COOPERATIVE EXTENSION
UNIVERSITY OF HAWAIʻI AT MĀNOA
COLLEGE OF TROPICAL AGRICULTURE AND HUMAN RESOURCES

"Short" Short-Day Sweet Onion Variety Evaluation

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Bulb onions (*Allium cepa L. var. cepa*) have been used worldwide for thousands of years. The edible bulb is composed of shortened, compressed underground stems that develop at the base of the vegetative leaf. The development and formation of these bulbs, and thus a successful harvest, is driven by a response to day length after the juvenile stage of leaf growth and other aspects of crop management. Once exposed to sufficient day length, the onion plants direct their energy from vegetative growth to underground bulb formation. Without the minimum number of daylight hours, bulbs will not form. Therefore, it is critical to select bulb onion varieties based on day length requirements.

Onions are organized into groups based on their day length requirements, with short-day (10-12 hours of sun/day), intermediate-day (12-14 hours of sun/day), and long-day (14-16 hours of sun/day) onion variety groups. In Hawaiʻi, where the shortest day is 10 hours and the longest day is 13.5 hours, according to the National Weather Service, it is recommended to grow short-day onions in the winter and intermediate-day onions in the summer. In Hawaiʻi, short-day onions are further classified as "short" or "medium" subcategories of short-day onions. Generally, "short" short-day onions are adapted to spring and fall plantings, while "medium" short-day onions are adapted to summer plantings (Table 1). In Hawaiʻi, intermediate-day onions are typically planted in the spring to initiate in the summer.

Table 1. Planting times for sweet onion variety classifications based on daylength.

Any short-day variety			Only "medium" short-day and intermediate-day variety			Only "short" short-day variety			Any short-day variety		
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

The objective of this trial was to evaluate and classify commercially available onion varieties as either “short” or “medium” short-day varieties since Hawai‘i is the only area that classifies short-day onions into two groups. This evaluation included 19 bulb onion varieties based on commercial availability (Table 2). The seeds were planted into 128-cell seedling trays filled with Sunshine mix in October 2022 and transplanted to the field in November 2023. The seedlings were transplanted in a single row along drip irrigation tubing at 6-inch spacing between seedlings and 3-feet row spacing. The plants received a total of 120 lbs of nitrogen per acre over six applications as calcium nitrate and urea. Fertilizer was applied via a venturi fertigation system during regular irrigation periods. The last application took place in January 2023 to minimize the soil nitrogen content during bulb initiation and formation. The onions were harvested in March 2023 and evaluated for individual bulb weights and equatorial diameter.

Table 2. Short-day sweet onion varieties and their respective seed companies.

	Variety	Seed Company
1	Rio Dulce	Osborne
2	Gabriella	Osborne
3	Hornet	Seminis
4	Savannah Sweet	Hoss
5	Sweet Magnolia	Seminis
6	Pecos	Seminis
7	Sweet Azalea	Seminis
8	Duster	Seminis
9	Sweet Agent	Seminis
10	Timon	NE Seeds
11	Sapelo	NE Seeds
12	Georgia Boy	NE Seeds
13	DP Sweet	NE Seeds
14	Early Sweet	NE Seeds
15	Plethora	Hoss
16	Cougar	Hoss
17	Madalyn	Johnny’s
18	Candy	Johnny’s
19	Alison	Seedway

