

More on Longleaf Toppling and Growing Longleaf Pine in Containers

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Toppling and Root Development in Container Longleaf and Container Loblolly

Tree *toppling* is a term used to define instability in young stands: trees are not completely windthrown, but lean at various angles and continue to grow.

G.F. Dykstra 1975
Tree Planters' Notes 25:21-22

Reports of Toppling

Species	Year	Hurricane
Loblolly (SC)	1989	Hugo
Longleaf (AL)	1995	Opal
Loblolly (NC)	1998	Bonnie
Longleaf (NC)	1999	Floyd
Loblolly (NC)	1999	Floyd
Loblolly (NC)	1999	Floyd
Longleaf (LA)	2002	Lili
Longleaf & Loblolly pine (GA)	2004	Winds >45 mph
Longleaf (AL)	2004	Ivan
Longleaf & Slash (LA)	2005	Rita & Katrina

Reports of Toppling

Species		Year	Hurricane
Loblolly (SC)	Bareroot	1989	Hugo
Longleaf (AL)	Container	1995	Opal
Loblolly (NC)	Container	1998	Bonnie
Longleaf (NC)	Container	1999	Floyd
Loblolly (NC)	Container	1999	Floyd
Loblolly (NC)	Container	1999	Floyd
Longleaf (LA)	Container	2002	Lili
Longleaf & Loblolly	????????	2004	Winds >45 mph
Longleaf (AL)	Container	2004	Ivan
Longleaf & Slash (LA)	Container	2005	Rita & Katrina









Our Hypothesis....

- Once air pruning of the tap root begins (which occurs in all container seedlings and species), the formation of the callus under certain conditions and over time prevents new roots from forming in the area of the callus and acting as a tap root(s).

Study Specifics

- Containerized longleaf & loblolly seedlings.
- 2008 container longleaf grown in 93 cc volume cavity
- 2009 – 2010 container longleaf and container loblolly grown in 122 cc volume container
- Seedlings grown:
 - 1 month in container + 4/5 months in box (30 seedlings)
 - 2 month in container + 4/5 months in box (30 seedlings)
 - 3 month in container + 4/5 months in box (30 seedlings)
 - 4 month in container + 4/5 months in box (30 seedlings)
 - Etc.
 - 10 months in container + 4/5 months in box (30 seedlings)



Results of study

- A percentage (3-20%) of container longleaf and loblolly pine never formed a taproot.
- Container loblolly had a higher incidence of no taproots than container longleaf.
- A lack of taproot formation was observed only after the taproot was **air pruned** at the bottom of the container.



