

# Urban Agriculture for Food Security in Challenging Spaces



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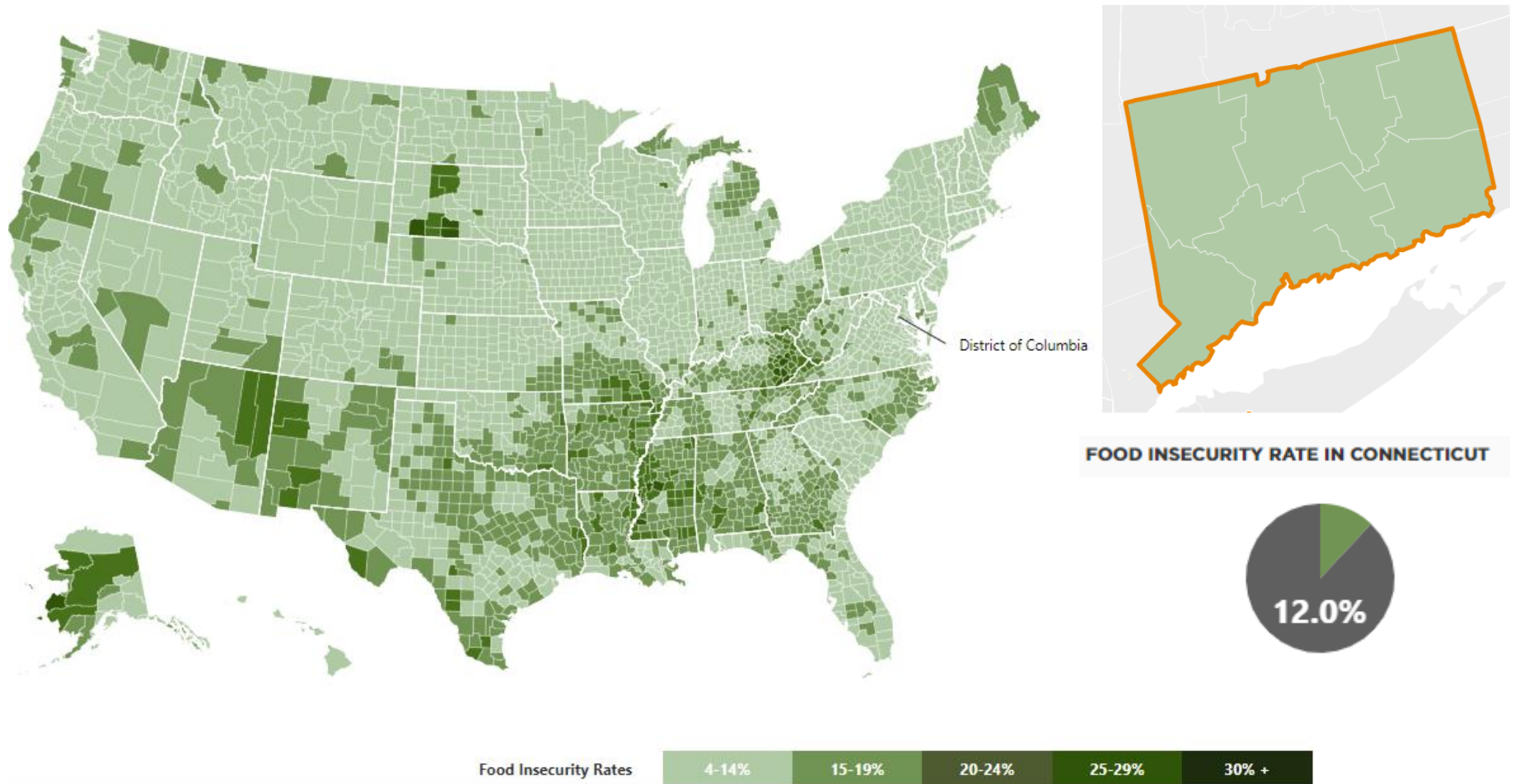
# Food Security

- “Availability and adequate access at all times to sufficient, safe, nutritious food to maintain a healthy and active life”
  - Food Availability
  - Food Access
  - Food Utilization

# Food Security

- Disruptions to Food availability
  - Civil upheaval
  - Macroeconomic upheaval
  - Socio-political factors
  - Weather and growing conditions