Results

The USDA classifies bulb onions based on diameter, with minimum diameters of 1" (small), 2" (medium), 3" (large or jumbo) and 3.75" (colossal). Overall, all varieties showed some level of bulb formation. 'Plethora' was the only variety to average in the large/jumbo class, with 'DP Sweet', 'Candy', 'Early Sweet', and 'Duster' averaging in the small class (Figure 1). All other varieties evaluated fell within the medium class based on diameter. 'Plethora' numerically had the greatest average bulb weight but was not statistically different from 'Sapelo', 'Madalyn', 'Georgia Boy', 'Gabriella', 'Hornet', and 'Sweet Magnolia' (Figure 2). Observational evaluations for % brix were taken from a single onion sample per variety to estimate the level of soluble solids per variety (Figure 3). Based on this data, 'Plethora', 'Sapelo', 'Madalyn', 'Georgia Boy', 'Gabriella', 'Hornet', and 'Sweet Magnolia' may be classified as "short" short-day varieties and are recommended for planting during the winter months. All other varieties may be classified as "medium" short-day varieties but more evaluations are needed to confirm that they bulb better in longer days. Depending on market preference, 'Plethora', 'Sapelo', 'Georgia Boy', and 'Sweet Magnolia' would be recommended for the flat onion market, and 'Madalyn', 'Gabriella', and 'Hornet' would be recommended for the round onion market.

Future Research

Additional trials are necessary to confirm that these varieties can be grown successfully during the summer months when days are longer. A summer planting expected in 2023 will provide further insight into the other varieties' ability to form bulbs under longer days. It could also establish whether the varieties that perform well during shorter days are not adversely affected by longer days, indicating potential for year-round planting.

