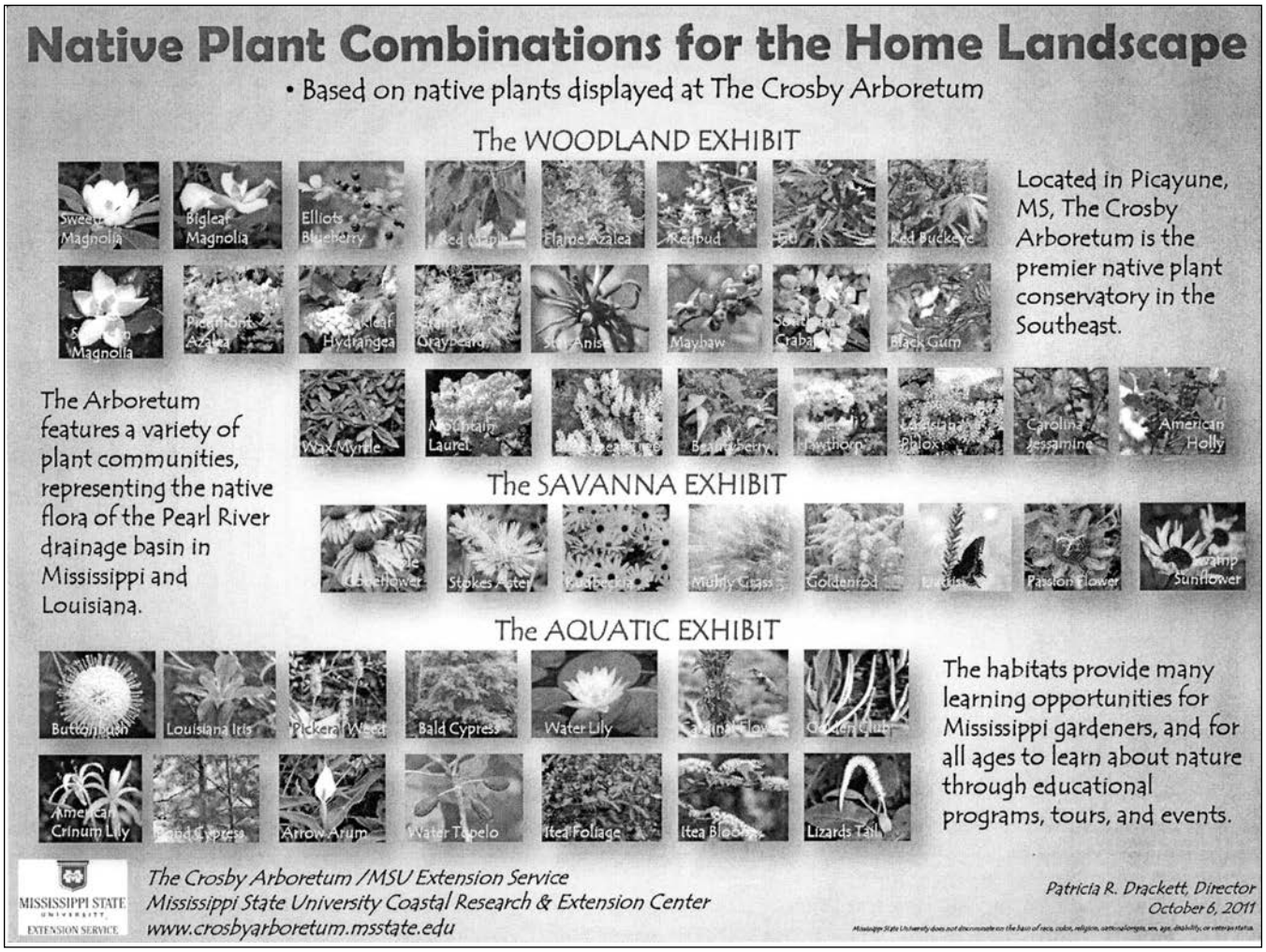
RRI: Relative retention indices calculated against n-alkanes ; %: calculated from FID data; tr: Trace (< 0.1 %); *Tentative identification

Results and Discussion

In the search for environmentally safe and effective ways of controlling mosquitoes, both *Artemisia* oils were evaluated for repellent and larvicidal activity against *Aedes aegypti*. Each of the oils was subsequently analyzed by GC and GC-MS systems in which the individual components were identified according to their relative retention indices with their relative percentages (Table 1). Forty seven compounds were identified from *A. abrotanum* and *A. pontica* oils which constituted 86.6% to 97.1%, respectively, of the total oil. The *A. abrotanum* oil was characterized with 32.6% 1,8-cineole, 13.5% borneol, 10.2% presilphiperfolan-9α-ol and 8.0% *p*-cymene. Major components identified in the oil of *A. pontica* were 35.6% artemisia ketone, 30.1% α-thujone, 22.3% 1,8-cineol and 3.7% β-thujone.