# Food Insecurity in the USA: 2019



Images from: <https://map.feedingamerica.org/>

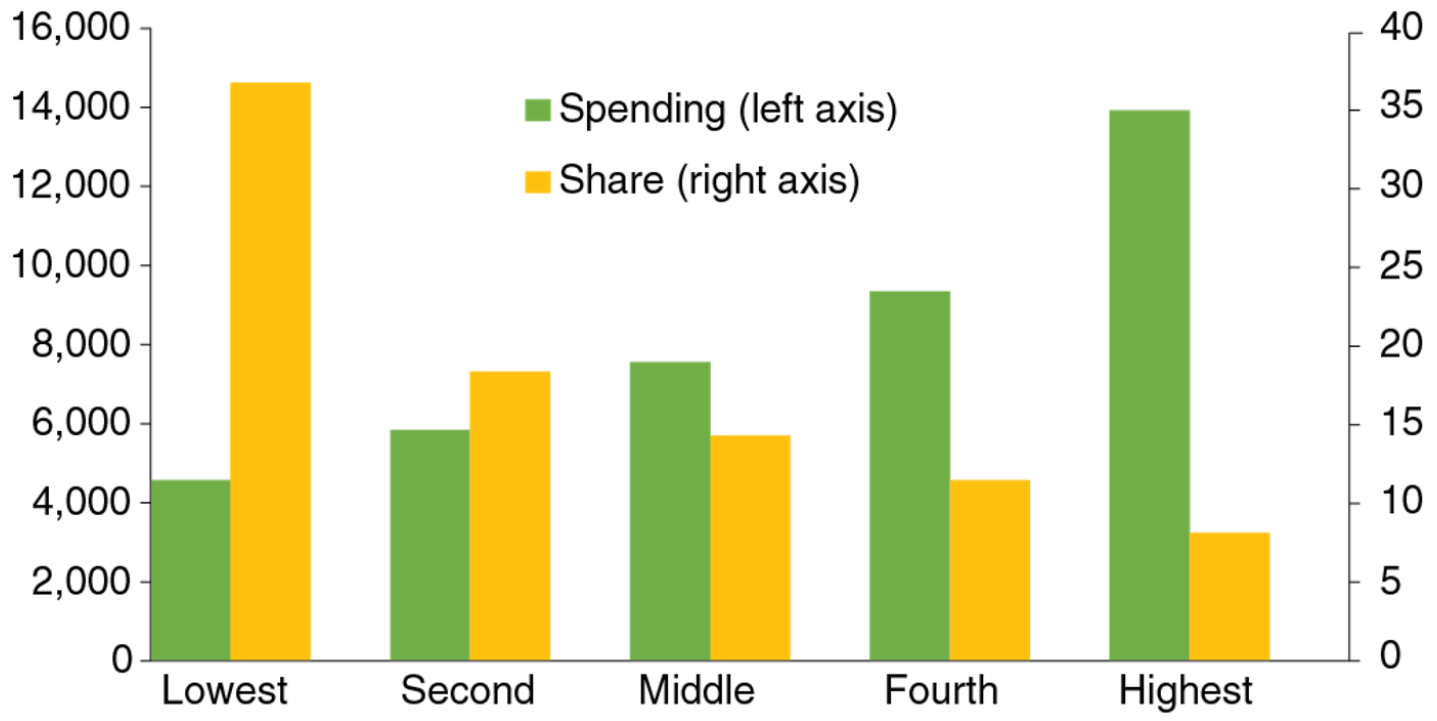
Google: “Map the meal gap” to get more info.

# Food Access

## Food spending and share of disposable income spent on food across U.S. households, 2019

Average annual food spending, dollars

Percent of income spent on food



Avg. \$12,236 after tax

Income quintile

Avg. \$174,777 after tax

Source: USDA, Economic Research Service using data from U.S. Bureau of Labor Statistics, Consumer Expenditure Survey, 2019.