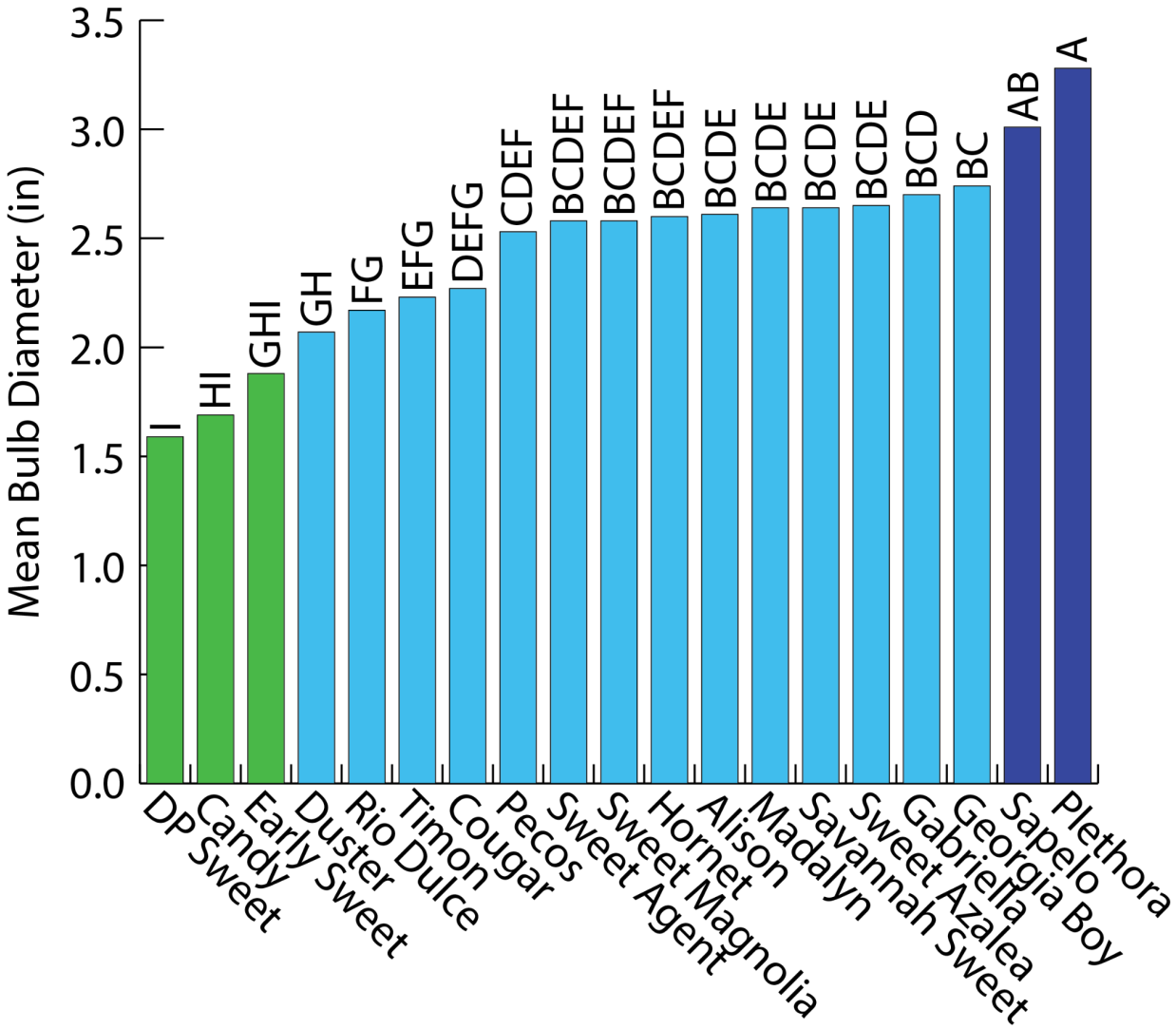


Figure 1. Mean bulb diameter. Levels not connected by the same letter are significantly different. Bars in green, teal and blue are represented as small, medium and large, respectively.