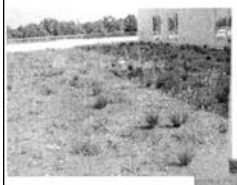
Artemisia abrotanum oil showed repellent activity at the minimum effective dosage of 0.219 (± 0.143) mg/cm² using cloth patch assay whereas *A. pontica* oil exhibited no repellent activity at the highest concentration tested (0.375 mg/cm²). Bioassay-guided isolation studies were performed on *A. abrotanum* oil using K & D module system and resulted in the isolation of two active compounds, presilphiperfolan-9α-ol and caryophyllene oxide. These compounds were tested at a doses of 25 nmol/cm² using DEET as a positive control and ethanol as solvent control. The presilphiperfolan-9α-ol showed significantly higher anti-biting activity than all the other treatments (Table 2). Caryophyllene oxide was similar to DEET at 25 nmol/cm² (Table 2). The major constituents 1,8-cineole and borneol were more active than ethanol but significantly less active than other treatments (Table 1). Consequently, these two active repellent compounds, presilphiperfolan-9α-ol and caryophyllene oxide, will be further examined for activity in topical cloth patch assay. In this study, presilphiperfolan-9α-ol is being reported for the first time as a repellent of *Ae. aegypti*.

In larval bioassay of *A. pontica* oil showed higher larvicidal activity against *Ae. aegypti* larvae than *A. abrotanum* oil. The *A. pontica* oil killed 100% 1 d-old-*Ae. aegypti* larvae at the concentrations of 125, 62.5 and 31.25 ppm. Bioassay-guided isolation studies were performed on *A. pontica* oil using larvicidal activity data (Scheme 2). Further fractionation of the fraction B led to the isolation of three compounds: artemisia ketone, α-thujone and 1,8-cineole. LD_{50} values were 188.75 (167.8-208-6) ppm for artemisa ketone and 28.1 (24.11-32.46) ppm for α-thujone. 1,8-Cineole showed weak larvicidal activity in the screening assay and its LD_{50} was not calculated. Caryophyllene oxide was isolated from fraction C and showed an LD_{50} value of 29.75 (20.37-45.09) ppm against 1-d-old *A.aegypti* larvae. Our study highlights the chemical variability of essential oils as a source of variation of insecticidal properties. Therefore, the chemically diverse essential oils can serve as alternative mosquito control agents.


Native Plant Combinations for the Home Landscape
• Based on native plants displayed at The Crosby Arboretum
The WOODLAND EXHIBIT
Sweetbay Magnolia
Bigleaf Magnolia
Elliots Blueberry
Red Maple
Flame Azalea
Redbud
Fringetree
Red Buckeye
Southern Magnolia
Piedmont Azalea
Oakleaf Hydrangea
Pinxter Flower
Anise
Maybaw
Southern Crabapple
Black Gum
Wax Myrtle
Mountain Laurel
Buttonbush
Hawthorn
Carolina Jessamine
American Holly
Located in Picayune, MS, The Crosby Arboretum is the premier native plant conservatory in the Southeast.
The Arboretum features a variety of plant communities, representing the native flora of the Pearl River drainage basin in Mississippi and Louisiana.
The SAVANNA EXHIBIT
Coneflower
Stokes Aster
Muhly Grass
Goldenrod
Passion Flower
Swamp Sunflower
The AQUATIC EXHIBIT
Buttonbush
Louisiana Iris
Pickerel Weed
Bald Cypress
Water Lily
Golden Club
American Crinum Lily
Bald Cypress
Arrow Arum
Water Tupelo
Itea Foliage
Itea Blooms
Lizards Tail
The habitats provide many learning opportunities for Mississippi gardeners, and for all ages to learn about nature through educational programs, tours, and events.
MISSISSIPPI STATE UNIVERSITY EXTENSION SERVICE
The Crosby Arboretum /MSU Extension Service
Mississippi State University Coastal Research & Extension Center
www.crosbyarboretum.msstate.edu
Patricia R. Drackett, Director
October 6, 2011

Community Gardening: Local is in Your Own Backyard

Christine Coker, Gary Bachman, Corey Wheeler, and Susan DeBlanc
Mississippi State University, Coastal Research and Extension Center



Armed Forces Retirement Home, Gulfport

8 Steps for a Successful Community Garden

Decide Your Type of Garden
Look for Community Partners
Find a Location
Plan Your Garden
Develop Your Supply List and Gather Resources
Develop Your Promotion and Education Strategy
Develop Your Work Plan
Get Started and Have Fun!

VA Hospital, Biloxi

Locations

Schools
Hospitals
Retirement Communities
Soup Kitchens
Churches
Community Centers

Types of Gardens

Vegetable gardens
Herb gardens
Wildlife gardens
Pollinator gardens
Rain gardens
Flower gardens

Anniston Elementary School

Opal Smith Day Center, Gulfport

For more information about Community Gardens contact **Dr. Christine Coker** @ ccoker@ra.msstate.edu

THE PEOPLE'S GARDEN

The People's Garden Initiative

- promotes health and wellness
- helps the environment
- creates teaching opportunities
- enables social and cultural expectations
- fosters pride

A late-flowering ornamental tung oil tree (*Aleurites fordii*).

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What do you name a "nutless", late-flowering ornamental tung oil tree?

Current suggestions include 'Southern Heart', 'White Wedding', 'Mama May', 'Amazing Grace' and 'Ohoyo'.

Our selection has delayed bud break and flowering, is at least partially sterile, does not produce normal-size fruits, if any fruit at all, and is easily propagated by budding.

Other than delayed flowering, we did not observe morphological or growth differences between our selection and other cultivars growing on site.

