Longleaf Container Tap Root Development

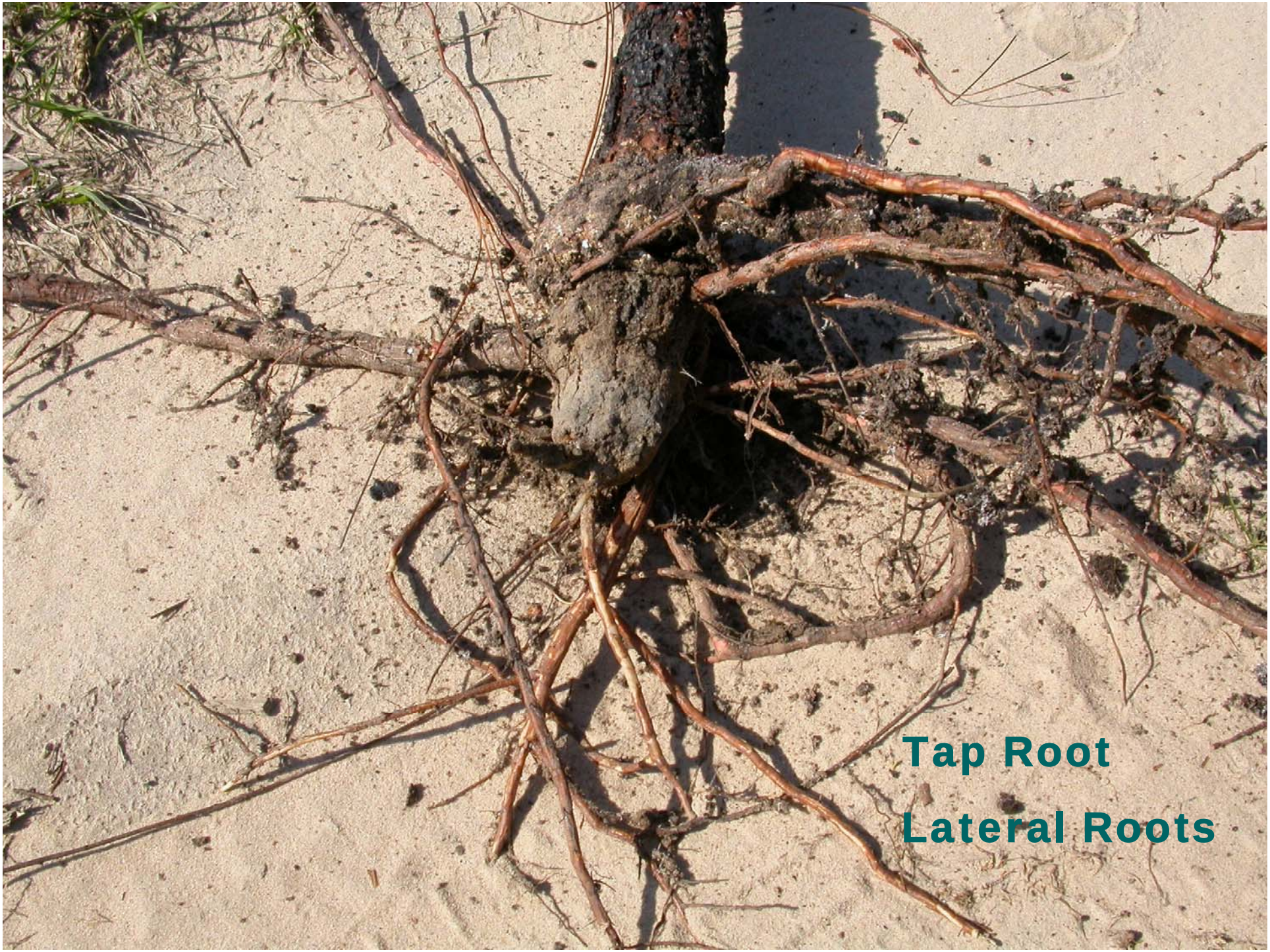
Tom Starkey

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	Jeanne
Longleaf (AL)	2004	Ivan ?
Longleaf & Slash (LA)	2005	Rita & Katrina

A Hypothesis to think about…

- Rooted cuttings and container grown trees are very similar in many ways.
- Not all pine rooted cuttings (Lob & Slash) root. A percentage (5% to 30% average of families) never root.
- This may be similar for Container grown trees – (Lob, Slash, LL). They also form a callus as a result of air pruning. Why should we expect 100% adventitious root development from them?