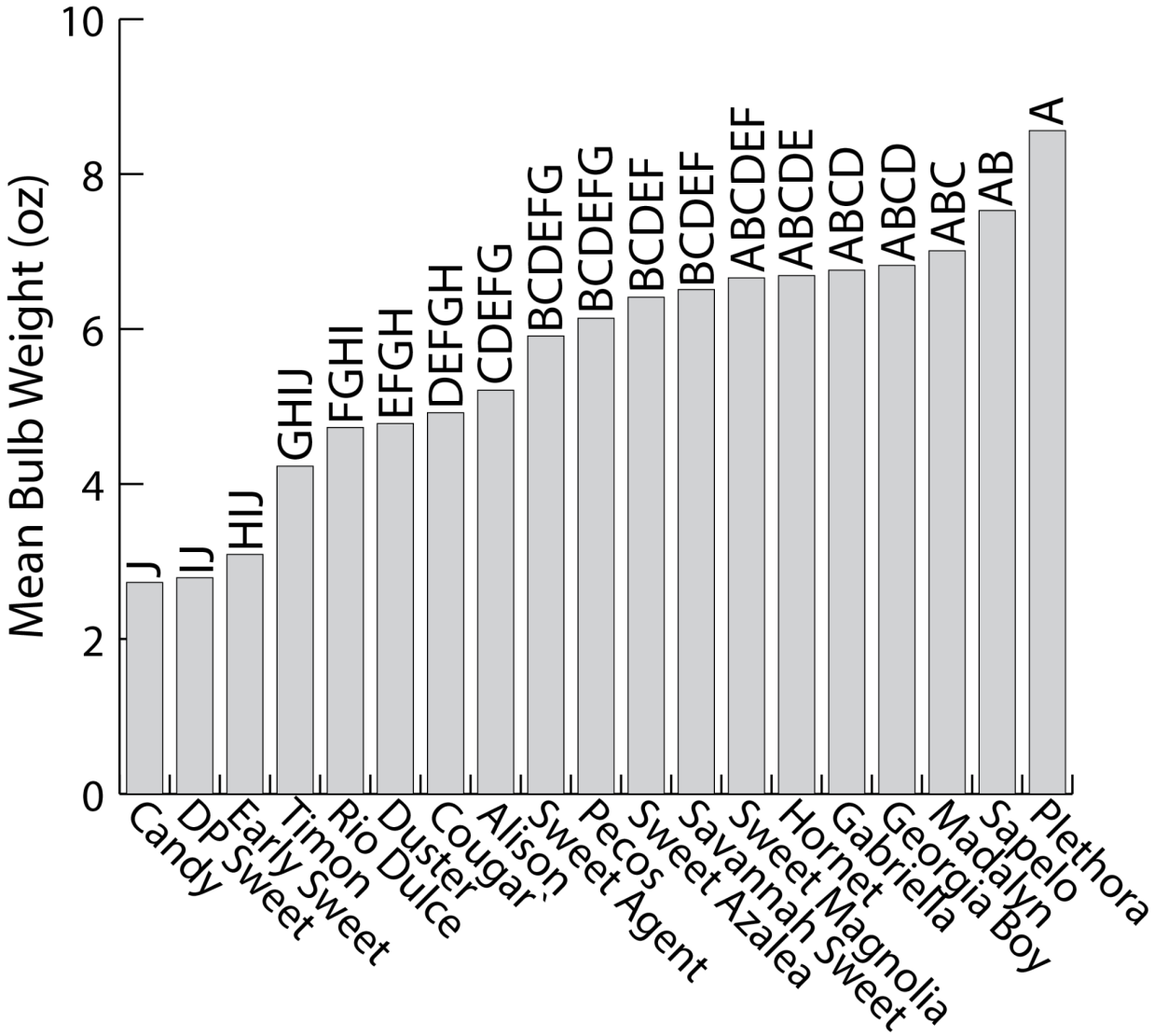


Figure 2. Mean bulb weight. Levels not connected by the same letter are significantly different.