# Food Access and Utility

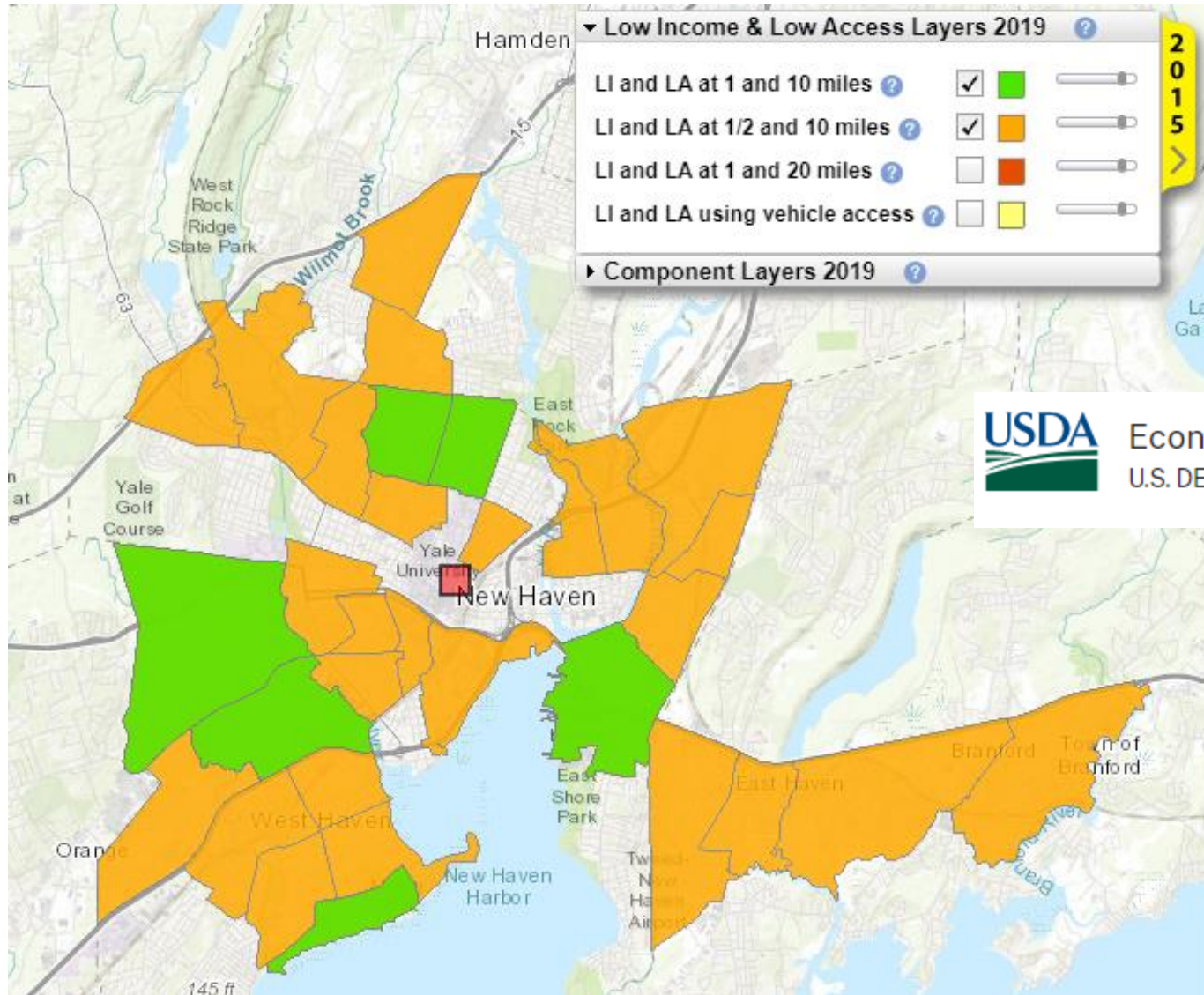


Image from:  
<https://www.ers.usda.gov/data-products/food-access-research-atlas/go-to-the-atlas/>

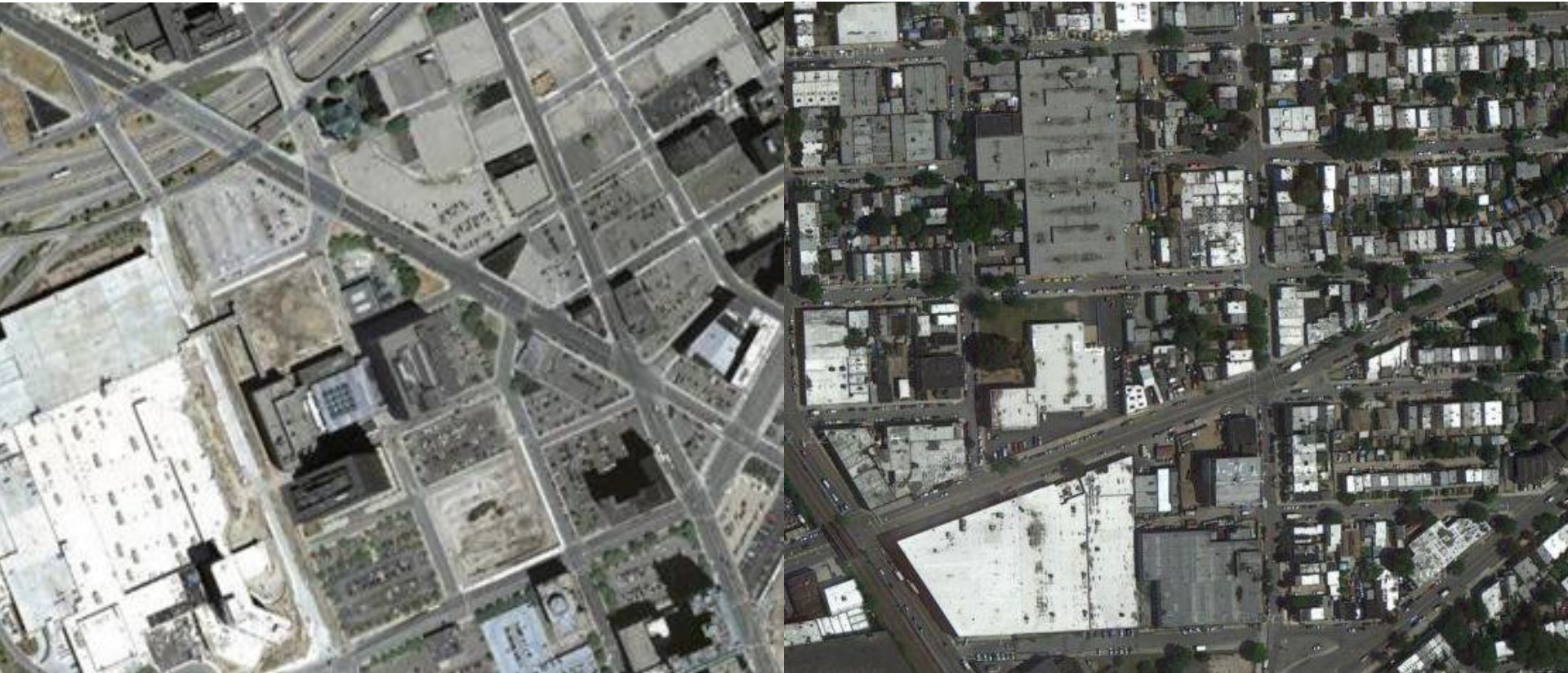
# Urban Agriculture

- Horticultural, agricultural, farming, and animal husbandry activities carried out on small plots of land in and around urban centers.