Tap Root
Lateral Roots

Study Specifics

- Containerized longleaf seedlings grown in large diameter cavity.
- (1) Seedlings grown (sown 5/06):
  - 1 month in nursery + 5 months in box
  - 2 month in nursery + 5 months in box
  - 3 month in nursery + 5 months in box
  - 4 month in nursery + 5 months in box
  - 5 month in nursery + 5 months in box
    - Ran out of boxes

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Study Specifics

- (2) Seedlings grown (sown 5/05):
  - 8 months in nursery + 4 months cold storage + 5 months in box
  - 13 months in nursery + 5 months in box
- Approximately 30 – 35 seedlings planted at each time per box.

Single tap root
Several sinker roots

Numerous sinker roots

Sinker roots on one side

4 significant tap roots

No tap root
Sinker roots; note right angle growth

No taproot
No significant sinker roots

3 tap roots

Sinker root changed direction 5 times

1 significant tap root plus several very small tap roots

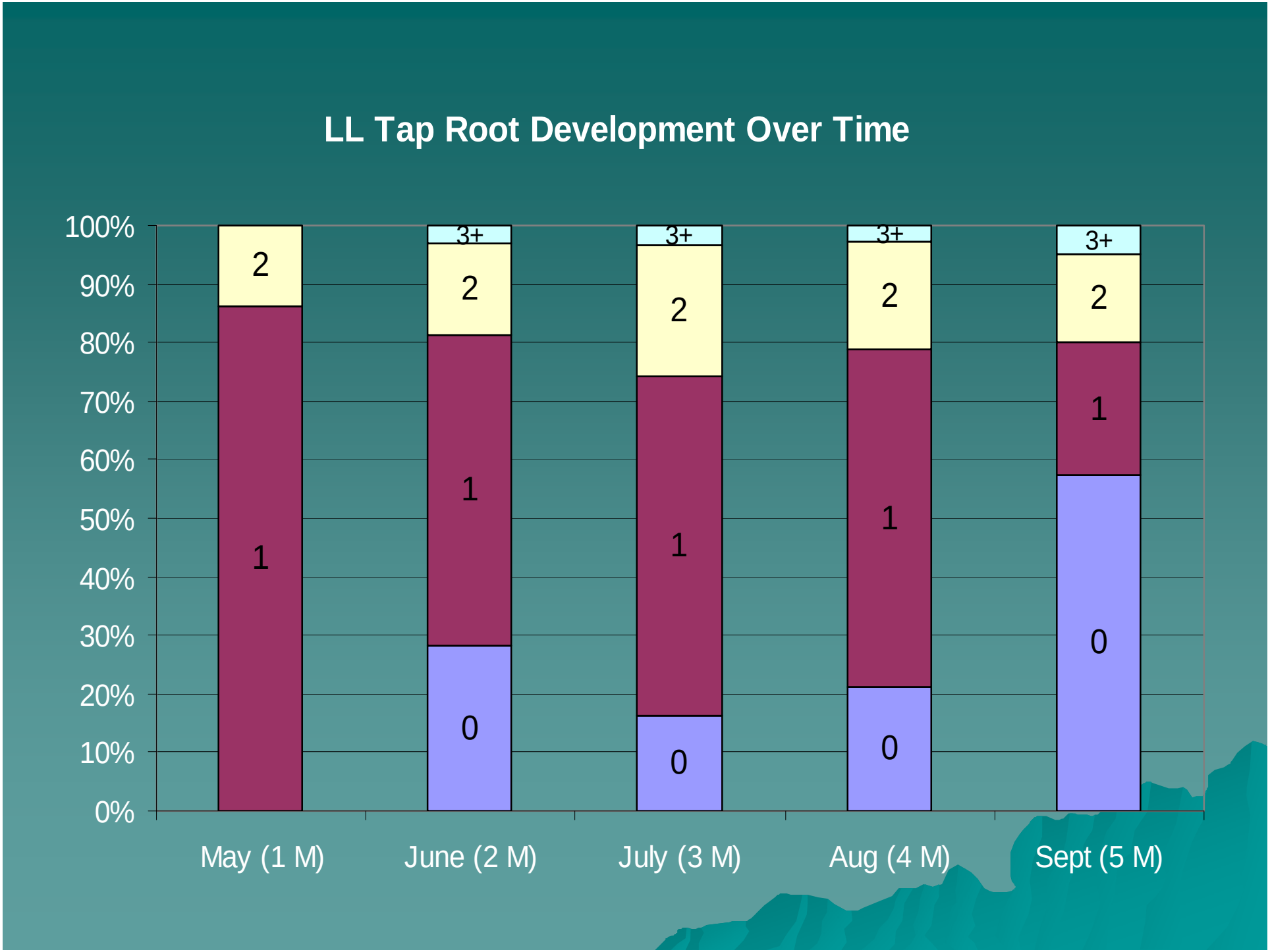
4 tap roots

No tap root - numerous sinker roots

Forked tap root

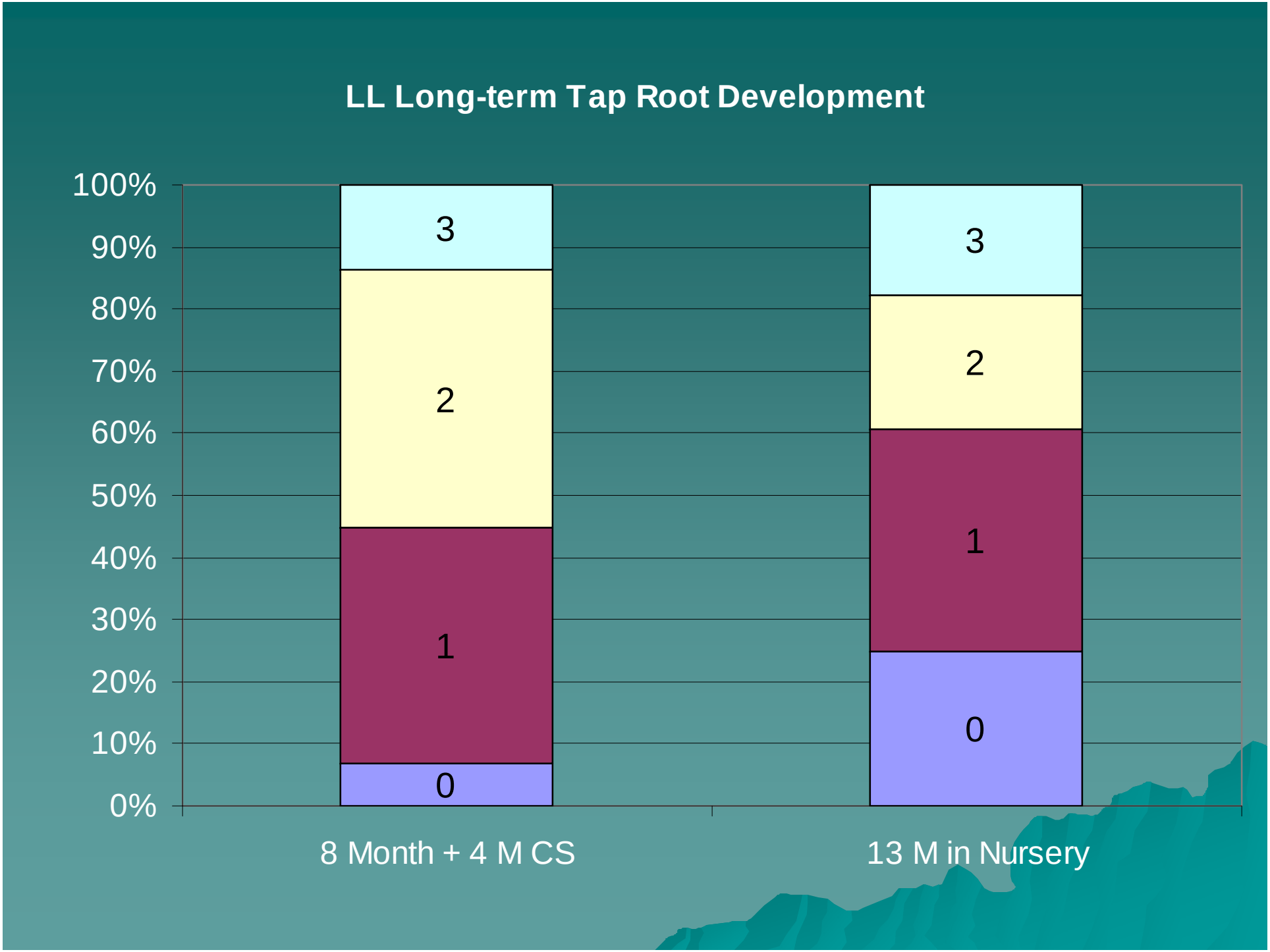
1 tap root, no significant sinker roots

Short and fat and no tap root


LL Tap Root Development Over Time
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
May (1 M)
June (2 M)
July (3 M)
Aug (4 M)
Sept (5 M)
2
1
3+
2
1
0
3+
2
1
0
3+
2
1
0
3+
2
1
0

