



Quality Characteristics of Georgia and Texas Grown Pecan Varieties

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Introduction

- Firmness:

Oxidative stability (resistance of pecan oil and kernel to rancidity), sensory and market value

- Oil yield:

Economic impact (demanding premium prices for health food and specialty markets), market competitiveness (higher yields, efficient stable production), and processing efficiency

- Water activity (a_w):

Microbial control, pathogen reduction, shelf life and quality retention



Introduction

- Total polyphenol content:
Antioxidant, anti-inflammatory, reduces oxidative stress linked to many chronic illnesses, cardiovascular protection, metabolic and insulin sensitivity support, synergism with other nutrients (Vitamin E and oxidative effects of pecan fats)
- Brix:
Nutrient quality, flavor, maturity (optimal harvest time)

In this study we investigated these characteristics for:

- 19 varieties of Georgia grown pecans
 - Harvest year 2025
 - Seedlings and crosses
- 26 varieties of Texas grown pecans
 - Harvest year 2024
 - Parent crosses and cross selections
- 21 varieties of Texas grown pecans
 - Harvest year 2025
 - Crosses, seedlings and cross selections



19 GA Varieties Harvest Year 2025

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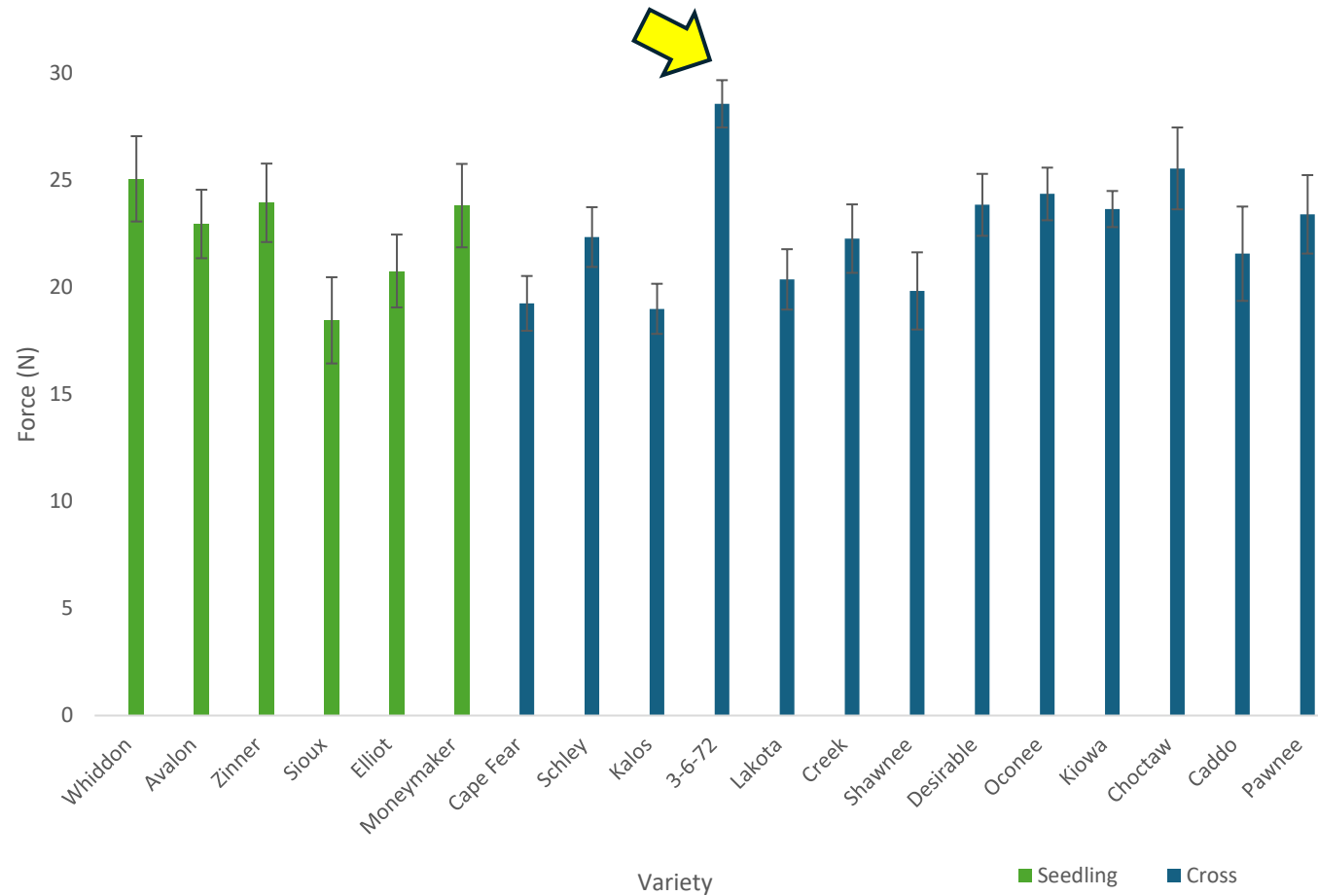


