

# Pollination, the Grand Interaction Among Flowers, Bees, Growers and Beekeepers

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# Squash Production Requires Pollination



# Why Do We Need Bees?



**Fruit and Vegetable Production Requires Pollination**

## Annual Pollinated Crop Value

Ø United States – \$14.6 Billion

Ø Tennessee - \$300+ Million



# Tennessee Apiculture Programs

A photograph showing two beekeepers in white protective suits and veils working with several white beehives in a field of purple flowers. The background is a dense line of trees.

## Extension and Research

Estimated Economic Impact After Surveys:  
Reducing Losses to One-Half of Average Loss.  
Saving 10,000 Colonies Valued at \$1,720,000.

# **If Flowers Are Restaurants to Bees, Then What Are Bees To Flowers?**

- **Hungry?**
- **Thirsty?**
- **Robots?**
- **Sexual Facilitators?**
- **Fooled?**
- **Pollinators, of Course!**
- **Partners +**

# Comparing Flowers to Restaurants

Ø Both Offer Food “Rewards”.

Ø Bees Need Nectar as Carbohydrate and Pollen as Protein.

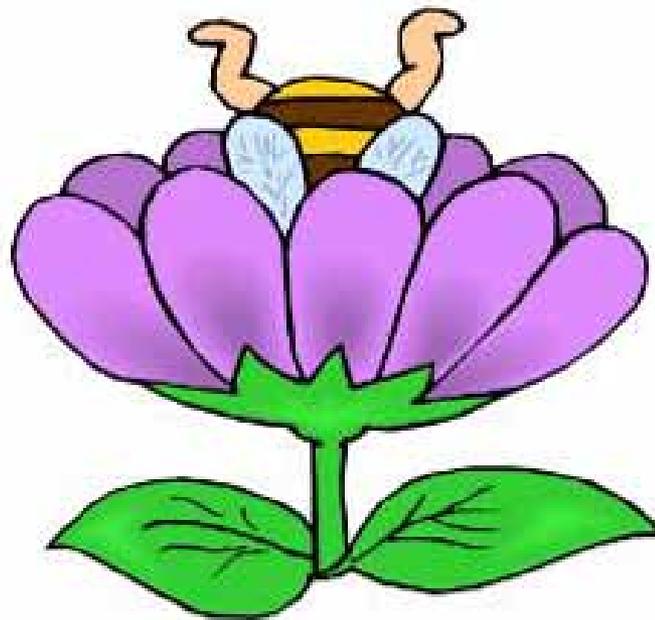
Ø People Need Carbohydrates and Proteins.

Ø Both Advertise to Attract Visitors.

Ø Flowers are “Signs” to Bees.

Ø Restaurants Use Signs to Attract People.

Yum ! I Found the Goodies  
Nectar!





**GOT POLLEN?**

# What is the “Purpose” of Flowers?

Ø Advertisement to Attract Pollinators.

Ø VISUAL

Ø Color – Visible to Bees – Blue, White, Yellow

Ø Bees “See” UV but not “Red”.

Ø Nectar Guides of Contrasting Color.

Ø TEXTURE – Affects reflection of light

Ø FORM + DEPTH + SHAPE



**Salvia coccinea**



**Salvia sp.**





**Henbit –**

**Note red  
pollen on  
bees head**

**Note –  
Purple  
”nectar  
guides”**





PLUM  
TREE

CHINESE  
RESTAURANT

龍

樓

13

HARRY'S

WATSON'S FACTORY STORE

WATSON'S FACTORY STORE

WATSON'S FACTORY STORE

DENTON'S  
NEW! CHICKEN FINGERS



CHICKEN FINGERS  
BUFFALO FINGERS

NEW!  
TRY ONE TODAY

NEW!  
TRY ONE TODAY





Neighborhood Grill & Bar  
TRY OUR NEW  
"YOU PICK TWO" COMBOS  
\$9.99

Wendy's

WORLD  
FUTON

Wendy's

Wendy's

Wendy's

Wendy's





Chick-fil-e

CHICK-FIL-E

FLO  
AM

Office  
DEPOT

OPEN  
7 DAYS

PAY  
SUPPLIES

WAL-MA











McDonald's

west hills  
CENTER

LAWSON'S  
BACK  
HARDWARE  
ELECTRIC  
PLUMBING

HICKORY  
AMERICA

Chick-fil-A



McDonald's

**DUNKIN'**  
**DONUTS**



DOUBLE DRIVE THRU







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**Evening primrose (*Oenothera biennis*): To the human eye the flower looks solid yellow but insects can aim for the bullseye in the centre**