Picture from:  
<http://sidewalksprouts.wordpress.com/ua/c>



# Barrier: Land Availability



Pictures of Downtown Detroit MI, and New York, NY  
From: Google Maps



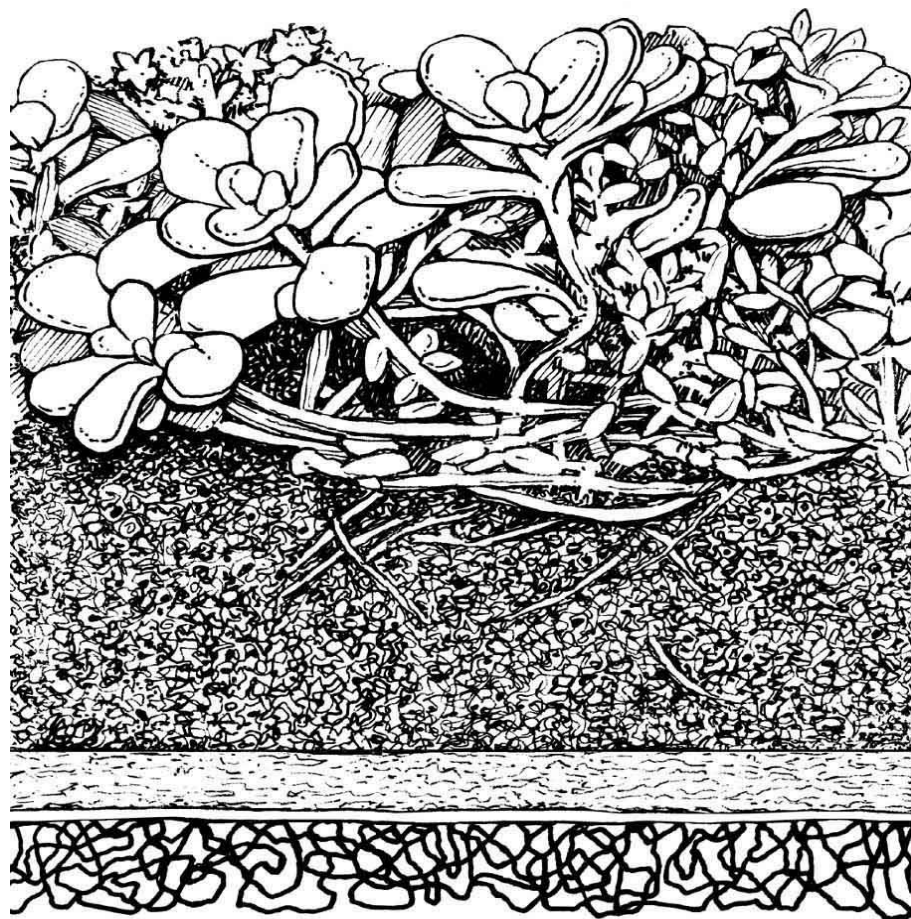
# Barrier: Soil Quality

- Common Contaminants:
  - Nutrients: nitrate
  - Pesticides/herbicides
  - Heavy Metals: eg lead, arsenic, mercury
  - Petroleum Products
  - Solvents, phenols, radioactivity
  - PAH, PCBs, PFAs

# Solution: Grow on Rooftops



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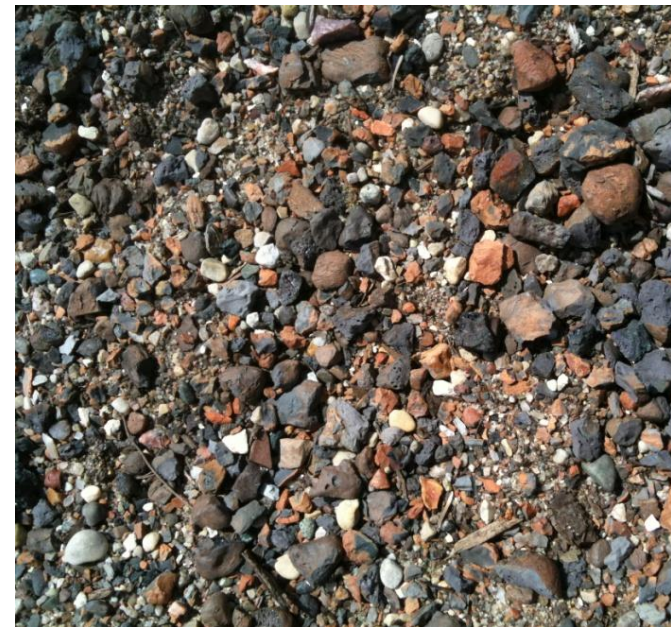
Vegetation

Growing medium

Water retention fabric

Filter fabric

Drainage layer



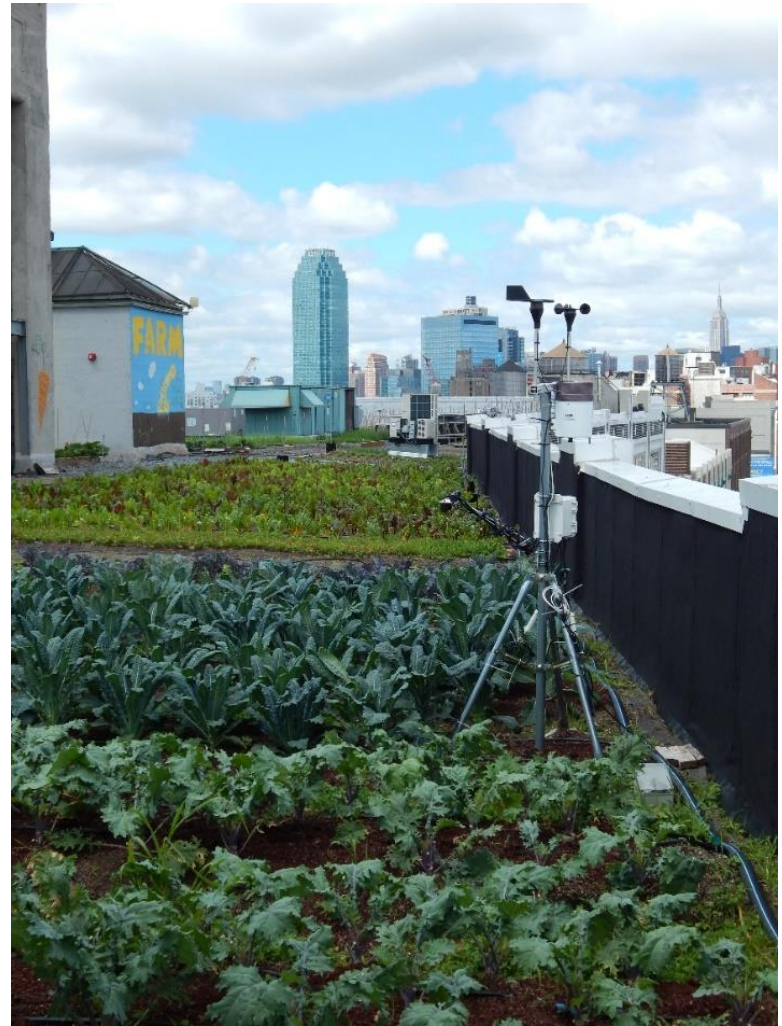
# CAES

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# Solution: Grow on Rooftops