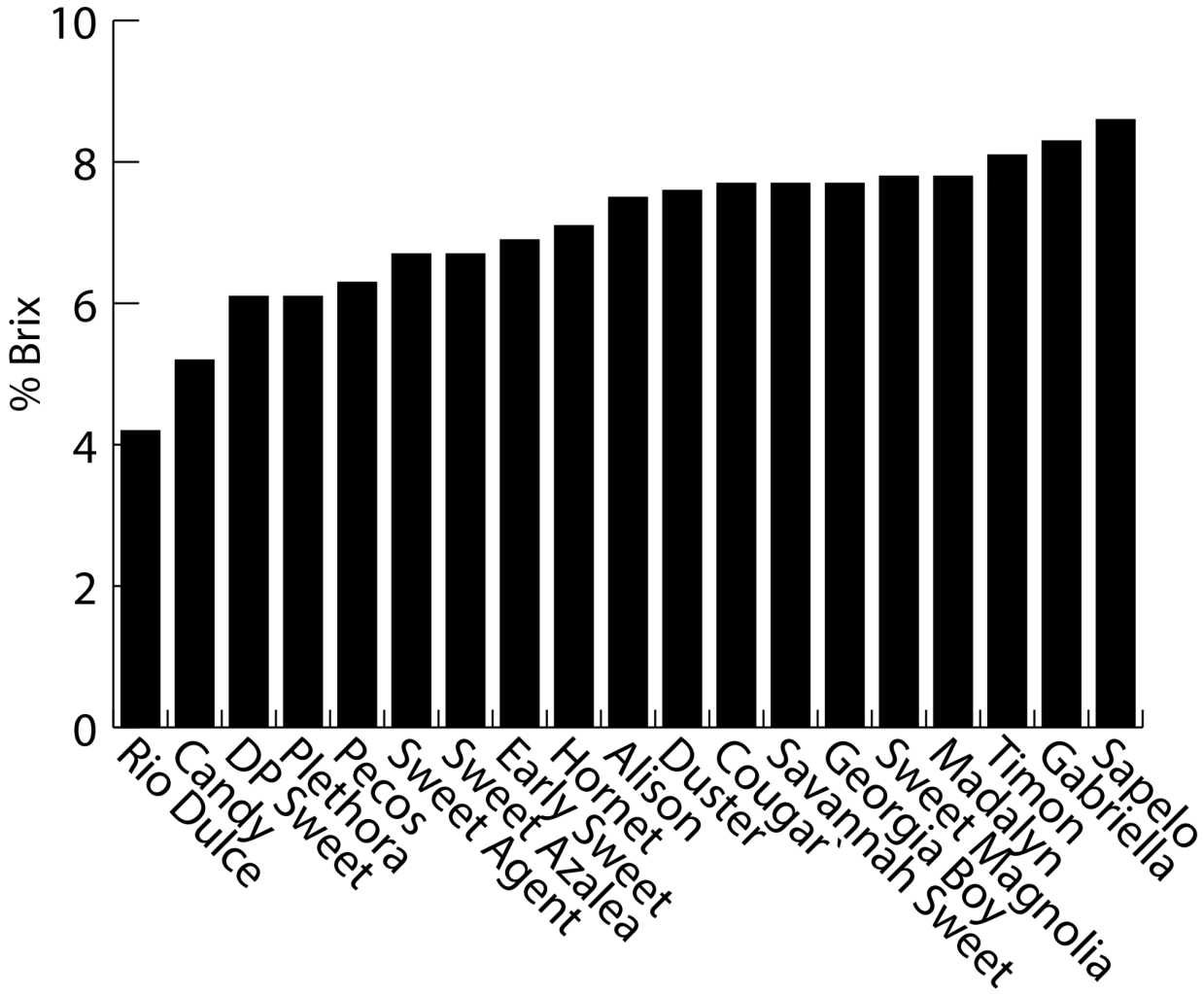
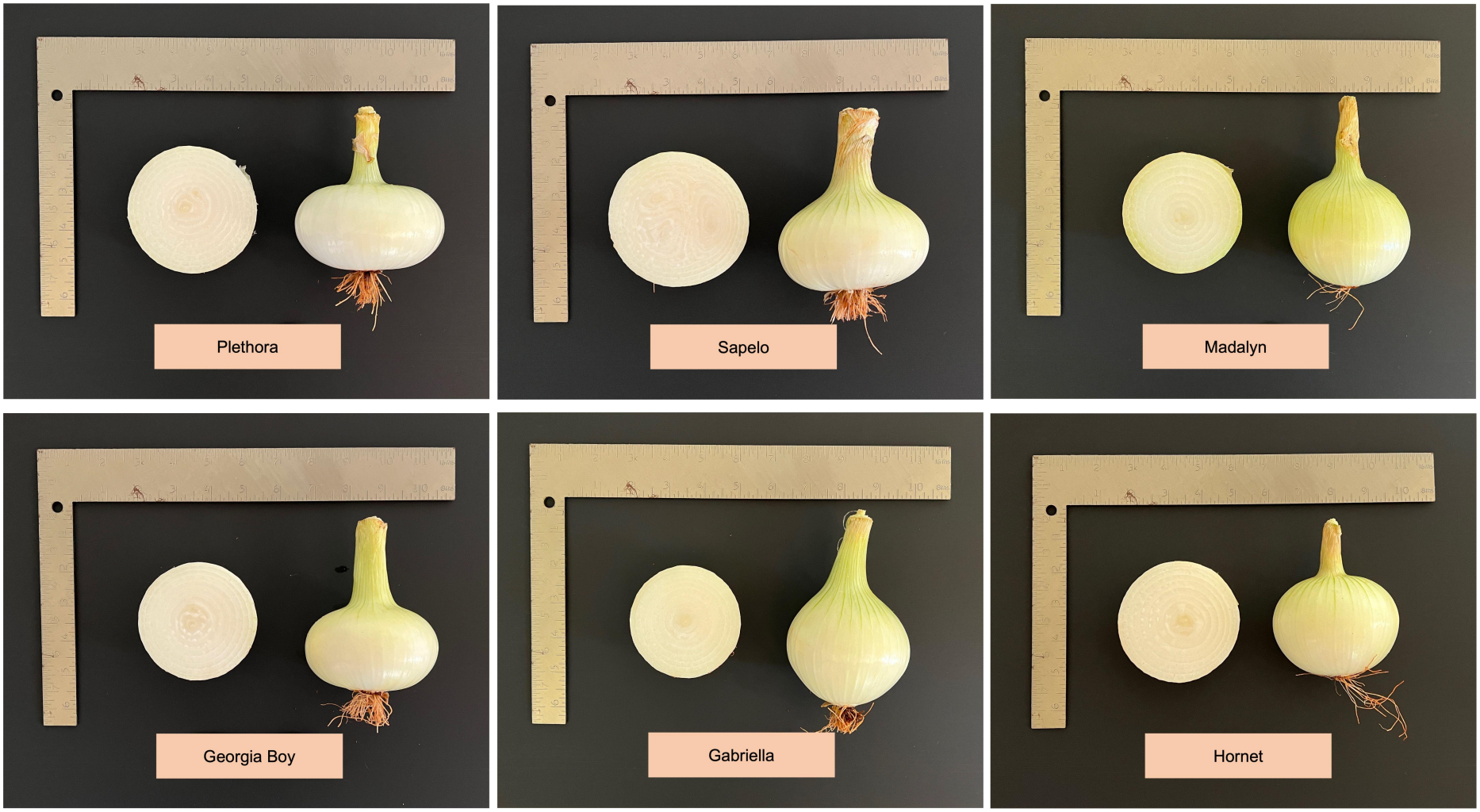