No tap root - numerous
strong first order laterals



No tap root
Note growth on first order lateral



3 tap roots



1 strong tap root plus several very small tap roots



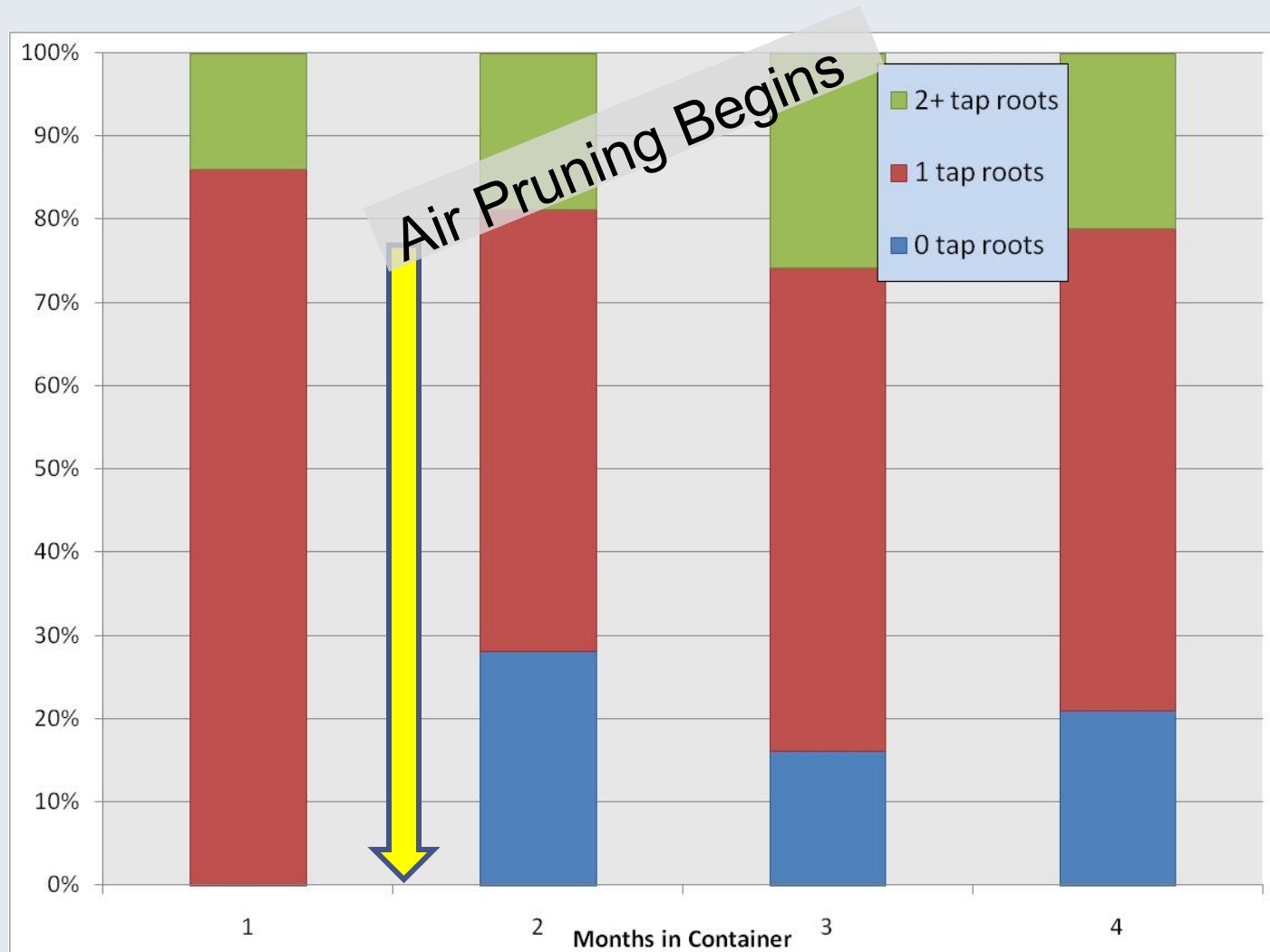
Our “Gummy” root



- Research Toward Increasing Nursery Productivity