- The Brooklyn Grange:
- Established: 2010
- Plants: Vegetables, herbs, and cut flowers
- Inputs: Irrigation, compost, and organic fertilizers



# Solution: Grow on Rooftops



# Solution: Grow in Containers



# Solution: Grow in Containers

\$/m <sup>2</sup>	Growing System
~\$12	Small plastic pools
\$70	Raised beds with sides
\$40-80	Nursery pots
Up to \$127	Commercially available planters



# Solution: Grow in Containers





# Solution: Grow In Containers

- What is the best media mix to use?
- If using repurposed containers, how do you achieve optimal drainage?
- How does optimal nutrient management differ from in ground production? Or container production for nursery plants?
- What is the optimal spacing of containers?
- How many vegetable plants can be grown in one pool?

# Cucumbers in Wading Pools



# Solution: Grow Nutrient Rich Foods



- Dark Green Leafy Vegetables
  - Fiber, iron, magnesium, potassium, and calcium
  - Vitamins A, B, C, E and K
  - Antioxidants

# Solution: Grow Nutrient Dense Food

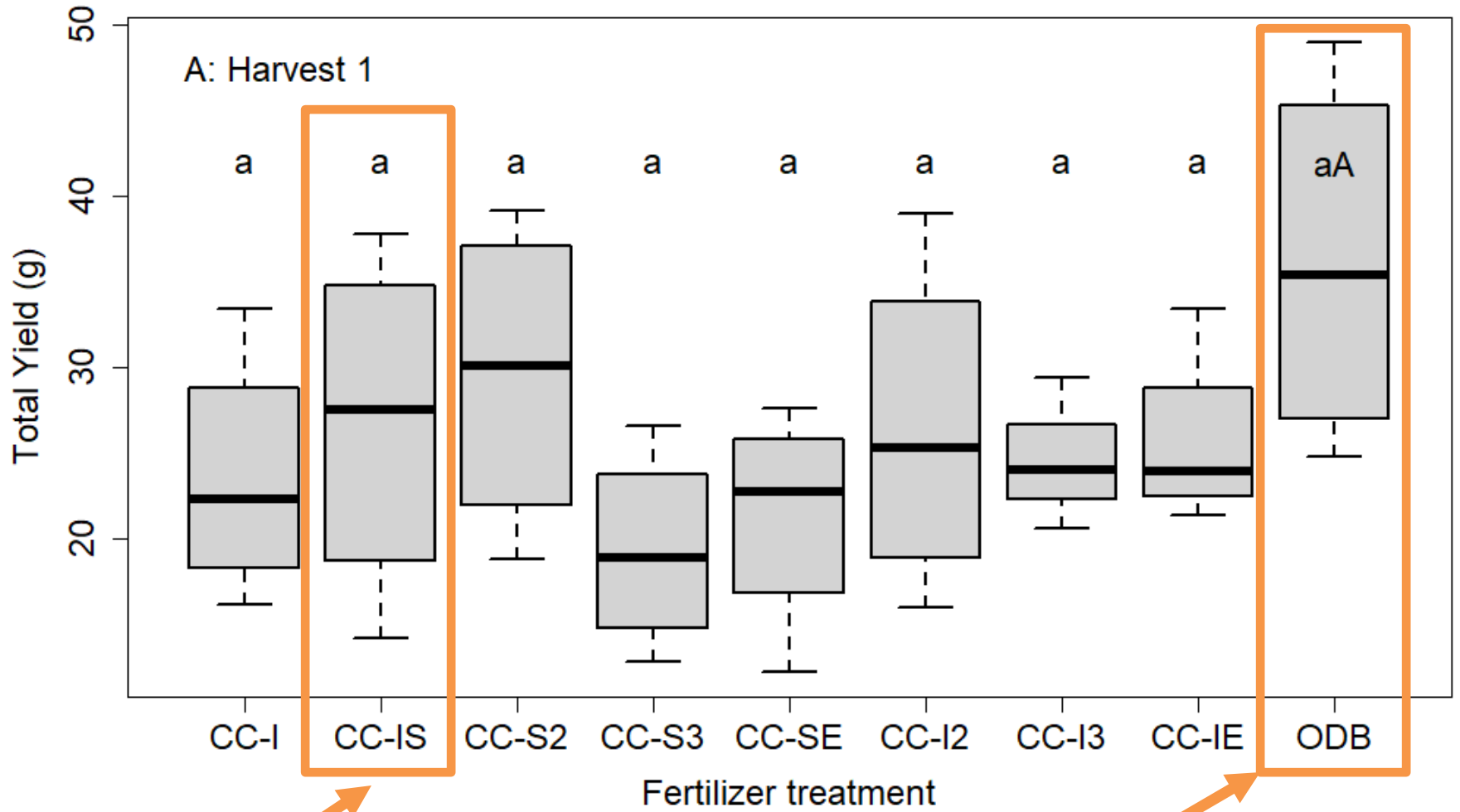
- **Cut-and-Come-Again** Harvesting
  - Remove the oldest, outside leaves leaving the center growing point
  - Repeat harvest every 7-14 days
  - 2-4 or more harvests possible



