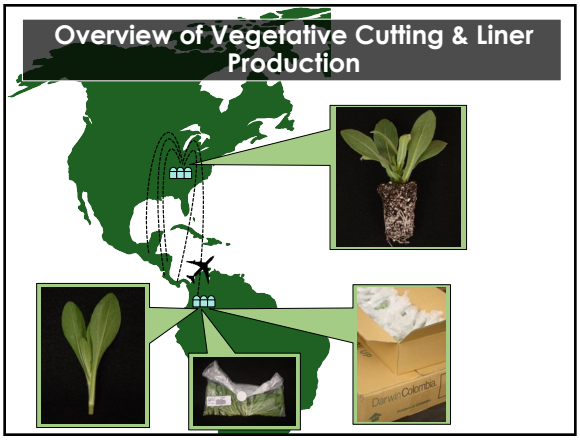
Successfully Rooting Vegetative Cuttings

W. Garrett Owen, Ph.D.
Floriculture Outreach & Research
wgowen@msu.edu
MICHIGAN STATE UNIVERSITY

Outline

I. Why?
II. Getting Started
III. Cultural Practices
   1. Rooting hormone
   2. Fertility
IV. Environmental Practices & Management
   1. Light
   2. Temperature

Overview of Vegetative Cutting & Liner Production



Developmental Phases

- **Horticultural Stages of Rooting Cuttings**
  - **Stages 0 – 1: Harvesting/sticking**
    - Harvest cuttings from stock plants
  - **Stage 2: Callusing**
    - Callus formation
  - **Stage 3: Root development**
    - Initiation & development of roots
  - **Stage 4: Toning**
    - Continuous root formation & shoot development resulting in "pullable" liners

(Dole and Gibson, 2006)

I. Why propagate your own cuttings?

I. Why propagate your own cuttings?

- Shorter production time

I. Why propagate your own cuttings?

- Shorter production time

Crop	128-Tray	
	Seed	Vegetative Cuttings
Coleus	7 – 8 wks	3 wks
Dahlia	7 – 8 wks	3 wks
Geranium	7 wks	4 – 5 wks
Petunia	7 – 8 wks	3 – 4 wks

(Styer and Koranski, 1997) (Dole and Gibson, 2006)

I. Why propagate your own cuttings?

- Shorter production time
- Production of sterile or seedless cultivars

I. Why propagate your own cuttings?

- Shorter production time
- Production of sterile or seedless cultivars
- Genotypic and phenotypic uniformity

I. Why propagate your own cuttings?

- Shorter production time
- Production of sterile or seedless cultivars
- Genotypic and phenotypic uniformity

YOU have **CONTROL**

I. Why propagate your own cuttings?

- Shorter production time
- Production of sterile or seedless cultivars
- Genotypic and phenotypic uniformity

YOU have **CONTROL**

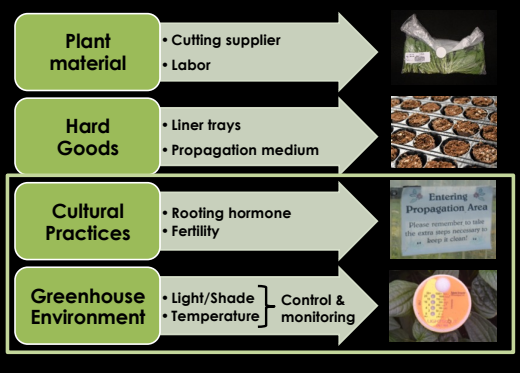
YOU know the **history** of the crop

II. What do I need to start propagating my own cuttings?

II. Getting Started

- You do not have to:
  - Buy or have top-of-the-line equipment

II. Getting Started



III. Cultural Practices
Rooting Hormone Applications

III. Cultural Practices
Rooting Hormone Applications

- Commercially available rooting compounds

Liquid	Powder
Dip' N Grow	Hormodin
IBA Water Soluble Salts	Rhizopon
C-mon C-mone K C-mone K+	Hormex

*List of examples. For a complete list, refer to Dole and Gibson (2006).

III. Cultural Practices
Rooting Hormone Applications

- **Do I need to apply to all unrooted cuttings?**

III. Cultural Practices
Rooting Hormone Applications

- **Do I need to apply to all unrooted cuttings?**
  - Not required by all bedding plants
  - Essential for economical rooting of difficult-to-root plants
    - Accelerate root initiation
    - Increase rooting uniformity and quality

III. Cultural Practices
Rooting Hormone Applications

- Rooting hormone requirements

Low	May Benefit	High
Angelonia	Argyranthemum	Coral bells
Coleus	Bacopa	Dahlia
Gaillardia	Calibrachoa	Hydrangea
Impatiens	Coreopsis	Osteospermum
Ipomoea	Fuchsia	Poinsettia
Lamium	Geranium	Scaevola
Petunia	Lavender	Thunbergia

*List of examples. For a expanded list, refer to Dole and Gibson (2006).
**Supplemented with information supplied by Dr. Royal Heins.