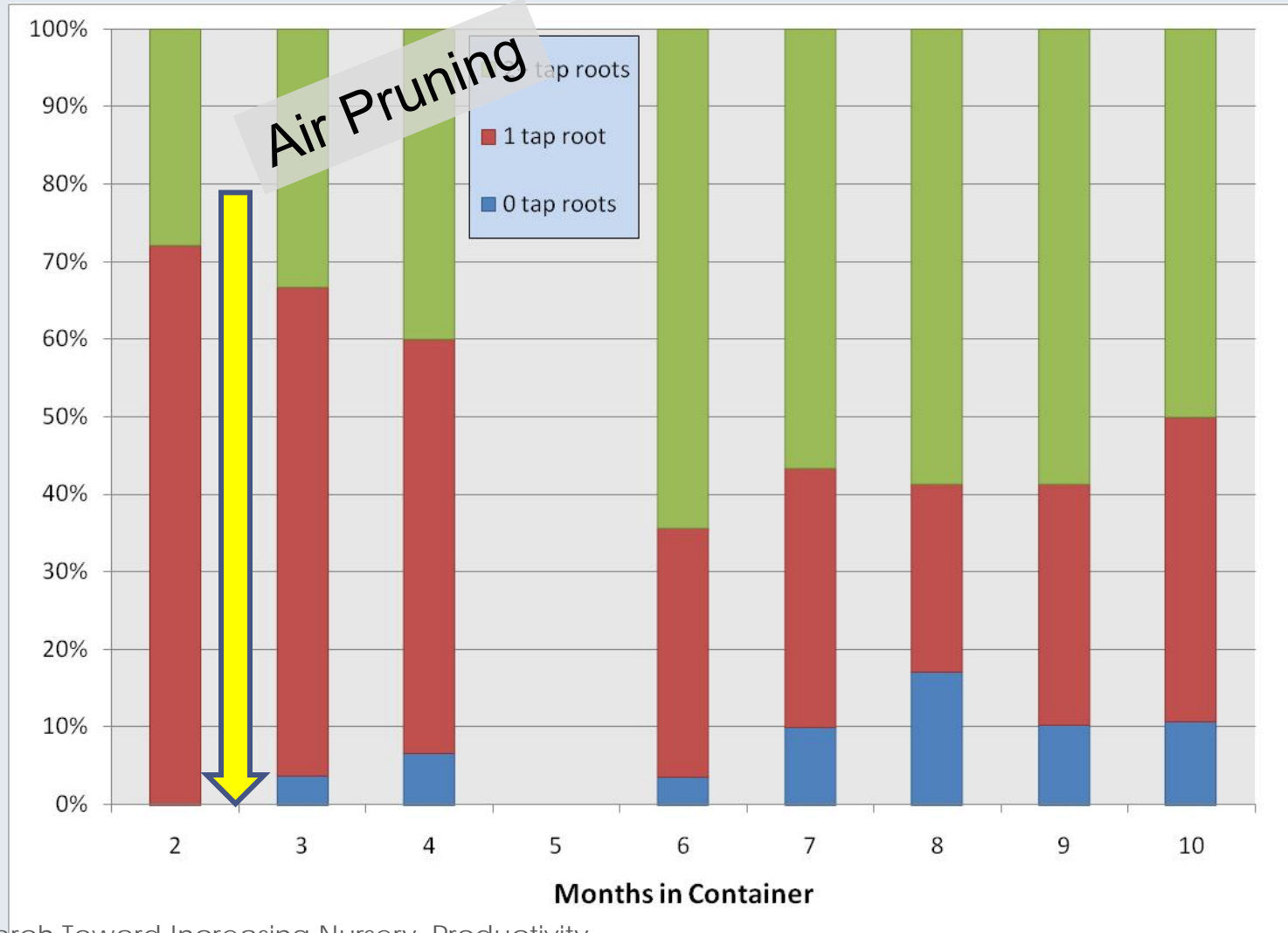
2008 longleaf results

93 cc container



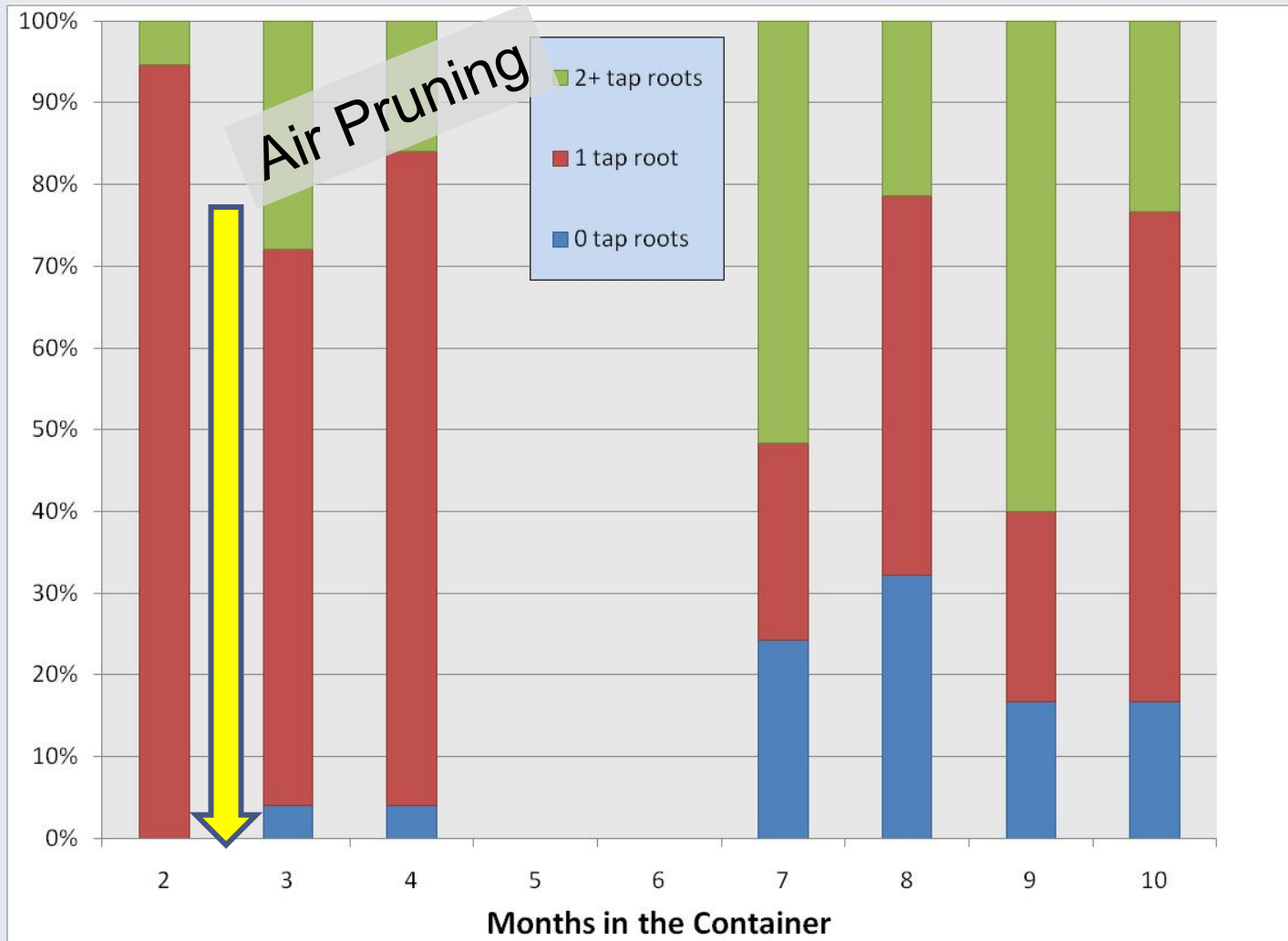
2010 longleaf pine

in 122 cc container



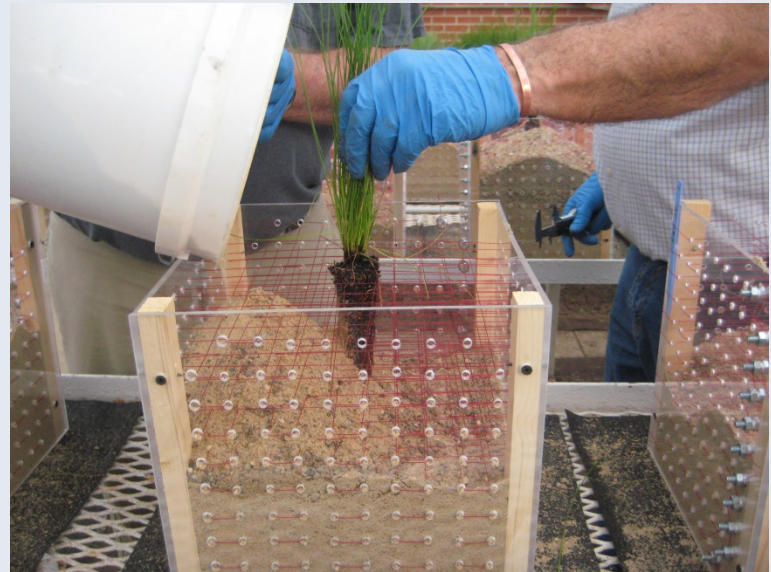
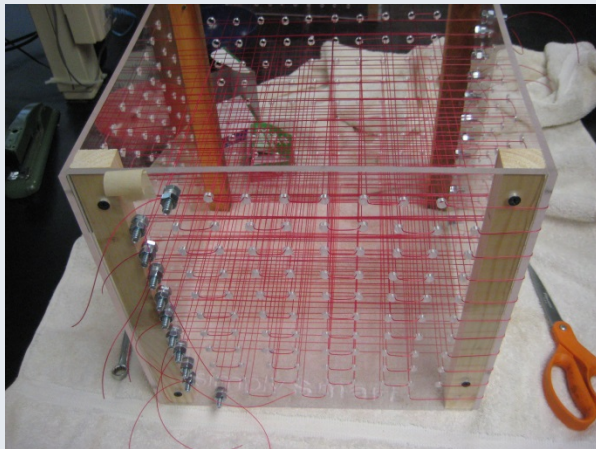
2010 loblolly pine

in 122 cc container



Current Longleaf Root Studies In Progress

- Longleaf root morphology – clipping + IBA
- Plexiglass container type root development
 - 2013 – Loblolly using 4 container types
 - 2014 – *Longleaf* using 6 container types