Shawnee: Avg
kernel wt. **4.27 g**

Elliot: Avg kernel
wt. **1.48 g**

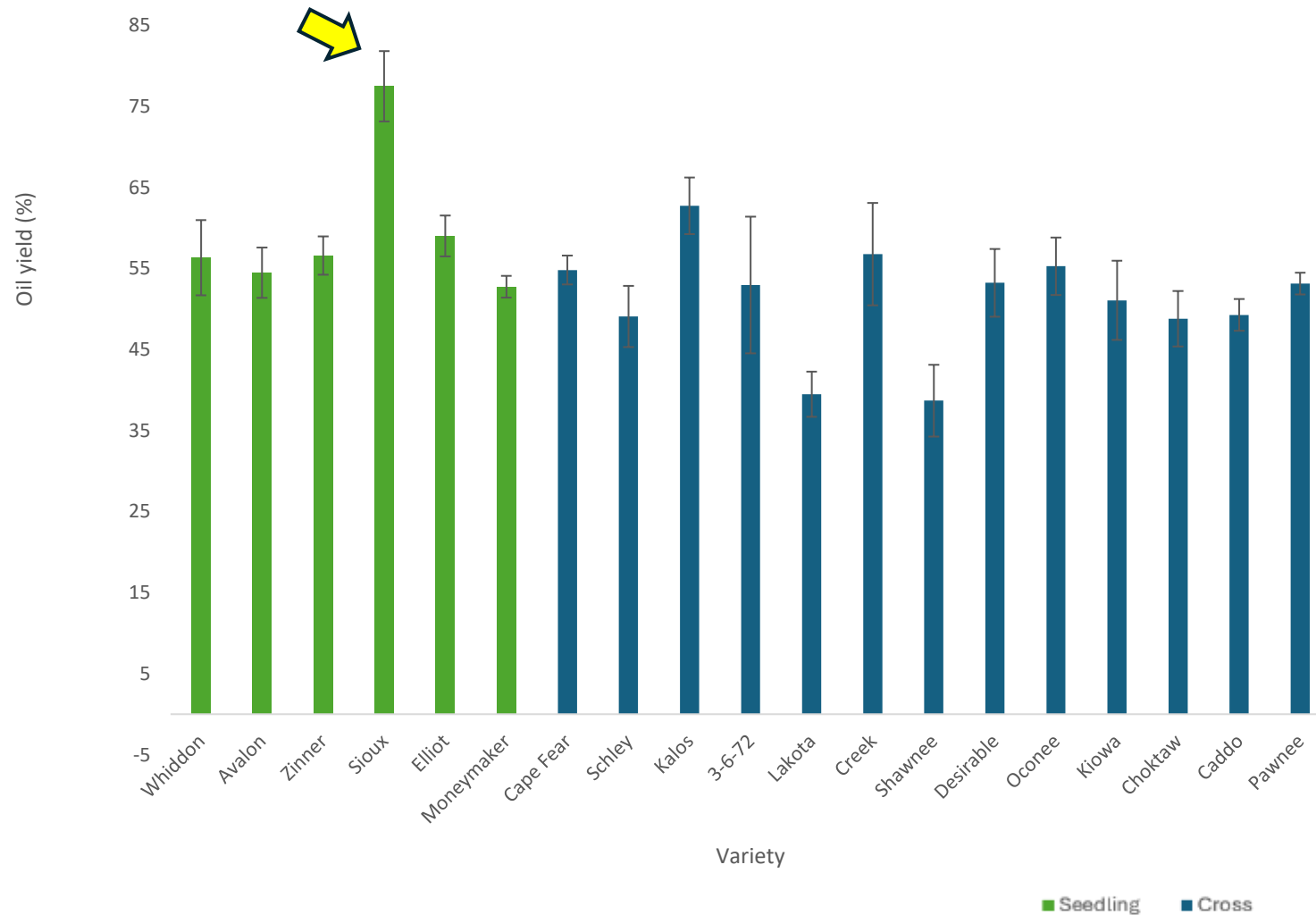
Figure 1. Nineteen GA pecan varieties in-shell and kernel. From top to bottom and left to right: Kalos, Whiddon, Avalon, 3-6-72, Lakota, Zinner, Sioux, Creek, Shawnee, Desirable, Cape Fear, Oconee, Kiowa, Choctaw, Caddo, Elliot, Pawnee, Moneymaker, and Schley.

