Shortleaf Pine Container Root Production

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Rationale: There is a high correlation between toppling of young trees in high winds/storms and stock type. Toppling has been reported in both container loblolly and longleaf pine stands, with the highest frequency in longleaf pine.

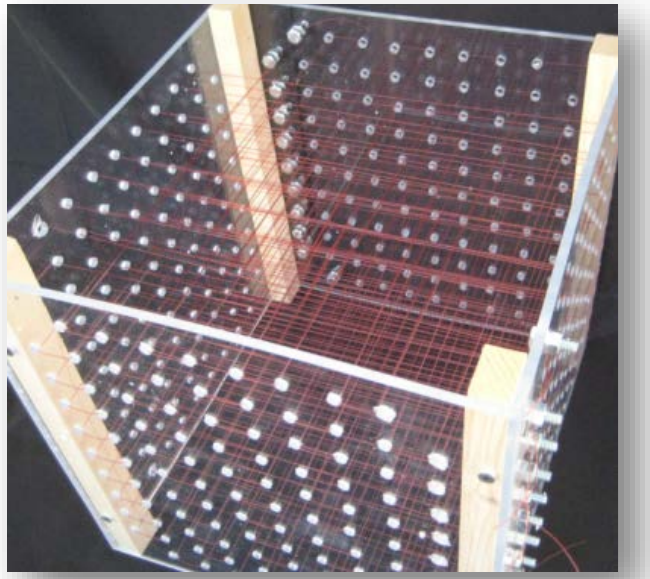
Objective: To determine if type of container (material, design, seedling configuration) have an influence on root architecture, including spatial distribution and biomass on three commonly grown conifer species.

History:

1. In 2014 and 2015 studies were completed with both loblolly and longleaf pine on 8 different container types.
2. Results have been presented at the 2015 and 2016 Contact Meeting and 2016 Southern Forest Nursery Association Meeting in Lake Charles, LA.

2016 Study Approach:

1. A 7-month old shortleaf pine from most common container types used in southern region was placed into a plexiglass box divided into 1” grids and filled with sand that was replicated 5 times.
2. After 6 months root architecture including spatial distribution and biomass was determined and reported for each 1” of plug length.



Container Type Specifications - 2016

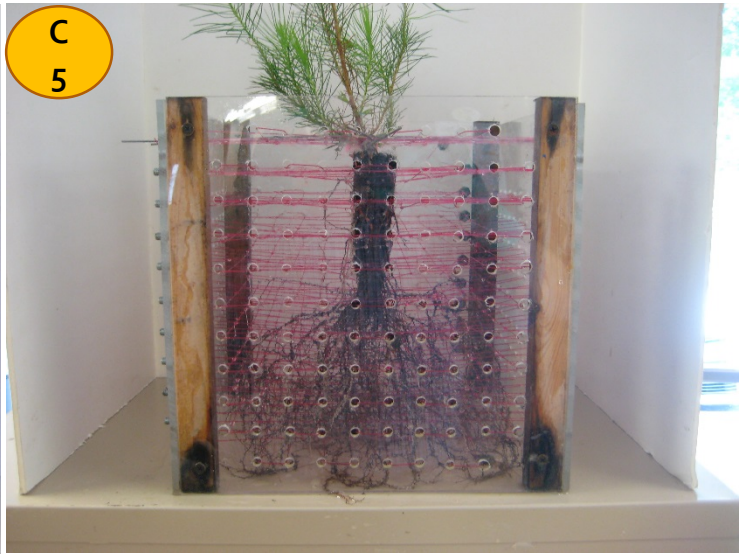
	C1	C2	C3	C4	C5	C6
Composition	Polystyrene	Hard Plastic	Hard Plastic	Hard Plastic	Hard Plastic	Hard Plastic
Seedling/sq foot	49.4	51.7	49.0	52	54	52
Cavity Diameter (in)	1.4	1.5	1.6	1.5	1.5	1.5
Cavity Length (in)	5.9	4.7	3.4	5.3	5.0	6.0
Cavity Volume (ml)	108	110	93	110	113	114
Cavities/tray	112	128	120	128	135	128
Chemical root pruning?	Yes	No	No	No	No	No
Side root pruning holes?	No	Yes	No	Yes	No	Yes
# root pruning holes	0	8	0	4	0	25