NC Nursery Clipping Study

~600 seedlings

NC Nursery @ Goldsboro 2012 Number of taproots on longleaf with taproot clipped or not clipped										
Treatment	Number of Taproots									
	0	1	2	3	4	5	6	7	8	
Not Clipped	85	102	72	22	13	0	0	1	1	
Clipped	65	171	47	9	1	1	2	0	0	

2013-14 Longleaf root morphology

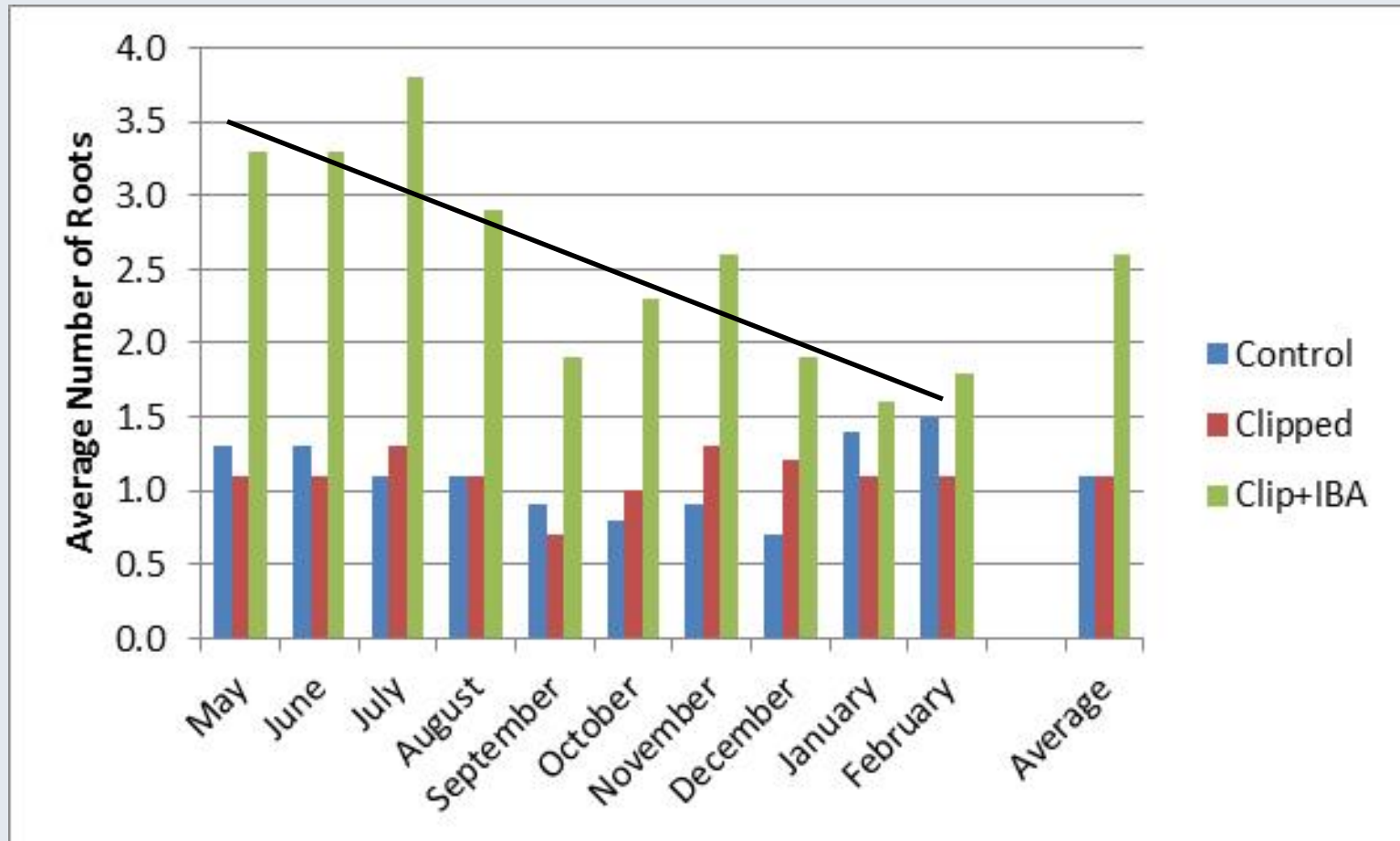
– clipping + IBA (0.3%)