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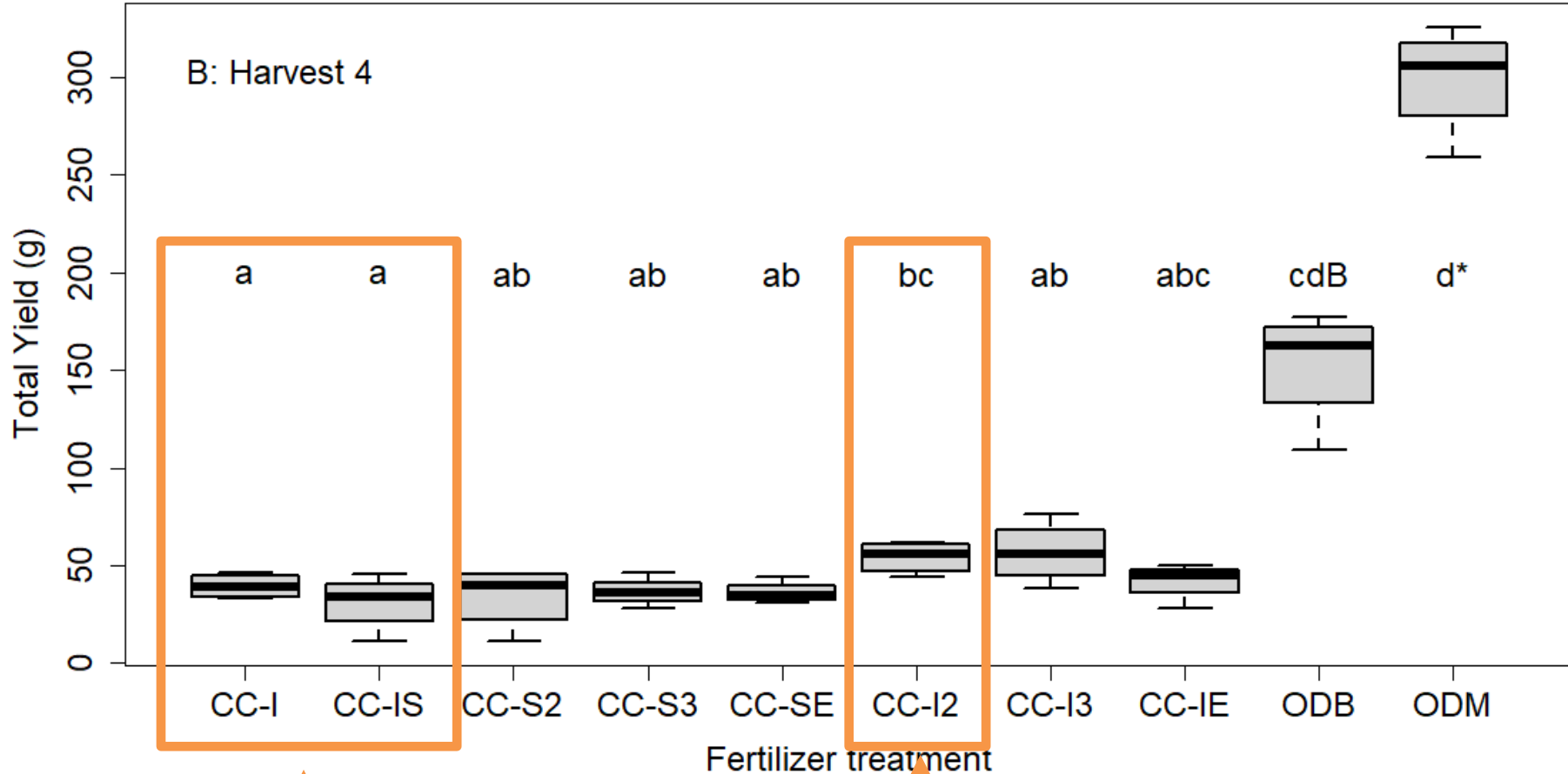