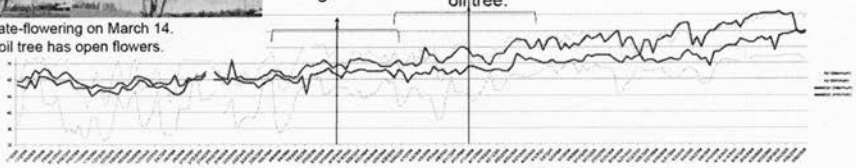
Late flowering selection blooms one month later, probably due to temperature.

Normal and late-flowering on March 14.
Normal tung oil tree has open flowers.

March is peak flowering time for normal tung oil tree.

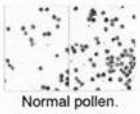
April is peak flowering time for late-flowering tung oil tree.

Air and soil temperatures for Poplarville, MS (minimums and maximums)

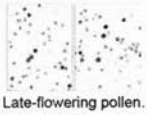


Daily air and soil temperatures for Poplarville, MS provided by Mississippi State University, South MS Branch Experiment Station

Male and Female Sterile, at least partially.



Normal pollen.



Late-flowering pollen.

Only 23.4% of the pollen from the late-blooming selection appears viable, as opposed to 94% from a normal tung oil tree. Most of the unstained pollen is smaller than normal. In 197 controlled crosses using normal pollen, late flowering trees only produced nine abnormal sized "nuts". None germinated. 43 full-sized nuts were produced after 74 crosses with late-flowering pollen on normal tung oil trees. None of these seed germinated.

Normal drupe (with golf ball).

Late-flowering drupe.

Jennifer Carroll is the USDA-ARS technician responsible for the tung oil tree research. She also discovered a variegated tung oil tree growing beside the road in Pearl River County. This chance seedling has been propagated and will be evaluated for potential release alongside the later-flowering selection.

Containerized Plants for Large-Scale Landscape Plantings: Does Plant Performance Match Media Claims?

H. Glenn Hughes, Extension Forestry Professor, MSU Extension Service, Purvis, MS

Introduction

Katrina destroyed some 320 million mature trees. One effort to restore hardwoods damaged by Katrina focused on large-scale plantings of container-grown trees. These trees, grown in a proprietary medium, were claimed to grow "three times faster" than normal trees.

Methods

Container-grown hardwood seedlings were planted on privately-owned land damaged by Katrina. Containers were two-gallon in size, and seedlings were 5-7 feet tall when planted in the spring.

To evaluate the performance of container grown seedlings relative to other sources, research plots were established that compared the survival and height growth of nuttall oak and swamp chestnut oak from the following sources;
•two-gallon container-grown stock;
•Six-inch plugs
•traditional bare root stock.

Research sites were located in Hancock and Pearl River County, sprayed with herbicide in the Fall of 2008, planted in the Spring of 2009, and received no supplemental water.

This poster focuses on survival and height growth comparisons of the most expensive trees (container grown) and the least expensive trees (traditional bare root seedlings) two years after planting. Approximate costs to purchase and plant the seedlings were $20 each for the container-grown stock and $1 each for the bare-root stock.

Katrina damaged oak

Container grown seedlings

Planting by hand

Finished planting

Results

Survival and height growth data are shown in Table 1 below.

Table 1. Survival and height growth of nuttall and swamp chestnut oak after two years.

	Stock	
	Container	Bare Root
Survival (%)		
Nuttall Oak	96.5	94.5
Swamp Chestnut Oak	93.0	91.5
Height Growth (cm) (with dieback)		
Nuttall Oak	-1.7	18.3
Swamp Chestnut Oak	3.7	14.1
Height Growth (cm) (w/out dieback)		
Nuttall Oak	3.2	19.7
Swamp Chestnut Oak	5.6	15.6

Survival with both container and bare-root stock was very high, with little difference in seedling stock. Height growth was appreciably greater with bare root stock. This is true in cases where plants that died back were kept in the sample (with dieback) and where plants that died back were excluded from the sample (without dieback).

Conclusions

Container grown stock did not live up to the claims. They in fact grew more slowly, and there was no difference in survival. These data, coupled with a 20-fold difference in seedling cost, do not justify planting such stock on a large-scale landscape basis.

Source: Ezell, A.J., H.G. Hughes, J.P. Shepard, D. Hollis, D. Alkire. 2010. . Implementation of the New Technologies for Hardwood Reforestation Demonstration Project. 2010 Progress Report to the USDA Farm Service Agency. 22p.

Ornamental Entomology Research at the Southern Horticultural Laboratory: Assisting Southern Nurseries

C. T. Werle and B. J. Sampson

The Strawberry Rootworm:
A new method for pest insect monitoring at the nursery

The strawberry rootworm, *Paria fragariae* (Wilcox), is a primary pest of containerized azalea at southeastern nurseries. Control costs at a large nursery have been reported to approach $30,000 annually. There are several chemical options available that can be highly effective when paired with smart cultural practices and a monitoring program.

Monitoring can help pest control professionals decide when to spray. We have developed a trapping station that, when fitted with a solar-powered light, is highly effective at collecting *P. fragariae* (Fig. 1 & 2). Our trapping station can in turn help nurseries save money from their pest control budget (Werle and Sampson, 2011).

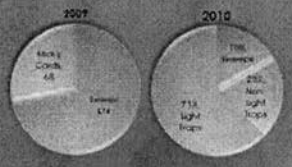


Fig. 1 Total *P. fragariae* collected from 2009 and 2010 monitoring research.