C
1


C
2

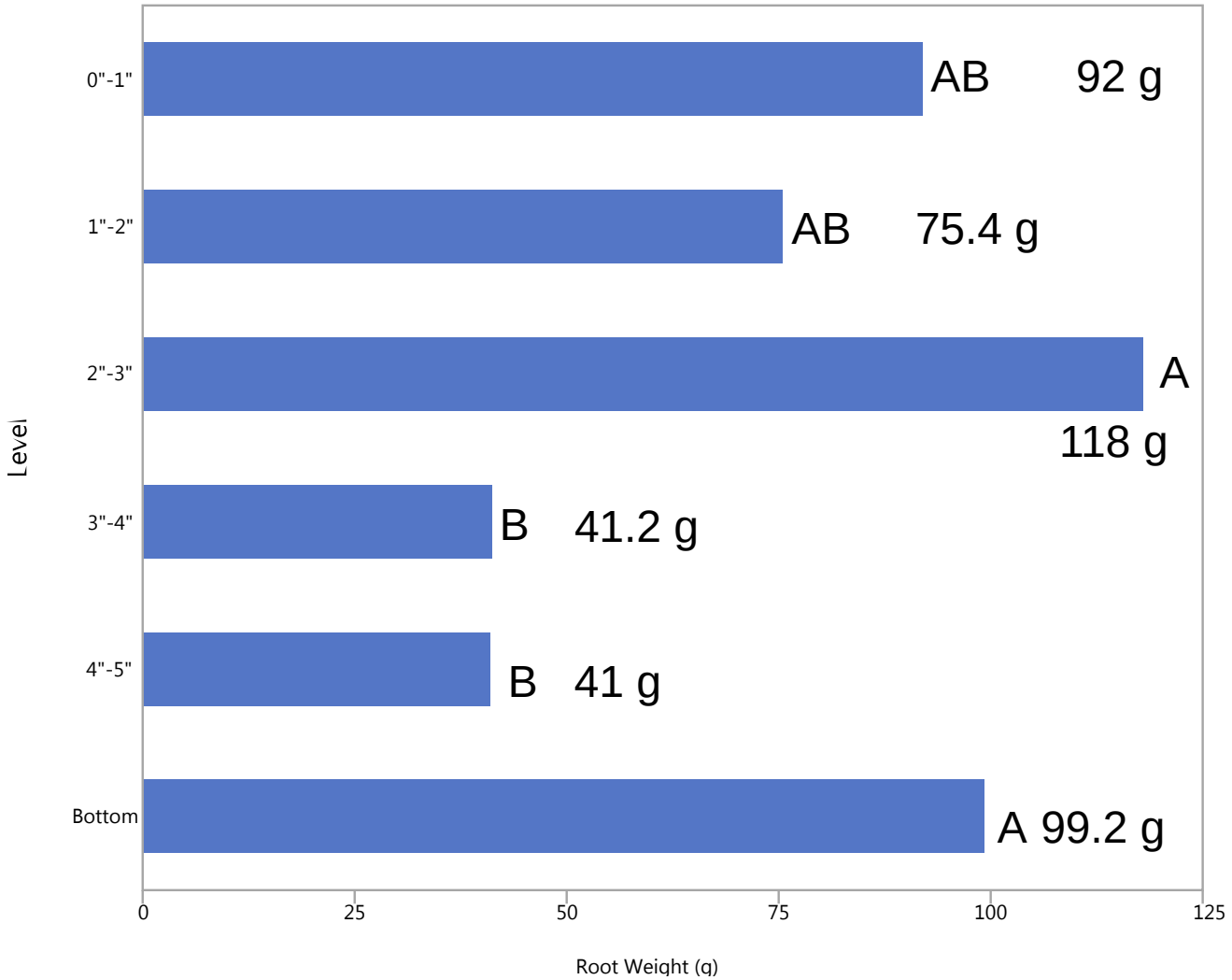

C
3


C
4


C
5

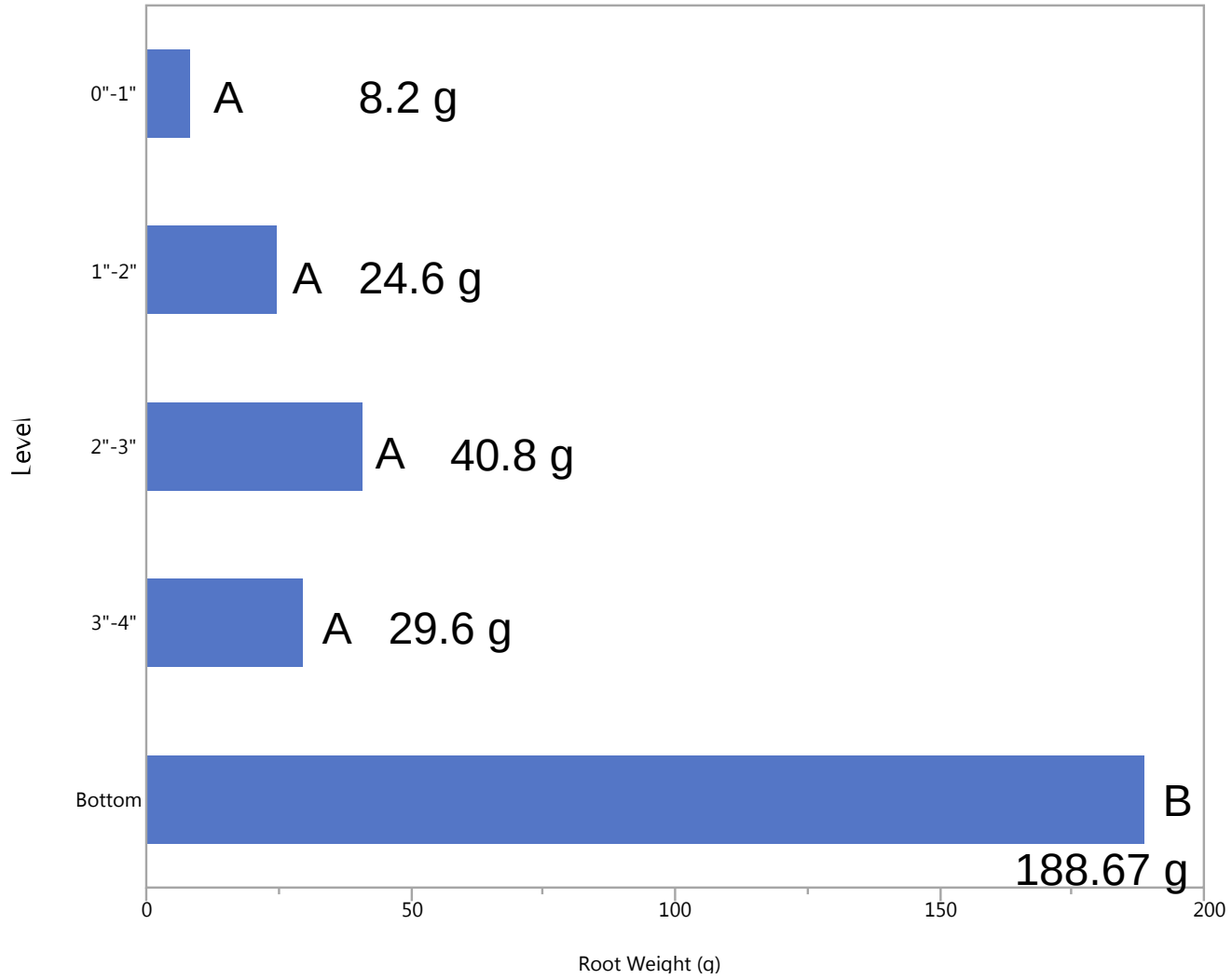

C
6

Container 1



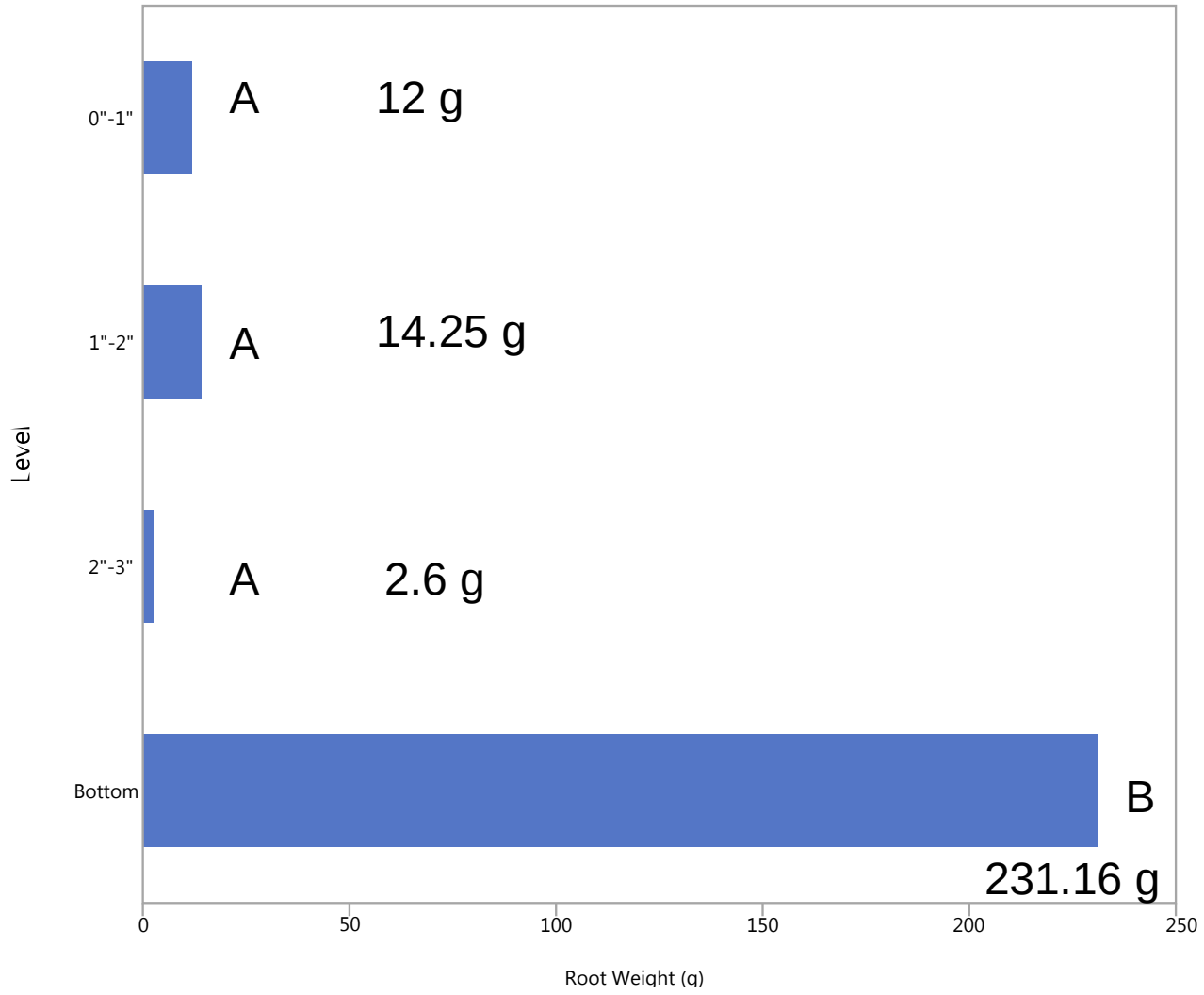
Mean total root weight = **466.8g**

Container 2



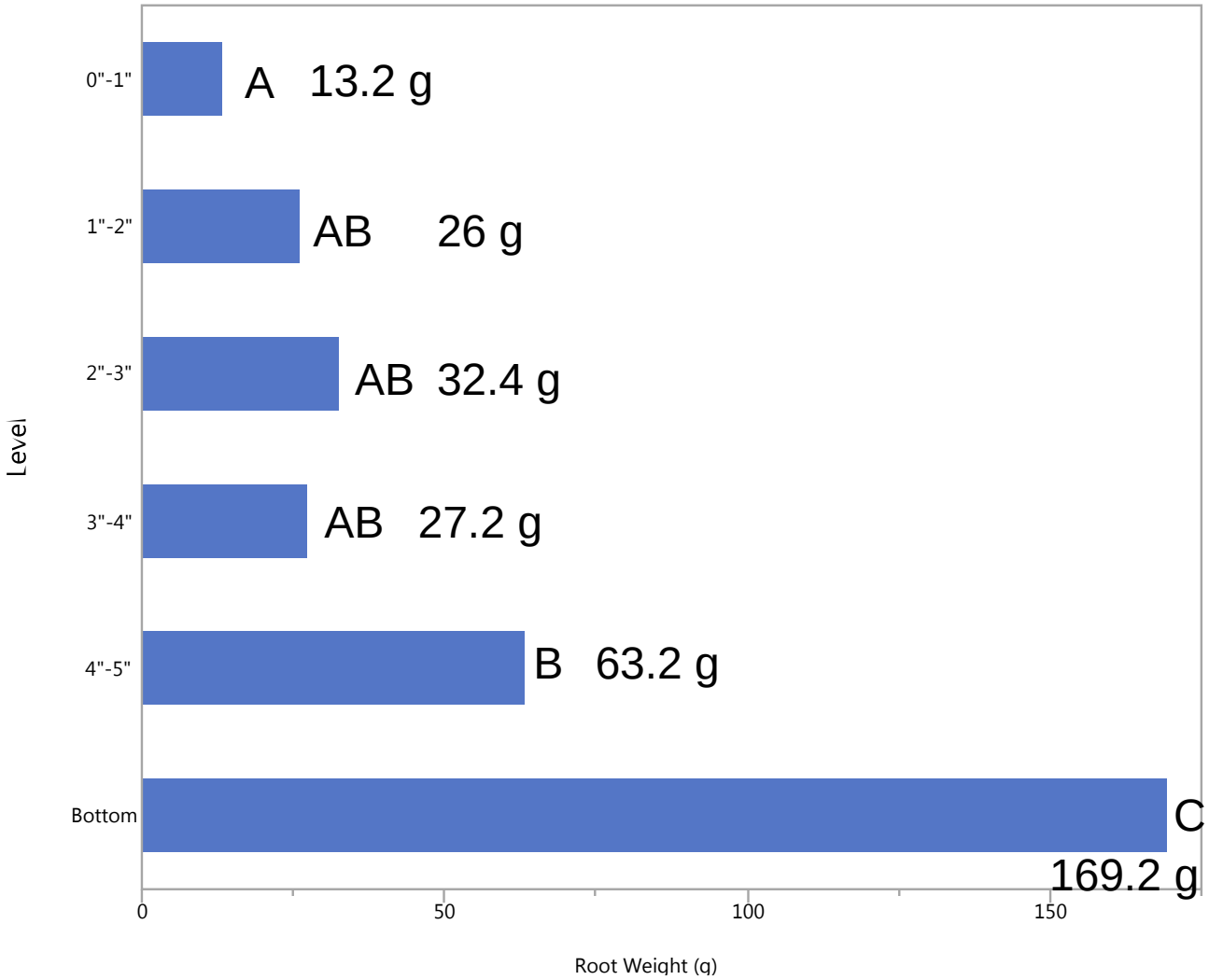