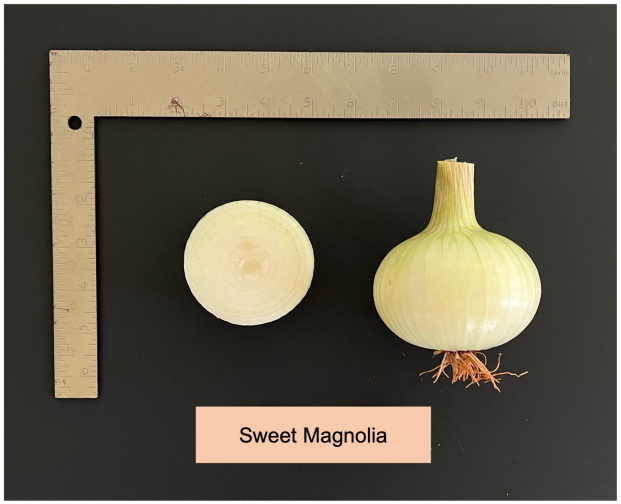
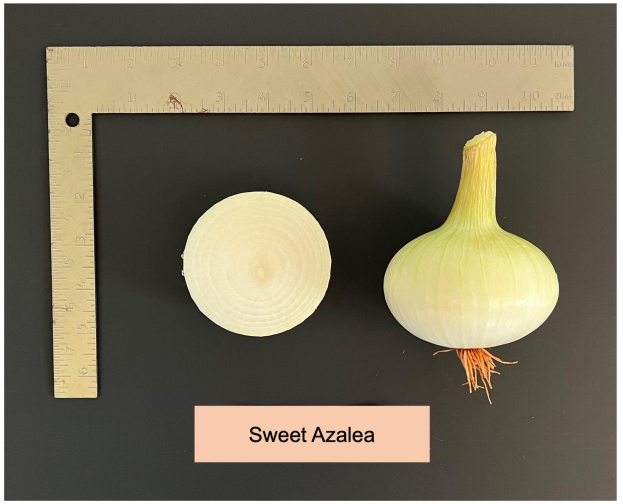