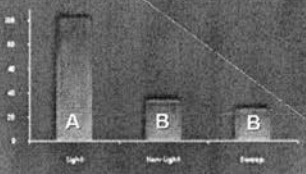


Fig. 2 Mean # *P. fragariae* collected with three methods in 2010. Bars with the same letter are not significantly different. (Tukey's HSD Test: P < 0.05)

Exotic Ambrosia Beetles:
Assessing community composition and predicting emergence

Exotic ambrosia beetles are becoming serious nursery pests, tunneling into a variety of tree species and cultivating fungus therein. This fungus, which is what kills the host tree, is fed upon by their offspring.

In collaboration with scientists in OH, VA and TN, we are assessing which species of ambrosia beetles are present and determining their emergence times. This knowledge can then be used by nurseries to apply preventative treatments, currently the best way to protect an ornamental tree crop.

Ambrosia beetles are attracted by ethanol, which is released by stressed trees. We are testing ethanol-based monitoring tools, including slow-release ethanol lures, ethanol-injected trees, and bolts cut from ethanol-injected trees (Fig. 4).

We have identified a dozen species of ambrosia beetles, including three of primary economic importance: *Xylosandrus crassiusculus, X. mutilatus and X. compactus* (Fig. 5) (Werle, Sampson and Oliver, in press).

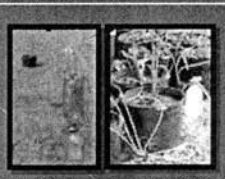


Fig. 4 Inexpensive soda bottle trap with etoh-injected sweetbay bolt, and tree injection system.

Fig. 5 Seasonality of three *Xylosandrus* ambrosia beetle species in south MS in 2010

Killer Worms:
Controlling soil insect pests with nematodes

Immature *P. fragariae* occur in soil around the roots of their host plant, where conventional insecticidal sprays are not as effective. While soil drenches have been shown to be effective at controlling immature insects, and possibly adults in the case of systemics, they can be expensive in terms of labor and product costs.

We plan to test entomopathogenic nematodes (Fig. 3) against *P. fragariae*, with the hypothesis that targeting the immature insects, when combined with conventional sprays targeting adults, will make pest control programs more effective. In addition, the possibility of applying nematodes through existing irrigation equipment may be less labor intensive than insecticidal drenches.

Using chemical ecology to augment pest control efficacy

Many insects utilize pheromones as a way to locate other members of their species; others use plant volatiles, or kairomones. We believe *P. fragariae* may key in on plant volatiles like hexenol, ocimene and caryophyllene, which we have isolated from several plant species known to be hosts (Fig. 6 & 7).

We plan to refine our trap station by including a chemical lure that can increase trapping efficiency. This improved trap station will be a highly effective tool not only for pest monitoring, but it could potentially become a control measure in itself.

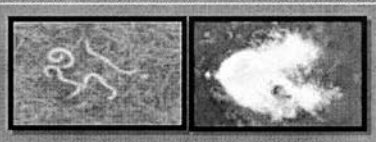


Fig. 3 Entomopathogenic nematodes (*Heterorhabditis bacteriophora*); and an insect larvae infected by nematodes.

Works Cited

Werle, C. T. and B. J. Sampson. 2011. A new method for monitoring strawberry rootworm populations in nurseries. SRA Res. Conf. Proc. 06: 92-96.

Werle, C. T., B. J. Sampson and J. K. Oliver. Diversity, abundance and seasonality of ambrosia beetles (Coleoptera: Curculionidae) in southern Mississippi. Midsouth Entomol. In press.