Mean total root weight = **291.9g**

Container 3



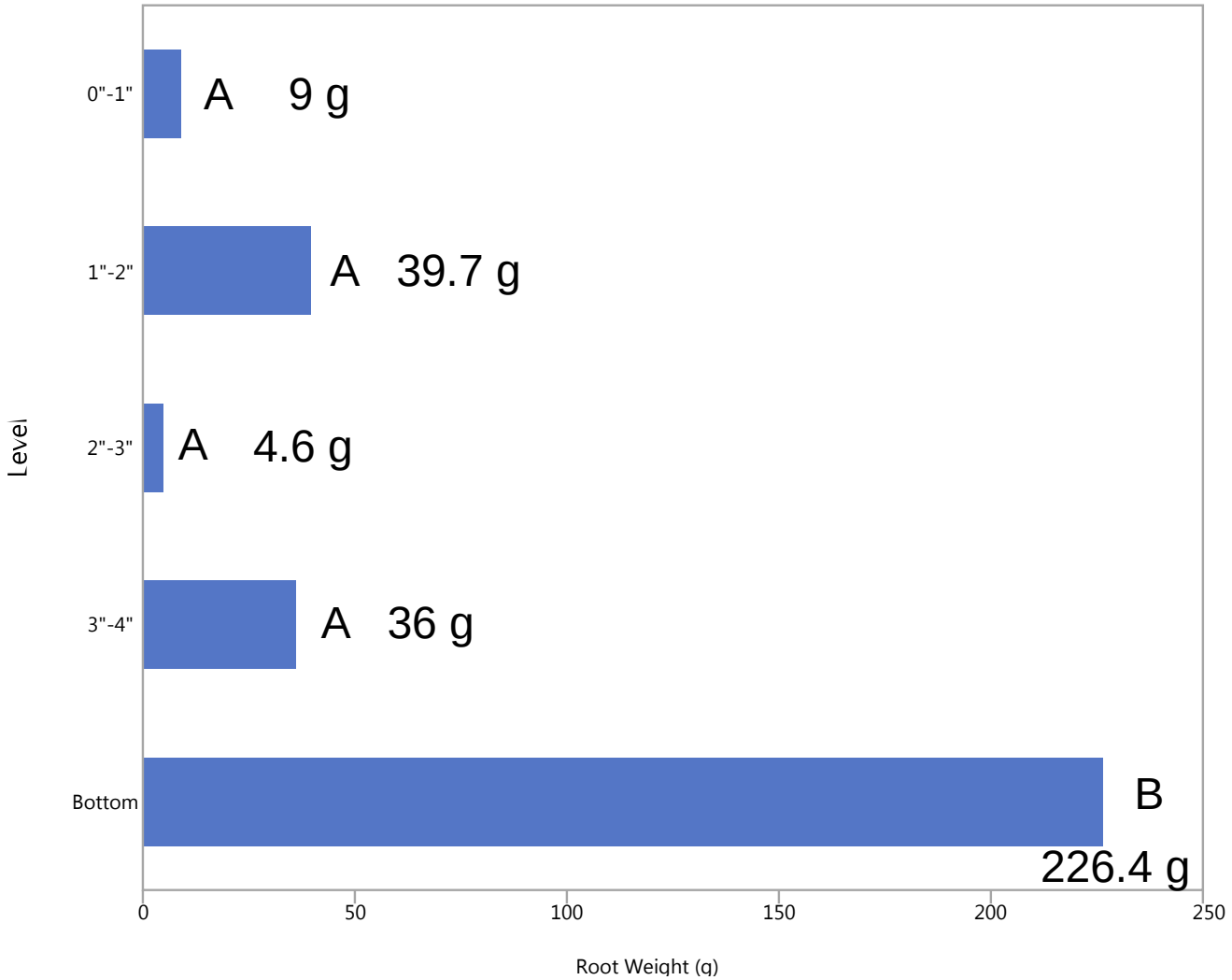
Mean total root weight = **260.01g**

Container 4

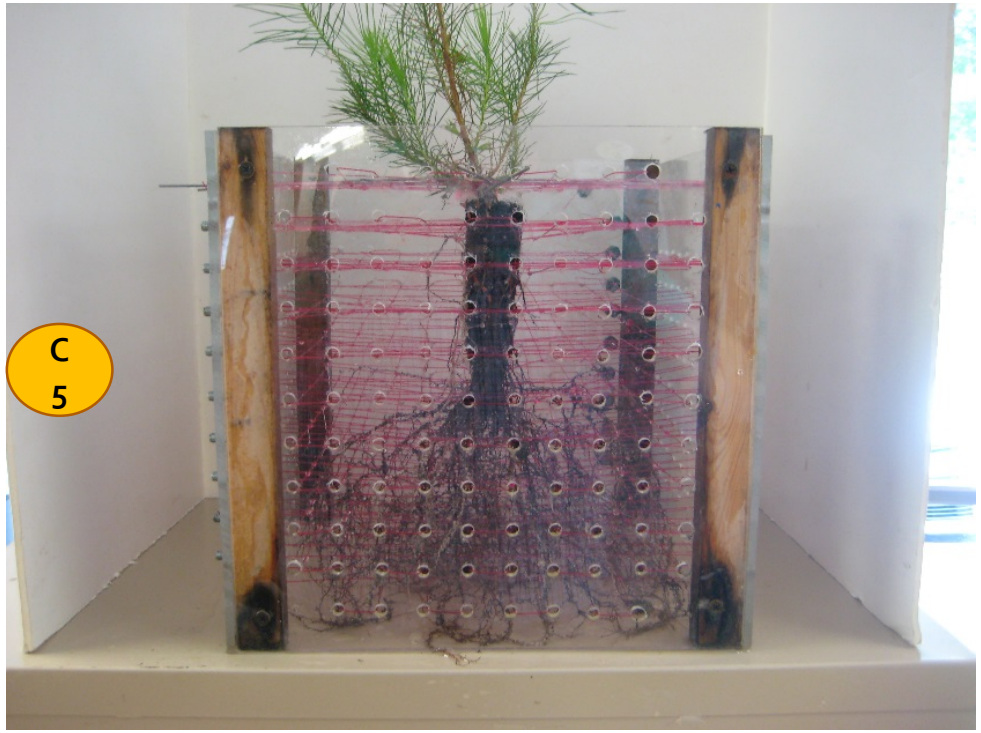


Mean total root weight = **331.2g**

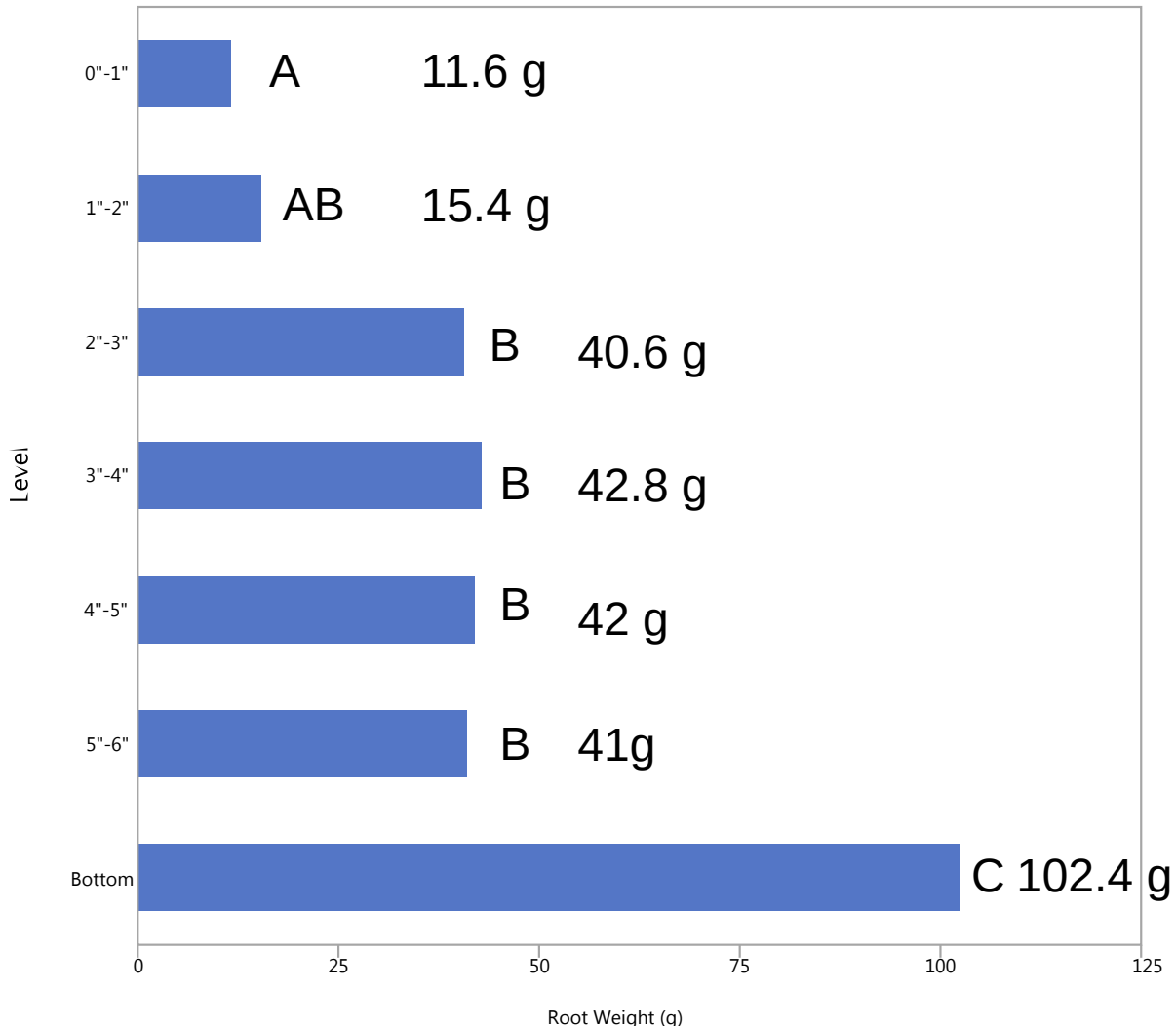
Container 5