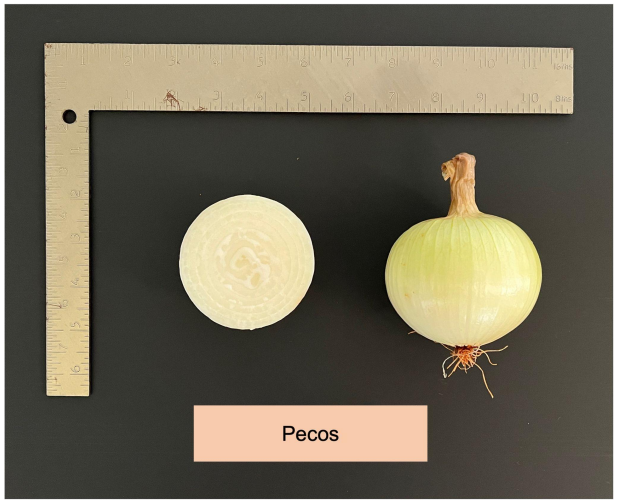
Figure 3. % Brix for a single onion sample. Values were not replicated.

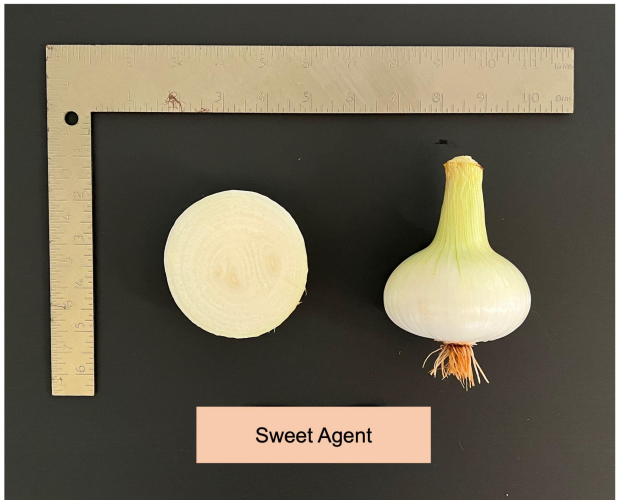

Plethora
Sapelo
Madalyn
Georgia Boy
Gabriella
Hornet


Sweet Magnolia

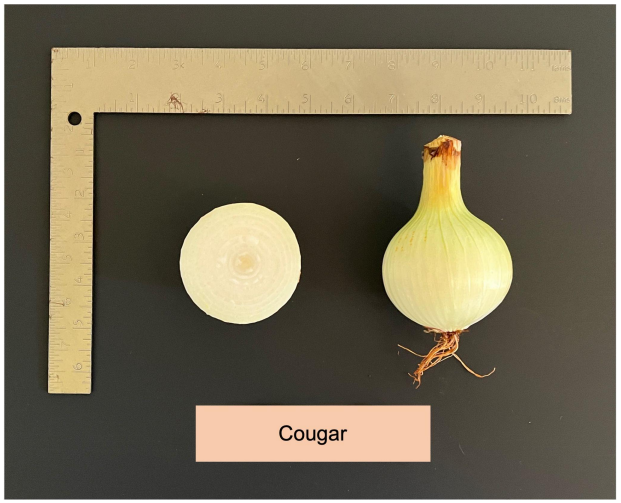

Savannah Sweet