Red Lobster



AMERICAN  
LIGHT  
HOUSE

Hair

TRAVEL







*Malus sylvestris*



M01032  
mbleeker@euronet.nl













**\$35.95**  
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**ALTIAD  
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Budget

**\$35.95**

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INDOOR POOL • RESTAURANT • HDI

**ORS**  
**EST**  
891-6393

LARGE





**BARNHILL'S BUFFET**

THE 3 SEASONS  
PARTY & EVENT STORE

AUTO  
ROUTER



Springdale

N Gallaher View RD 100 →

**HOOTERS**  
NEXT EXIT, RIGHT 1/2 MILE

**LJ LAMON JEWELERS**  
• Master Jewelry Craftsmen • Platinum Designs  
• Direct Diamond Source • Regalia's White-U-Wait  
**NEXT EXIT - RIGHT 2 BLOCKS**

THE GREAT  
SEAFOOD  
MALL

PIG-Y IMPRES

**HOOTERS**





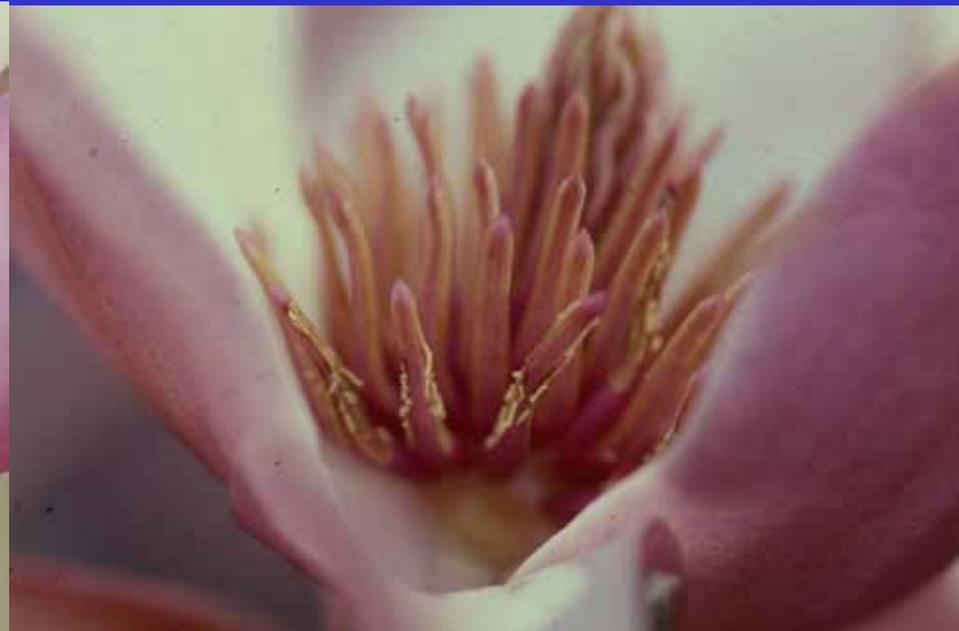
**LUNCH SPECIAL**  
**HAM & CHEESE FRIES \$5.49**  
**WING SPECIAL 3-6**

**2001 CALENDARS R HERE**

# Magnolia Flower



**1. Stigmas Receptive First  
Female First = Protogynous**



**2. Anthers Open Later  
Male Stage**



**Bumble Bees Buzz Pollinate Rabiteye Blueberry**



# Carpenter Bee Perforates Corolla



Ø Honey Bee “Thieves  
Nectar”



**I am glad  
Tennessee skunks  
are not this large!**



# Honey Bees, Pollination and Dogwoods? – You’ve Got To “Bee Kidding”

John A. Skinner

J. Patrick Parkman

Michael D. Studer and

Mark “Dogwood”