III. Cultural Practices
Rooting Hormone Applications

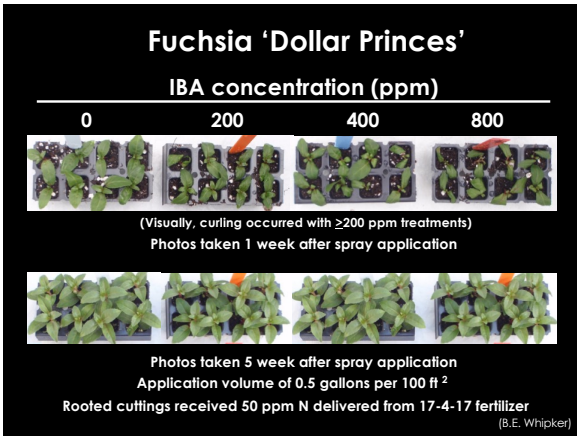
Labor intensive **Time consuming**

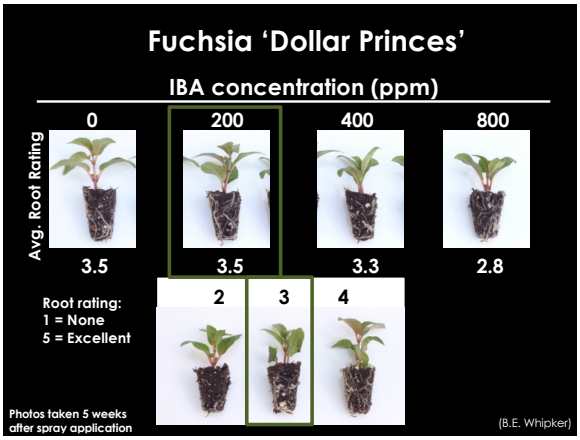
III. Cultural Practices
Rooting Hormone Applications

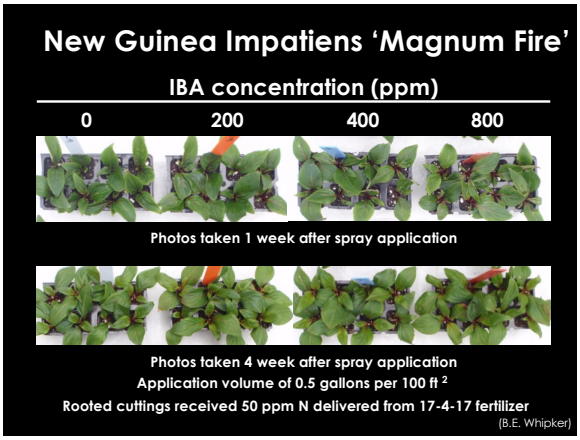
- **IBA Foliar Spray – An alternative option!**

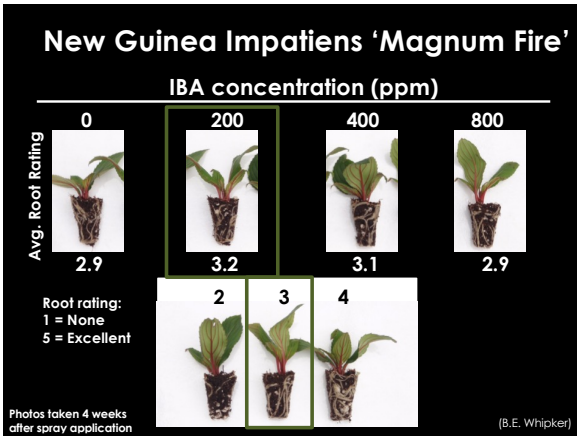
III. Cultural Practices
Rooting Hormone Applications

- **IBA Foliar Spray – An alternative option!**
  - Apply after sticking
    - To the point of runoff
  - IBA concentration lower than recommended rate for cutting dips
    - Rates and concentrations for specific crops
    - **Conduct a small in-house trial**









III. Cultural Practices
Rooting Hormone Applications

- In general, rooting was less at higher IBA concentration rates
  - Distorted growth occurred
- Optimal IBA concentration for foliar sprays is considered to be around 200 ppm

III. Cultural Practices
Fertility

III. Cultural Practices
Fertility

- **Do I need to provide cuttings with nutrition during propagation?**

III. Cultural Practices
Fertility

- **Do I need to provide cuttings with nutrition during propagation?**
  - Low nutrition at stick and throughout propagation
    - Slow to root and non-uniform rooting
    - Cuttings will become nutrient deficient
    - Greater susceptibility to diseases

III. Cultural Practices
Fertility

- Do I need to provide cuttings with nutrition during propagation?
- **When do I start?**

III. Cultural Practices
Fertility

- **When do I start?**
  - Tissue nutrient concentrations often drop
    - After cutting harvest (Stage 0) to just after sticking (Stage 1)
    - Increase at root formation (Stage 3)

III. Cultural Practices
Fertility

- Do I need to provide cuttings with nutrition during propagation?
- When do I start?
- **How do I provide cuttings nutrition?**

III. Cultural Practices
Fertility

- **How do I provide cuttings nutrition?**
  - Water-soluble
    - Mist
    - Hand irrigated (daily)