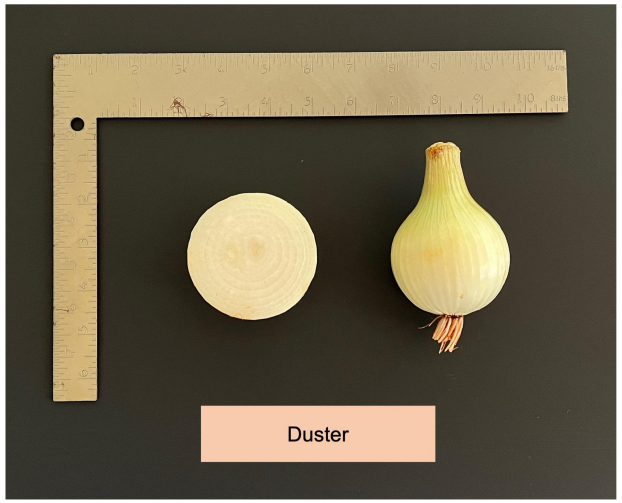

Sweet Azalea

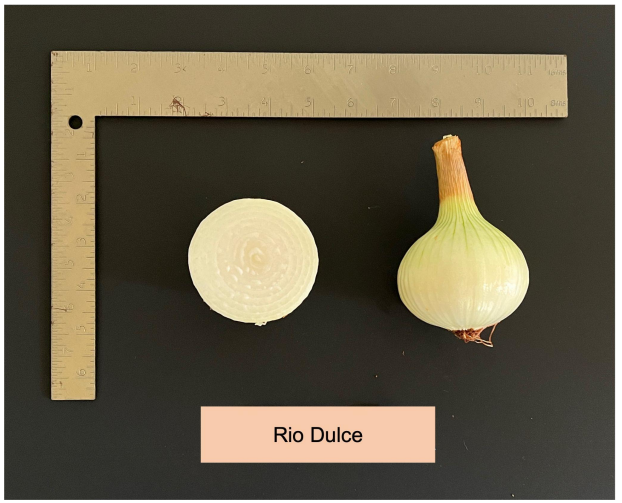

Pecos

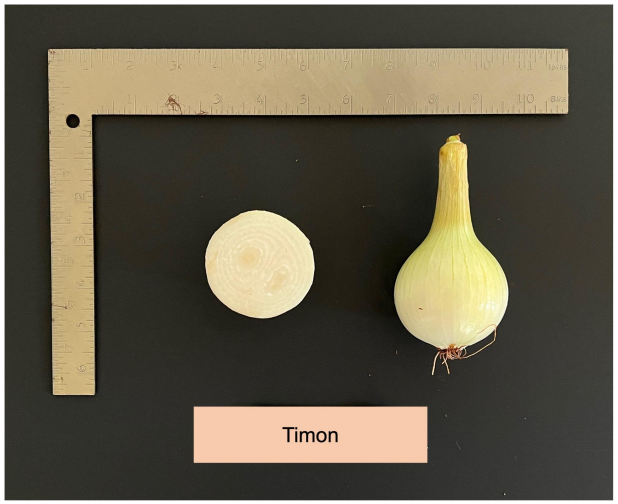

Sweet Agent


Alison

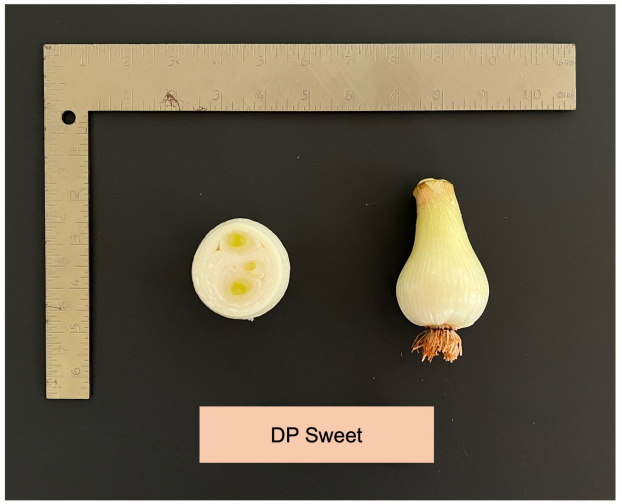

Cougar

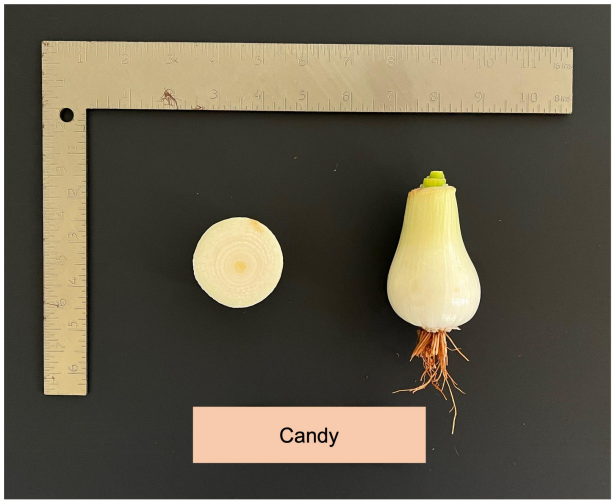

Duster


Rio Dulce


Timon


Early Sweet


DP Sweet


Candy