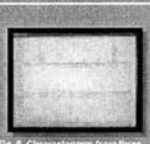
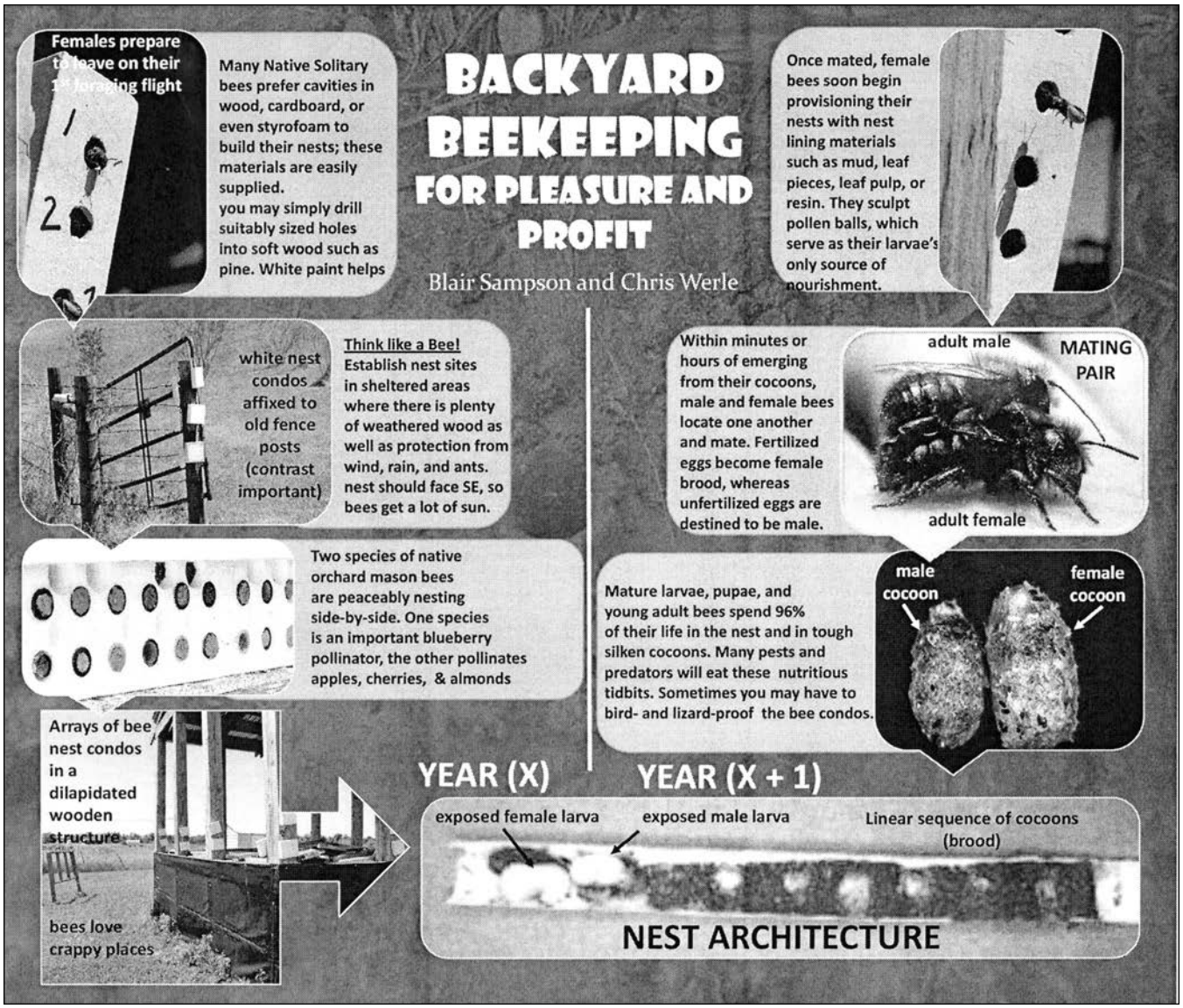


Fig. 6 Chromatogram from three ornamental plant species, showing peaks for plant volatiles.

Fig. 7 GC/MS equipment used to identify plant volatiles; and our novel approach for testing plant volatiles with a SPME fiber.


Females prepare to leave on their 1st foraging flight
Many Native Solitary bees prefer cavities in wood, cardboard, or even styrofoam to build their nests; these materials are easily supplied.
you may simply drill suitably sized holes into soft wood such as pine. White paint helps
BACKYARD BEEKEEPING
FOR PLEASURE AND PROFIT
Blair Sampson and Chris Werle
Once mated, female bees soon begin provisioning their nests with nest lining materials such as mud, leaf pieces, leaf pulp, or resin. They sculpt pollen balls, which serve as their larvae's only source of nourishment.
white nest condos affixed to old fence posts (contrast important)
Think like a Bee!
Establish nest sites in sheltered areas where there is plenty of weathered wood as well as protection from wind, rain, and ants.
nest should face SE, so bees get a lot of sun.
Within minutes or hours of emerging from their cocoons, male and female bees locate one another and mate. Fertilized eggs become female brood, whereas unfertilized eggs are destined to be male.
adult male
MATING PAIR
adult female
Two species of native orchard mason bees are peaceably nesting side-by-side. One species is an important blueberry pollinator, the other pollinates apples, cherries, & almonds
Mature larvae, pupae, and young adult bees spend 96% of their life in the nest and in tough silken cocoons. Many pests and predators will eat these nutritious tidbits. Sometimes you may have to bird- and lizard-proof the bee condos.
male cocoon
female cocoon
Arrays of bee nest condos in a dilapidated wooden structure
bees love crappy places
YEAR (X)
YEAR (X + 1)
exposed female larva
exposed male larva
Linear sequence of cocoons (brood)
NEST ARCHITECTURE

Determining the Suitability of Alternative Greenhouse/Nursery Substrates

Anthony L. Witcher[1], Eugene K. Blythe[2], Glenn B. Fain[3], Kenneth J. Curry[4] and Cecil T. Pounders[1]

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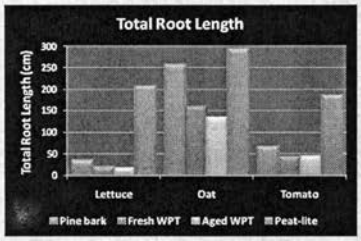
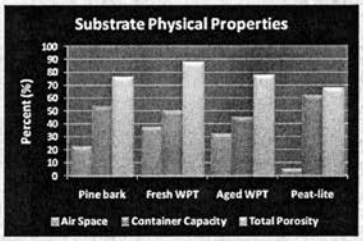
[2]Coastal Research and Extension Center, Mississippi State University, South Mississippi Branch Experiment Station, Poplarville, MS

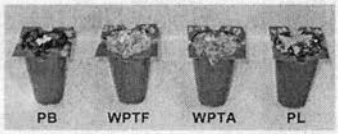
[3]Department of Horticulture, Auburn University, AL

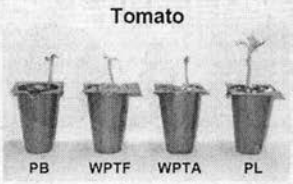
[4]University of Southern Mississippi, Department of Biological Sciences, Hattiesburg, MS