III. Cultural Practices
Fertility

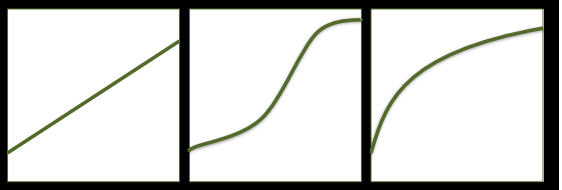
- **How do I provide cuttings nutrition?**
  - Water-soluble
    - Mist
    - Hand irrigated (daily)
- Up to 13 lbs./1000 ft^2 N may be applied during propagation
  - 24% of N being leached (Santos et al., 2009)

III. Cultural Practices
Controlled-release Fertilizers

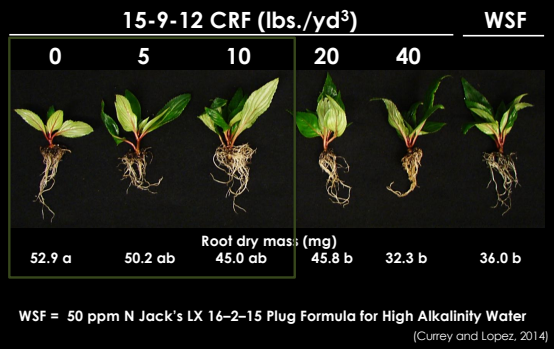
- Application
  - Incorporated
- Types
  - Urea-Formaldehyde
  - Sulfur-Coated
  - Polymer-Coated
- Release rate

III. Cultural Practices
Controlled-release Fertilizers

- Blended formulations control release

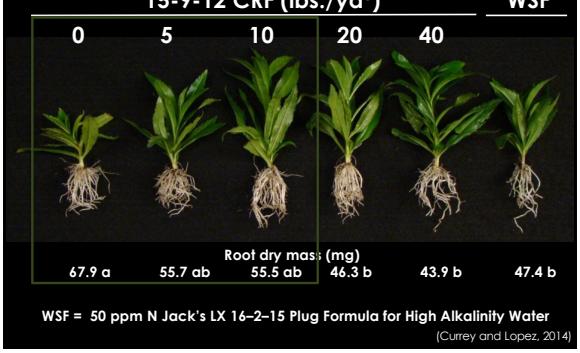


New Guinea Impatiens
'Celebrette Rose Hot'



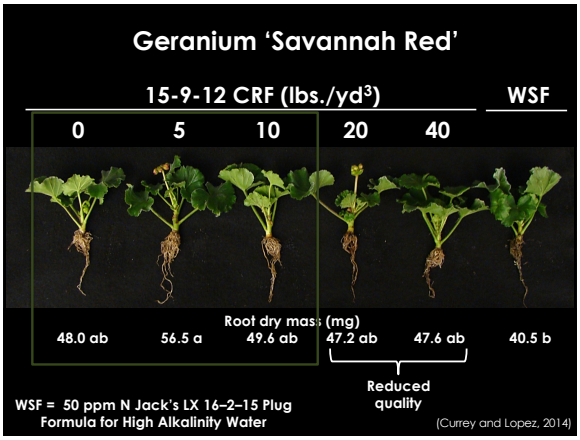
WSF = 50 ppm N Jack's LX 16–2–15 Plug Formula for High Alkalinity Water
(Currey and Lopez, 2014)

Angelonia 'Sundancer Pink'

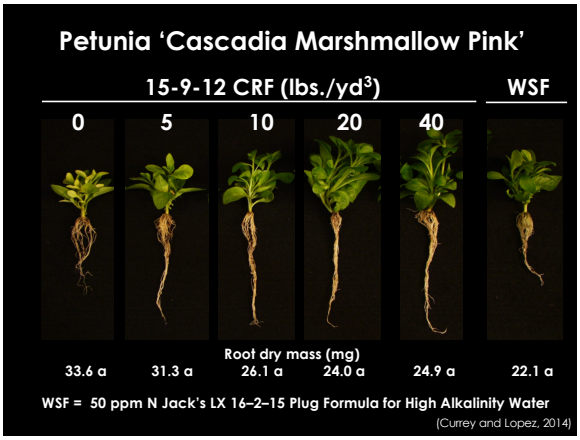


WSF = 50 ppm N Jack's LX 16–2–15 Plug Formula for High Alkalinity Water
(Currey and Lopez, 2014)

Geranium 'Savannah Red'



Petunia 'Cascadia Marshmallow Pink'

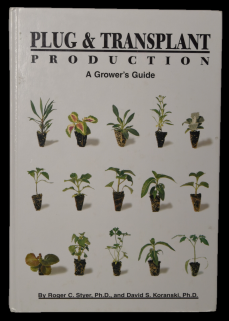


III. Cultural Practices
Controlled-release Fertilizers

Controlled-release fertilizer (lbs./yd³)	Cost per 105-cell tray
5	$0.04
10	$0.07
20	$0.15
40	$0.30

(Currey and Lopez, 2014)

Resources



www.flor.hrt.msu.edu