### Cut-and-Come-Again

treatment getting the same fertilizer as the **One-and-Done** treatment

**One-and-Done** harvest treatments, grown to the “Baby” stage- 30 days after planting

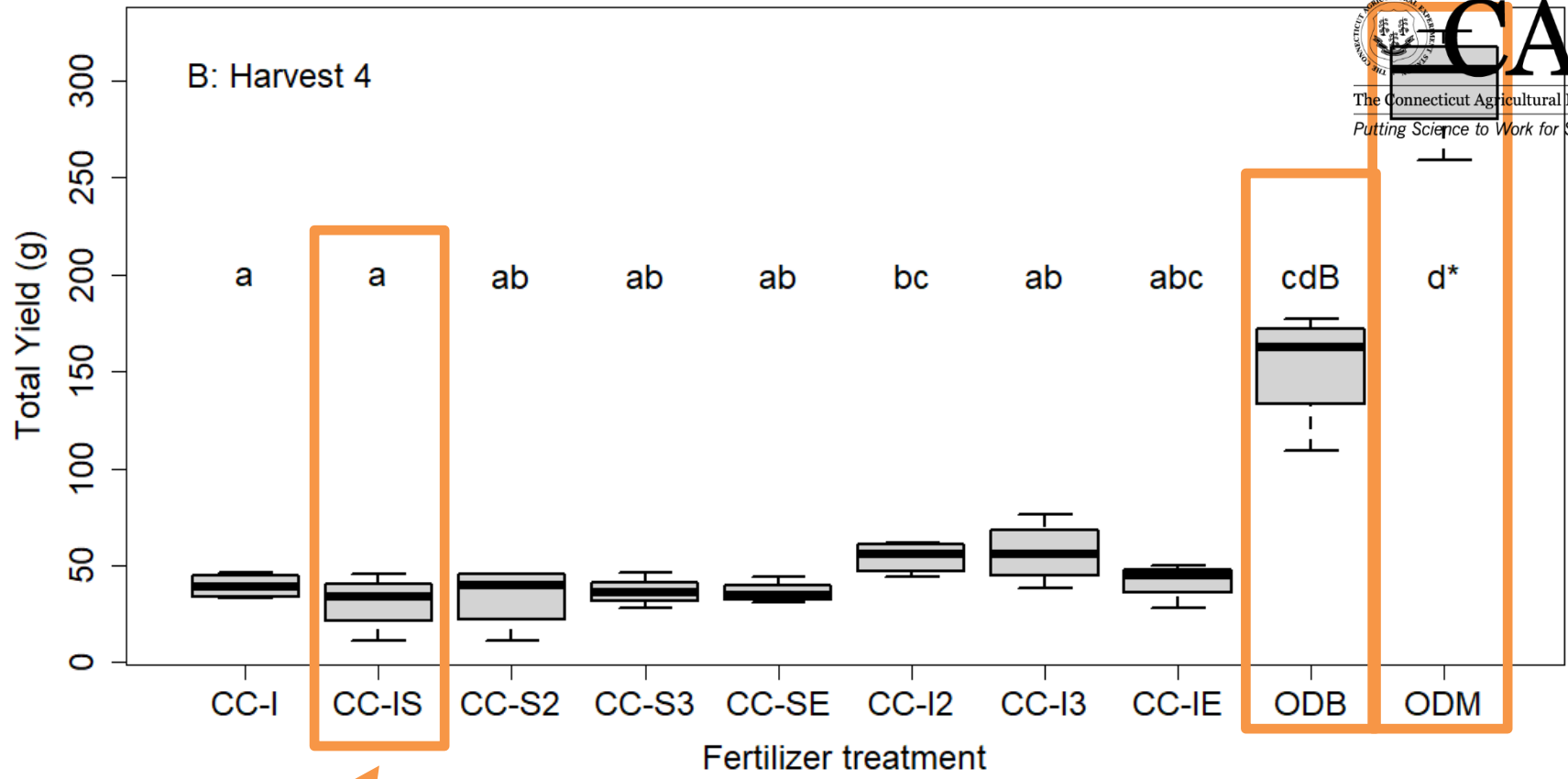
B: Harvest 4



Received fertilizer at  
Planting (I) and a side  
dressing (S) only

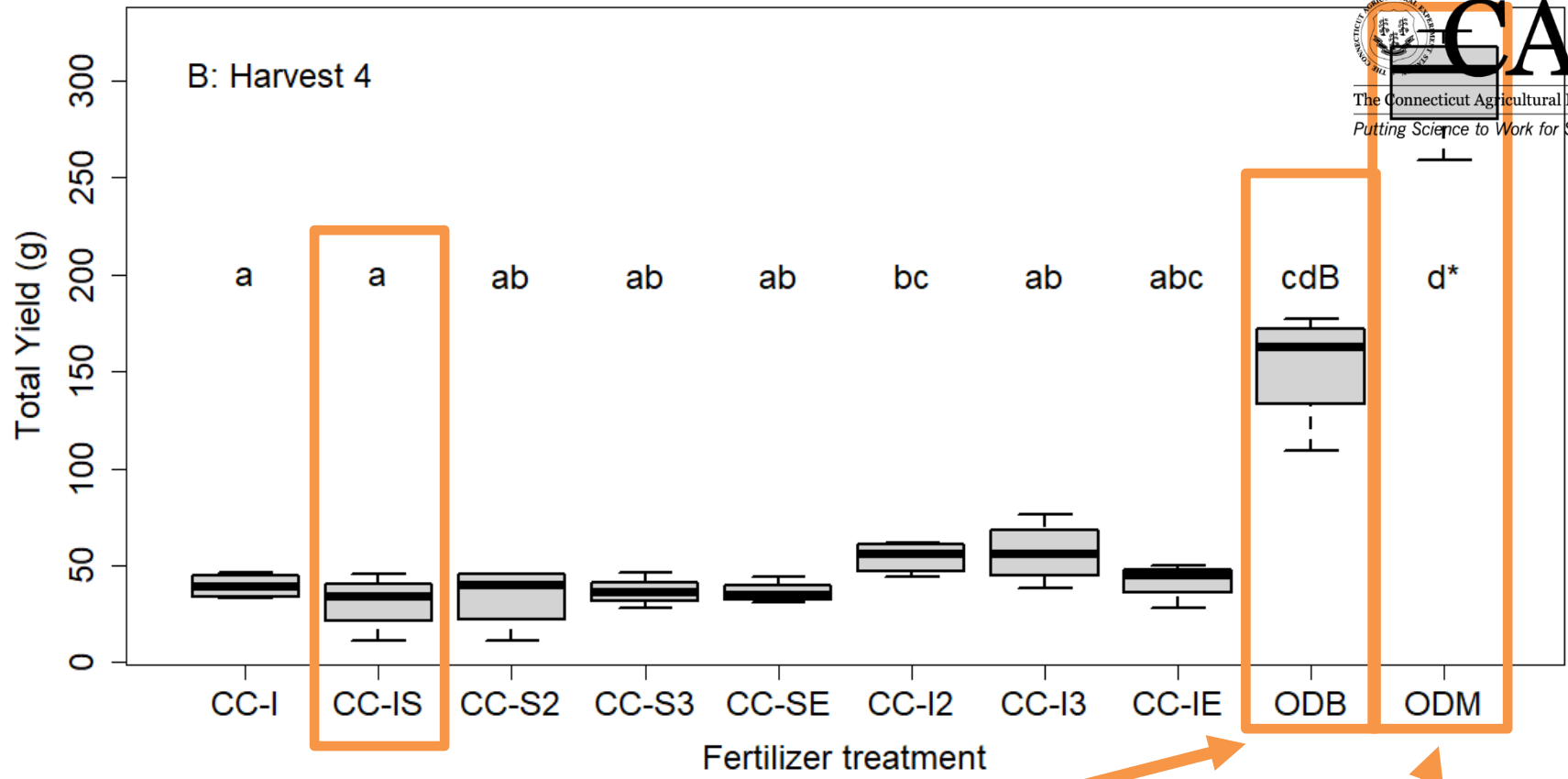
Received the same fertilizer  
as the initial treatment at  
every two (2) harvests