Windham



# Dogwood Breeding Project

## “Fooling the Bees”

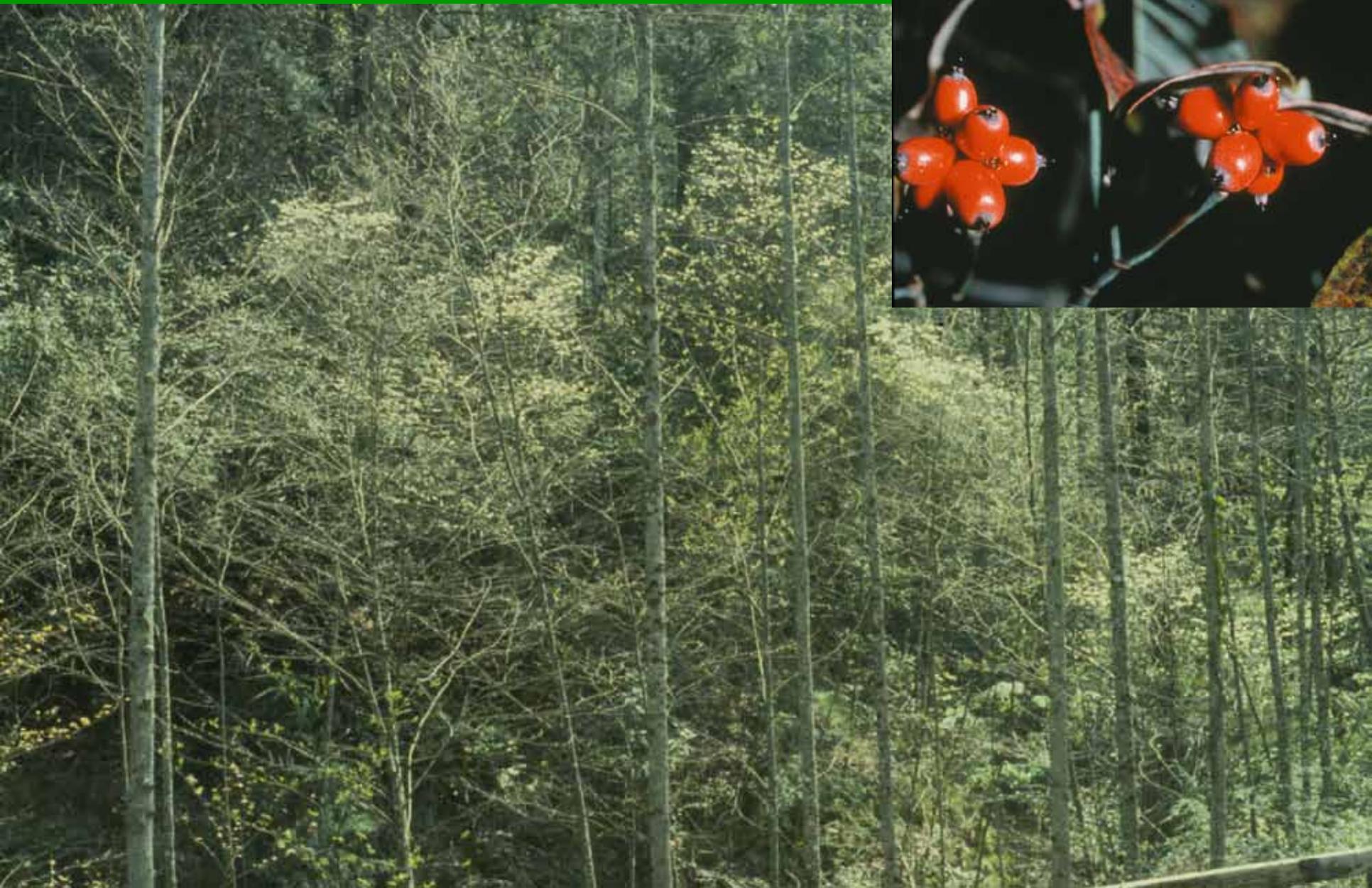




# \$ Dogwoods Are A Major Nursery Crop \$



# Native Dogwoods Provide Food For Wildlife



# Dogwood Diseases Cause Major Problems

Dogwood Anthracnose

Ø *Discula destructiva*

Ø Lesions on leaves

Ø Twigs, bark.

Ø Aided by cool wet

Ø weather

Powdery Mildew

Ø *Microsphaera corni*

Ø White Lesions on leaf surface.

Ø Distorted foliage.

Ø Aided by warm dry weather followed by cool nights.



# *Cornus florida* cultivars

## • **Appalachian Spring**

• White Bracts

• Resistant to Anthracnose

• Susceptible to Powdery  
Mildew

## • **Cherokee Brave**

• Pink Bracts

• Resistant to Powdery  
Mildew

# Overall Goal

To produce a white dogwood that is resistant to anthracnose and powdery mildew.

# Dogwood Pollination

- ü Dogwoods Probably Native Bee Pollinated?
- ü Dogwoods Not Attractive to Honey Bees?
  - ü Very Low Nectar Production
  - ü More Attractive Nectar Plants Nearby?
  - ü Pollen Only?
- ü Pollination Studies Incomplete



# Cultivars in Cages With a Nucleus Colony of Honey Bees



# Trick or Treat The Bees?

- ü Create a False Nectary of Sugar Syrup
  - ü Gives Forager Food
  - ü Reward Reinforces Behavior
- ü Place at Base of Bracts – Careful Now!
- ü Add QMP – Queen Mandibular Pheromone
  - ü Adds Scent Cue
  - ü Cue Reinforces Behavior
- ü Low and “Beehold” – It Works!





**The End**



**TENNESSEE HONEY HOUSE**