Mean total root weight = **315.6g**

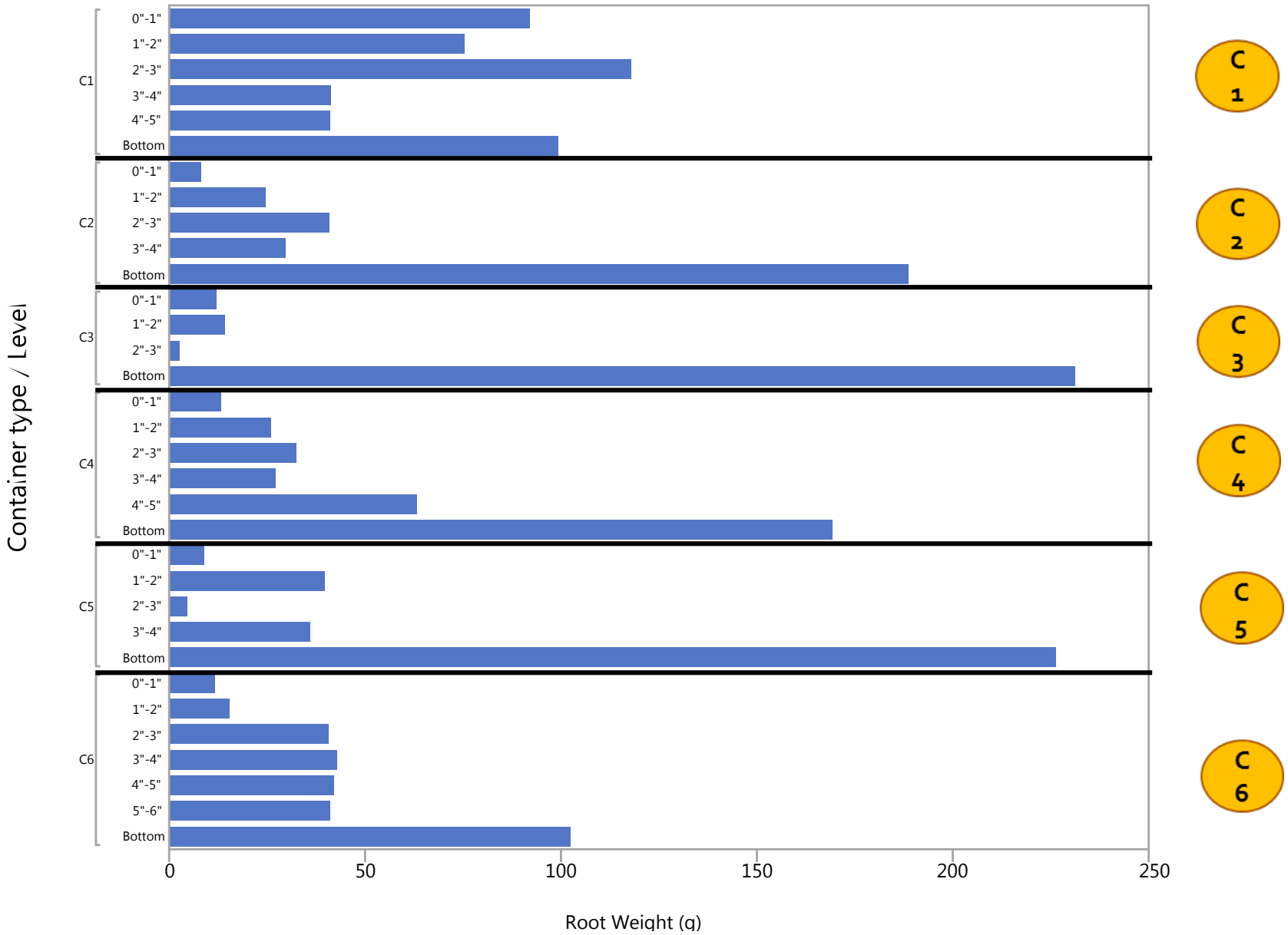


Container 6



Mean total root weight = **295.8g**

Average weight of roots by level



Container Root Growth/ Architecture Summary

- **Container type, its construction and size has a significant affect on root architecture and root growth. In the field, the direction of lateral root growth is determined by soil conditions and the planting process, which could all come into play with the seedling toppling that has been reported.**
- **In all three species, roots were lacking in the middle section of the longer plugs (5") that may be due to either low oxygen levels or high moisture levels in the middle of the plug.**
- **The location of root pruning holes in containers was more apparent with loblolly and shortleaf pine than with longleaf pine.**
- **While, loblolly pine had a greater number of roots over the study period when compared to either longleaf and shortleaf pine, all three species had equal root biomass.**
- **For all three species, the copper–treated container had larger roots and more primary roots present at all levels of the plug than hard plastic containers.**
- **In longleaf and shortleaf pine the number of primary roots in the copper-treated container was uniform along the plug, less so with loblolly pine.**

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