Study Concerns

- I do not believe the results from the September seedlings in the previous slide are accurate. These results may have been caused by our handling of the seedlings in the boxes


LL Long-term Tap Root Development
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
3
2
1
0
3
2
1
0
8 Month + 4 M CS
13 M in Nursery

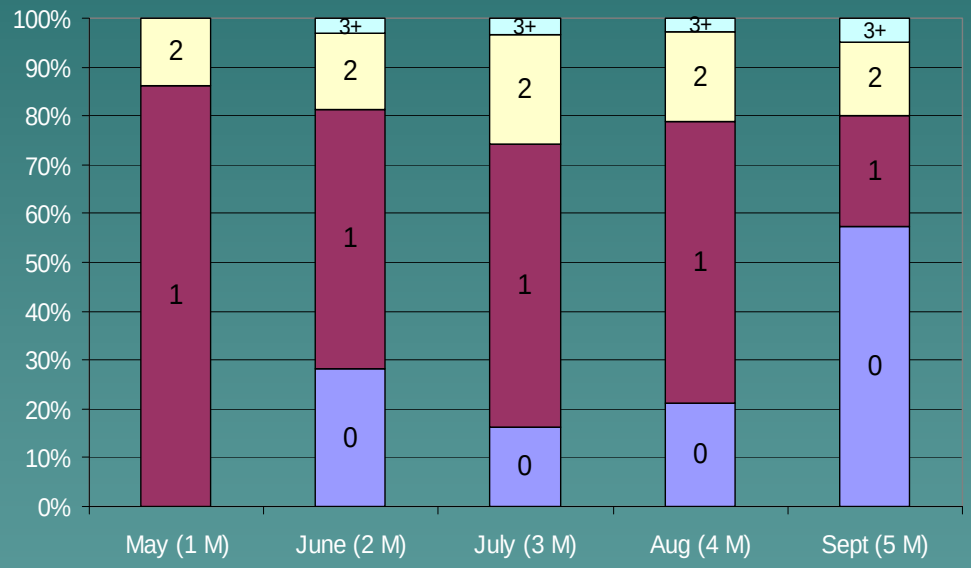
Some Possible Conclusions

- We need to repeat this study and carry through 1 month - 12 months in the boxes.
- There are several hypothesis in the literature
  - One Hypothesis – Container seedlings that develop a “significant” callus (air pruned) do not develop tap roots when out planted.
  - Another Hypothesis – Container seedlings > 8 months old and are “root bound” do not form tap roots.
  - These hypothesis need to be tested.

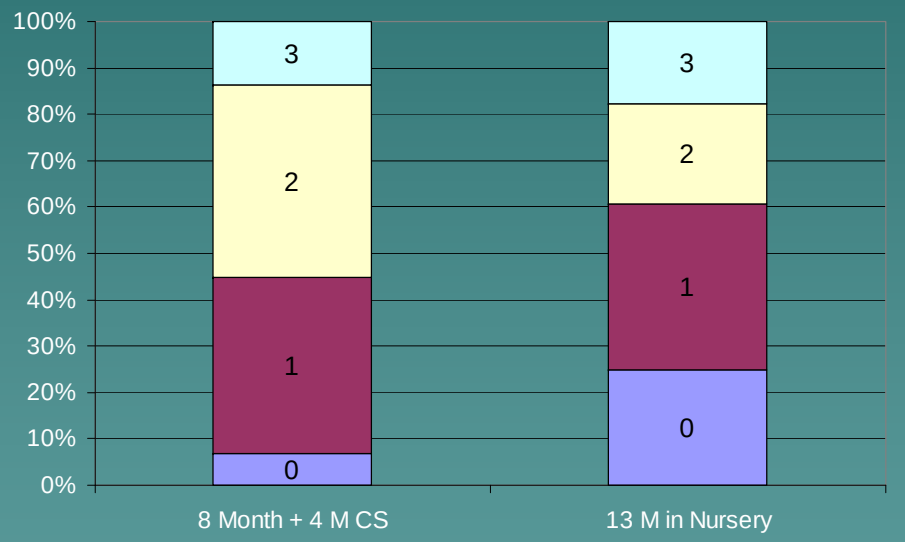
Some Possible Conclusions

- One possible explanation for WTT – these could be trees that were outplanted from seedlings that never would have developed a tap root.
- When examining WTT in the field. We need to look for a correlation with seedling age at extraction.

LL Tap Root Development Over Time



LL Long-term Tap Root Development



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