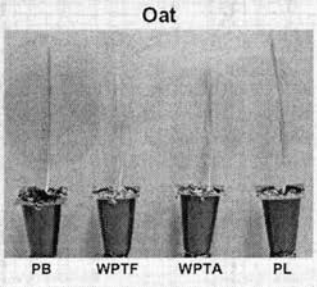


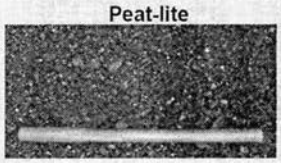
Greenhouse and nursery crop producers have greater awareness and access to materials not traditionally used as container substrates. Materials such as composted plant debris and animal wastes, industrial by-products, and wood biomass have been successfully used for crop propagation and production. Reduced plant growth in wood-based substrates has been attributed to a variety of factors, including phytotoxicity. The objective of our research was to develop a method for identifying phytotoxicity in processed whole pine trees, while examining the potential of such methods for testing other alternative substrates. A seedling growth test was conducted to evaluate root growth of three plant species (lettuce, oat, and tomato) in four substrates [aged (WPTA) and fresh (WPTF) whole pine tree, pine bark (PB), and a peat-lite mix (PL)]. Total root length was significantly greater for PL within each species, while aging the whole pine tree material did not result in significantly greater root length. Substrate air space had a greater effect on root length compared with the substrate chemical properties. Further investigation of substrate physical properties is required to determine which factors contribute to reduced root development.

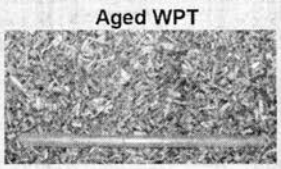












Timing of Fungicide Sprays to Prevent Azalea Web Blight Symptoms

Warren Copes, Research Plant Pathologist, USDA ARS
Austin Hagan and John Olive, Auburn University

GOOD INFORMATION IS KEY TO MAKING SOUND ECONOMIC DECISIONS!

Truth or Myth : Rhizoctonia web blight develops after frequent rains.

Research Facts and Developing Information About Web Blight.

1.Many azalea cultivars are infested with the web blight pathogen (binucleate *Rhizoctonia* fungi) in the nursery.

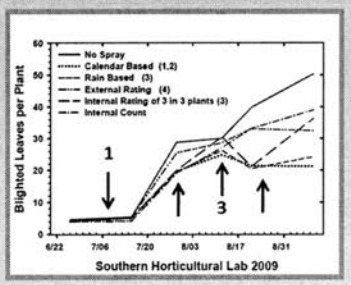
2.Web blight naturally develops in an irregular manner. Web blight develops at different rates within a block of plants of the same age, and between blocks of plants of different ages and cultivars (over about a 5 week period).

3.Web blight development starts before afternoon rain patterns begin, because daily irrigation provides the moisture conditions needed for slow to moderate disease development.

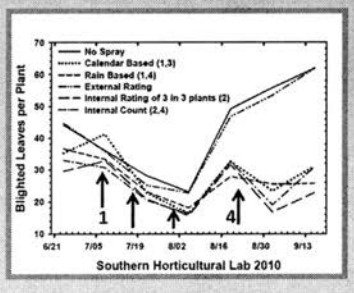
4.The only way to verify which blocks have a high risk of web blight is to look into the canopy of about six plants per block. Also assess risk of web blight based on past and current history of plants (cultivar, plant age, spacing, placement in nursery, weather). By checking several blocks it will be obvious which blocks of plants have more advanced symptoms.

5.Count the number of dead leaves deep within the canopy of about six plants per block. Small plants could have 5 to 30 dead leaves. Large plants could have 10 to 60 dead leaves. The important point is to spray when there is an increased count of 10 to double the number of dead leaves per plant from the previous week.

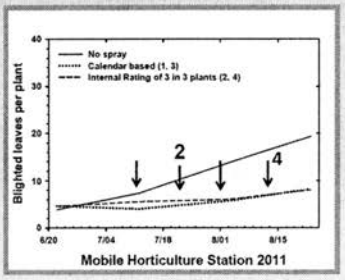
6.Scouting takes about five minutes per block. Alternatives are to spray on set calendar dates or when rainy periods are forecast. Call me if you have questions.



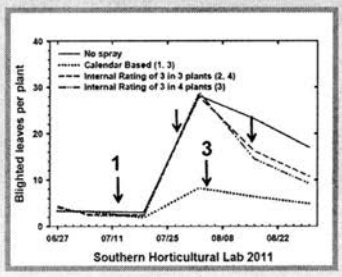
Southern Horticultural Lab 2009



Southern Horticultural Lab 2010



Mobile Horticulture Station 2011



Southern Horticultural Lab 2011

Deciding when to spray.

1.Plan to spray on the calendar dates near July 9 and August 1. This is the most conservative choice for 'Gumpo White' in 1 gal containers.
2.Scouting verifies the current status of blight severity. The problem is web blight can advance rapidly (in several days) when weather conditions become favorable.
3.Spray only the blocks of equal risk for web blight.

The above data has not been fully analyzed yet. The full analysis will include identifying weather conditions that promote the rapid appearance of web blight and will be completed by next spring.

Fungicides inhibit pathogen colonization of plant tissue and prevent (limit) symptom development.
Fungicides are a sophisticated technology, but should not be the first line of defense if other options are economically justified.