- Treatments:
 - No clipped (18 Seedlings)
 - Clipped (1-2 mm tap root callus clipped) (18 Seedlings)
 - Clipped + IBA (18 Seedlings)
- Seedlings grown:
 - 1 month in container + 4/5 months in box
 - 2 month in container + 4/5 months in box
 - 3 month in container + 4/5 months in box
 - 4 month in container + 4/5 months in box
 - etc.
 - 10 months in container + 4/5 months in box

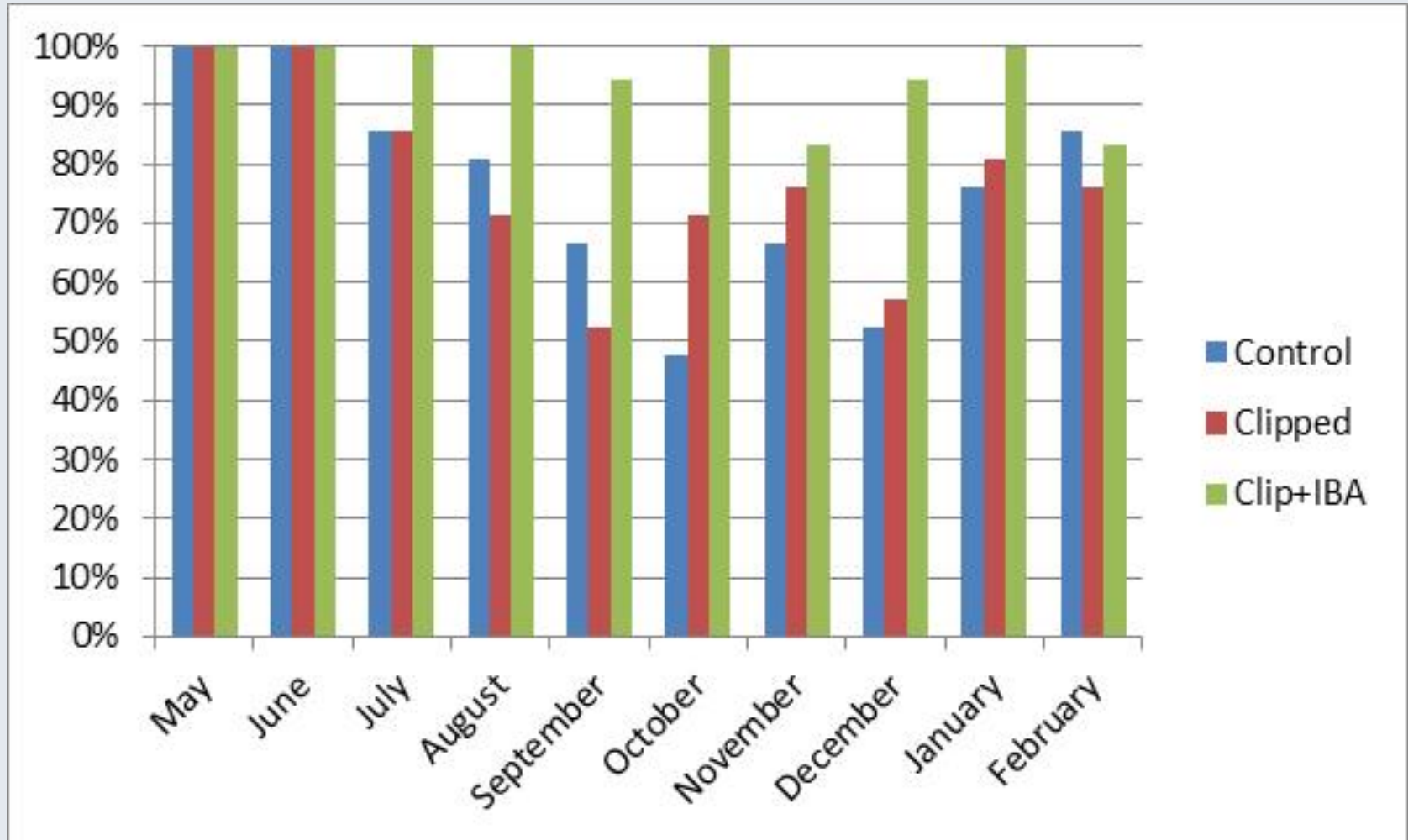
What is IBA?