B: Harvest 4



**Cut-and-Come-Again**  
treatment getting  
the same fertilizer as  
the **One-and-Done**  
treatments

B: Harvest 4

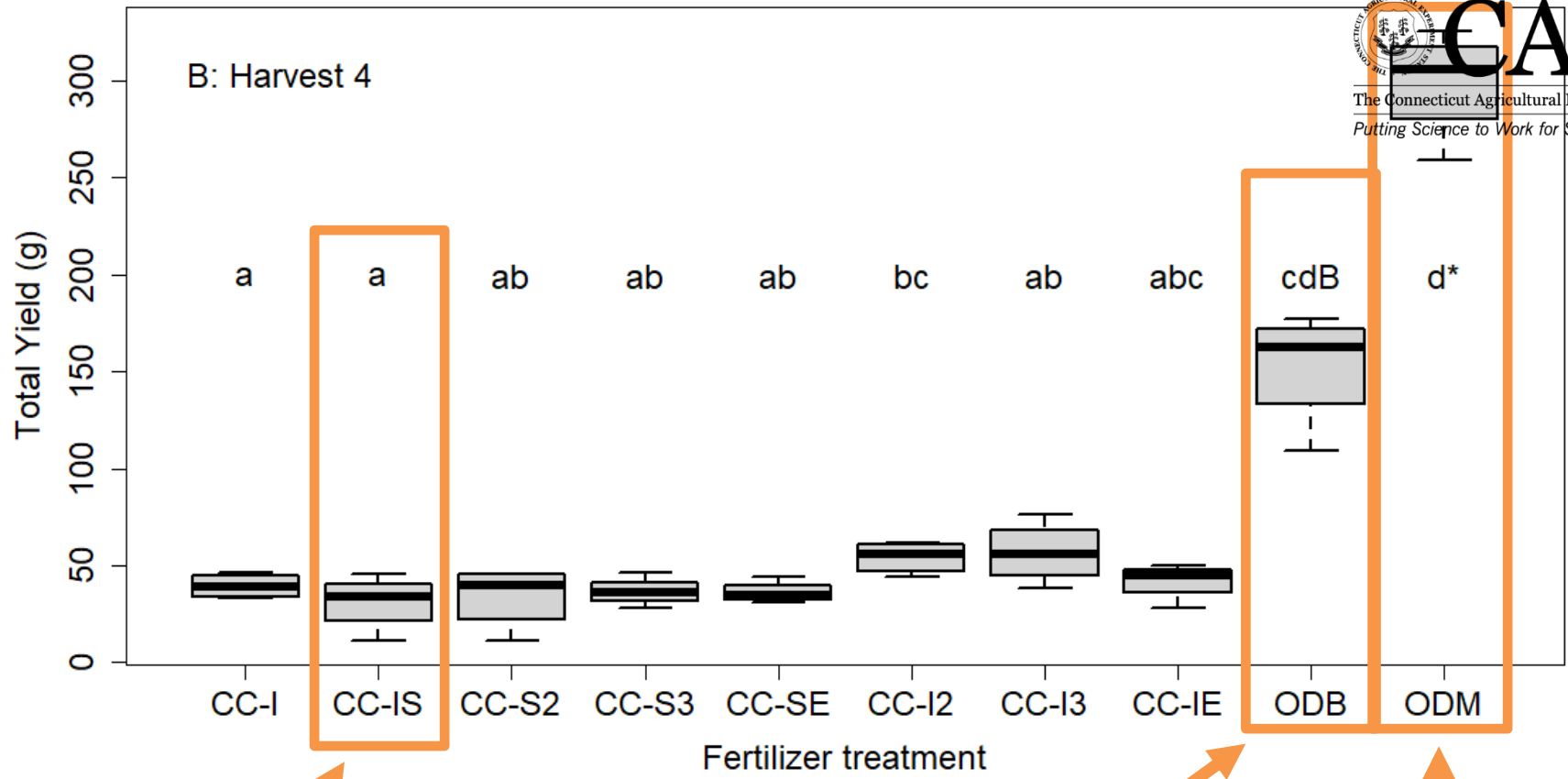


Planted to reach the “Baby” stage -30 days after planting- for this harvest of the **Cut-and-Come-Again** treatments

Planted at the same time as the **Cut-and Come-Again** treatments, grown to the “Mature” stage ~ 50 days after planting



B: Harvest 4



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