Sanitation is a practical control strategy that needs to be developed further for ornamental plant production systems.
The goal is to restrict pathogen movement, so clean plants don't become infected with a potential disease problem.
Currently sanitation practices rely on generalized facts and possibly are not achieving maximum benefit.
Reasons sanitation can be effective are 1) new growth media is used for each crop, 2) areas can be sanitized prior to introducing a new crop, 3) plants are moveable thus can be placed in specific areas of the nursery to minimize across crop contamination, 4) management activities can be used beneficially, and 5) the entire plant is removed from the location when sold.

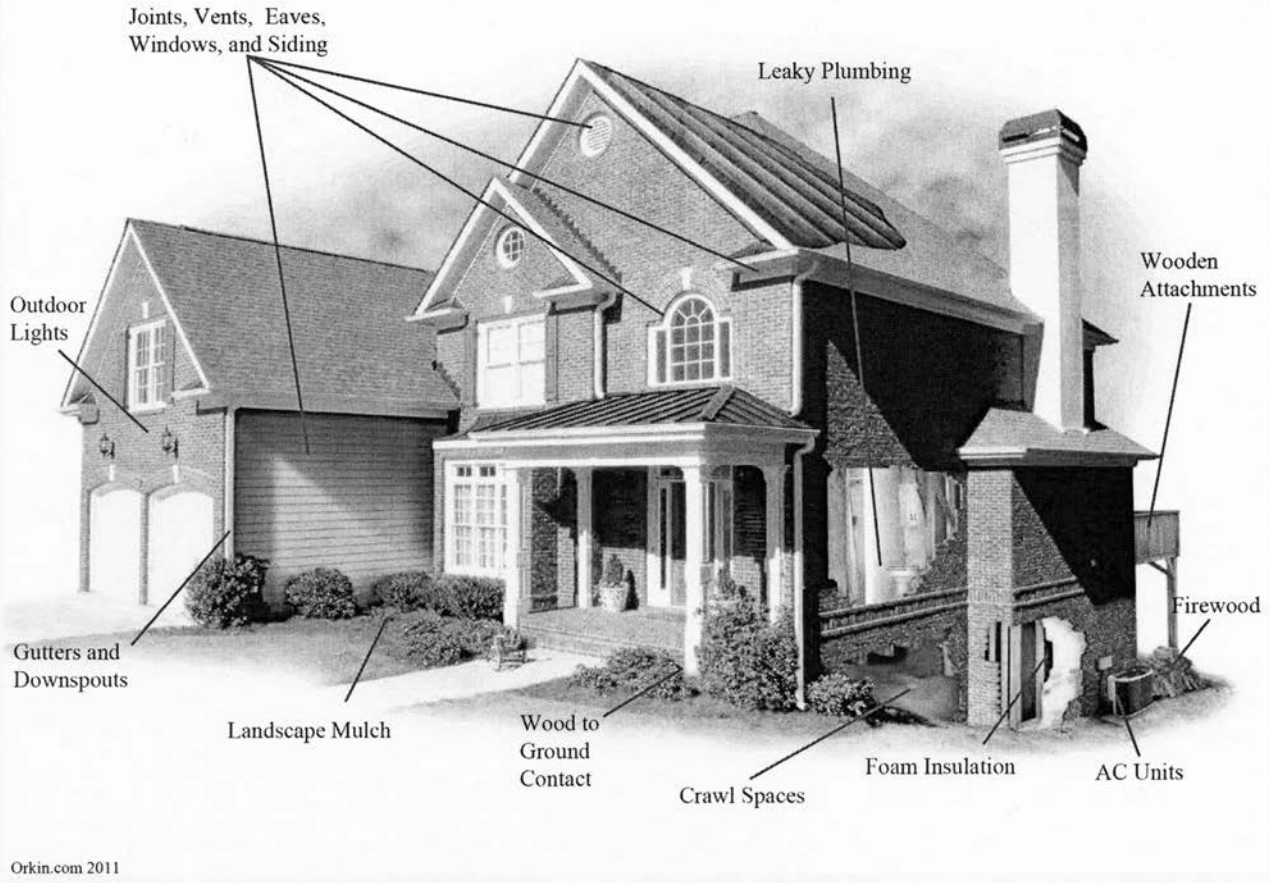
Sophisticated Disease Controls Have To Be User Friendly To Be Useful To Commercial Producers!

Mississippi State University

K.C. Lee and Eldon J. Mallette

Coastal Research and Extension Center, Poplarville, MS 39470 (**kcl61@msstate.edu**)

Identification of residential problem areas that could provide a conducive environment for a termite infestation



Integrating Mississippi MarketMaker in Marketing Flowers, Grains, Herbs, Fruits, Nuts and Vegetables

Dr. Benedict Posadas, Amanda Seymour and Randy Coker
Mississippi State University, Coastal Research and Extension Center

What is MarketMaker?

MarketMaker is an interactive mapping system that locates businesses and markets of agricultural and seafood products in Mississippi, as well as in other member states, providing an important link betweenproducers and consumers.

Why should you register your business in MarketMaker?

MarketMaker is FREE for marketing your business and products. As of now 16 states and Washington D.C. are registered with MarketMaker and currently undergoing the registration process are two more states. That is a lot of geography covered for a FREE marketing tool!

What can happen if I do not register with MarketMaker?

You could lose potential clients and sales because you are not participating in the FREE marketing tool. On the other hand, absolutely nothing could happen, but that is not a good thing either!