- IBA (indole-3-butyric acid) is a plant growth regulator, used to promote and accelerate root formation of plant clippings and to reduce transplant shock of ornamental nursery stock.
- IBA has been classified as a biochemical pesticide because it is similar in structure and function to the naturally-occurring plant growth hormone indole-3-acetic acid.

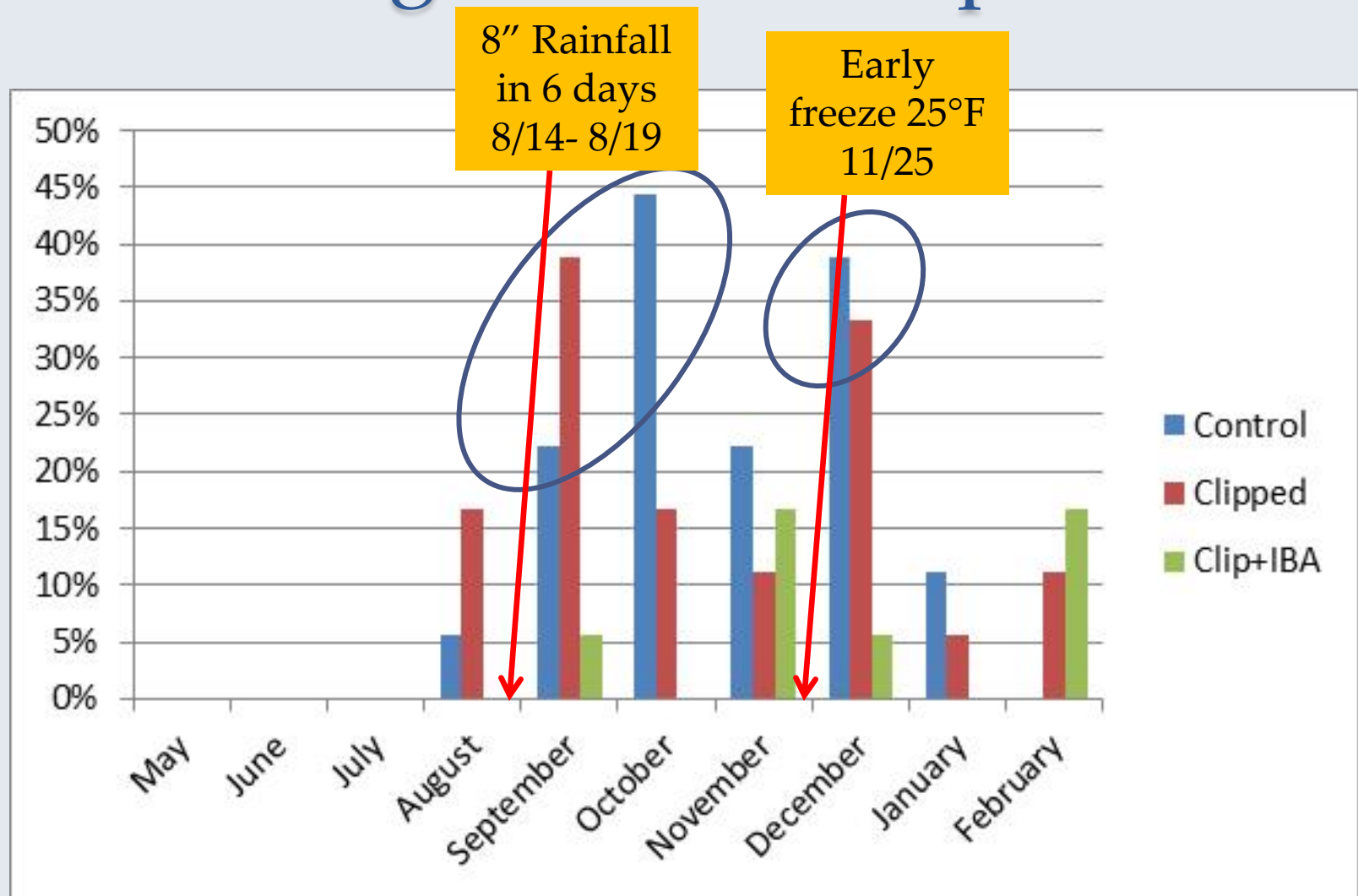
Average Number of Roots Per Treatment



Seedlings With 1 or More Tap Roots



Seedlings With No Tap Root





Clipped with IBA

Questions?