What Information do I need to register in MarketMaker?

- Business Type
- Products available
- Contact Information
- Hours of Operation
- Up to five pictures (optional)
- Anything else you would like the public to know about your business!

MISSISSIPPI STATE UNIVERSITY
COASTAL RESEARCH & EXTENSION CENTER

MISSISSIPPI STATE UNIVERSITY

Integrating Mississippi MarketMaker in Marketing Flowers, Grains, Herbs, Fruits, Nuts and Vegetables

Dr. Benedict Posadas, Amanda Seymour and Randy Coker
Mississippi State University, Coastal Research and Extension Center

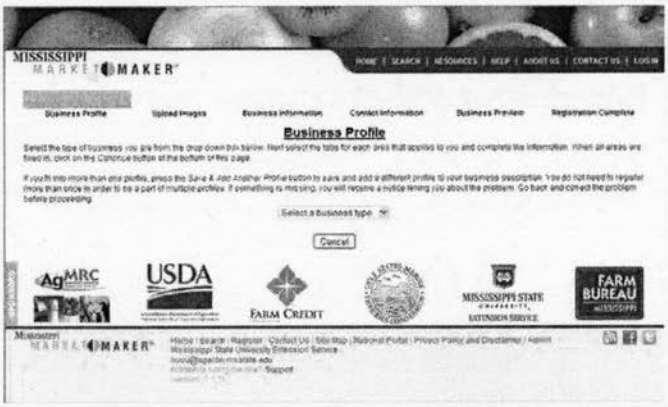
How do I register and update my business on MarketMaker?

1. Step one: Go to Mississippi MarketMaker by finding it on Google and/or Yahoo and click on the state where your business is located.

2. Step two: Click on "Register Your Business"

3. Step three: Follow the on screen instructions to input your business information.

Once you submit your information, you will automatically receive an email from MarketMaker that will include your username and temporary password. This access will allow you to make changes to your profile and keep the information up to date. When you receive the email, log into your account through the URL in Step 1 and change your password to one that you will remember. Your information should appear on the website within 1 to 2 business days.



Are there any workshops or technical assistance if needed?

Yes! The MarketMaker team hosts a workshop every couple of months, to view the schedule, check out the webpage: http://coastal.msstate.edu/MSMMWorkshops.html. Also, team is available to call or email for assistance, information is below.

Benedict Posadas, 228-546-1024 or benp@ext.msstate.edu

Amanda Seymour, 228-546-1044 or aseymour@ext.msstate.edu

Randy Coker, 228-762-7783 or rcoker@ra.msstate.edu

MISSISSIPPI STATE UNIVERSITY

Hibiscus 'Lufkin Red' & 'Lufkin White'

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USDA, ARS, Poplarville, MS 39470
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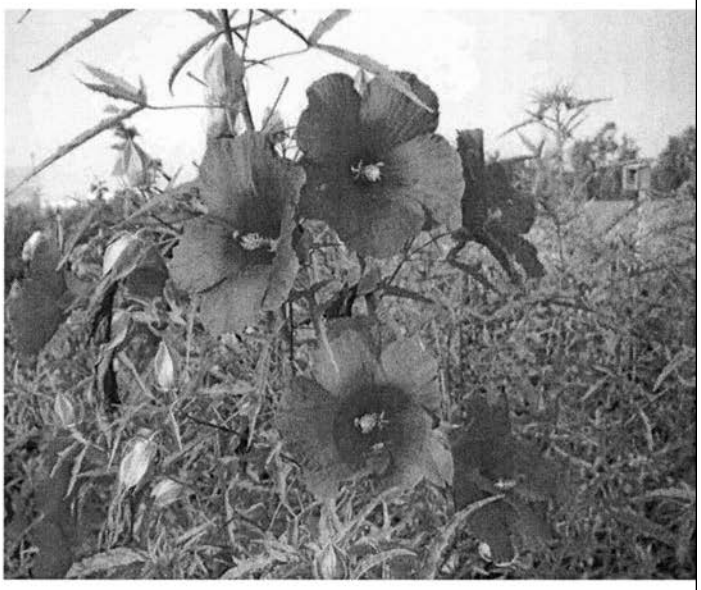

The Agricultural Research Service, United States Department of Agriculture, has released *Hibiscus laevis* 'Lufkin Red' and 'Lufkin White', two new hardy native ornamental hibiscus. These cultivars are recommended for trial by gardeners and horticulturists as summer flowering perennial landscape plants nationwide, but selections are particularly adapted to conditions in the South. Plants have exceptional flowers and outstanding disease resistant foliage. The form and scale of the selections are ideally proportioned for inclusion as a component of perennial borders and gardens.

Plants develop rapidly in containers and, in addition to leaf-spot resistance, display good tolerance to other common pests. Ultimate plant size is dependent on container size and environmental conditions with plants in a #3 nursery pot growing to 2 feet high x 1 foot wide within 3 months under optimum conditions. Under landscape conditions plants should mature to approximately 4 feet high x 5 feet wide. Plants die to ground level each winter and build a large multi-stemmed clump after several seasons of regrowth.

Micropropagation of *Solanum aethiopicum* L. (Scarlet Eggplant): Effect of Genotype and Culture Media

Carrie Witcher and Hamidou Sakhanokho

A copy of this poster will be available as a hand-out at the field day.