19 GA Varieties Harvest Year 2025: Firmness



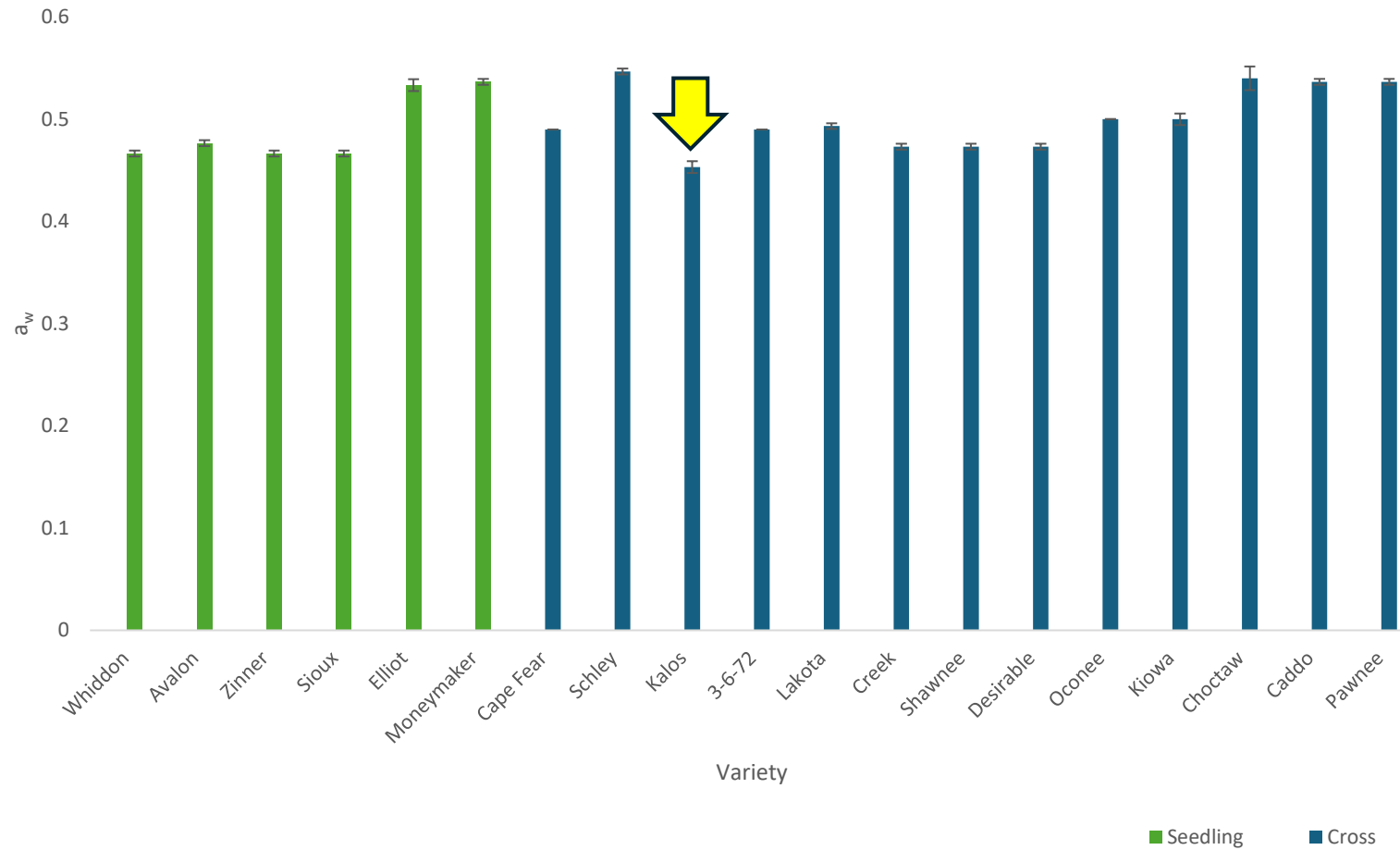
Highest firmness value: UGA
cross 3-6-72 **28.65 N**

19 GA Varieties Harvest Year 2025: Oil yield



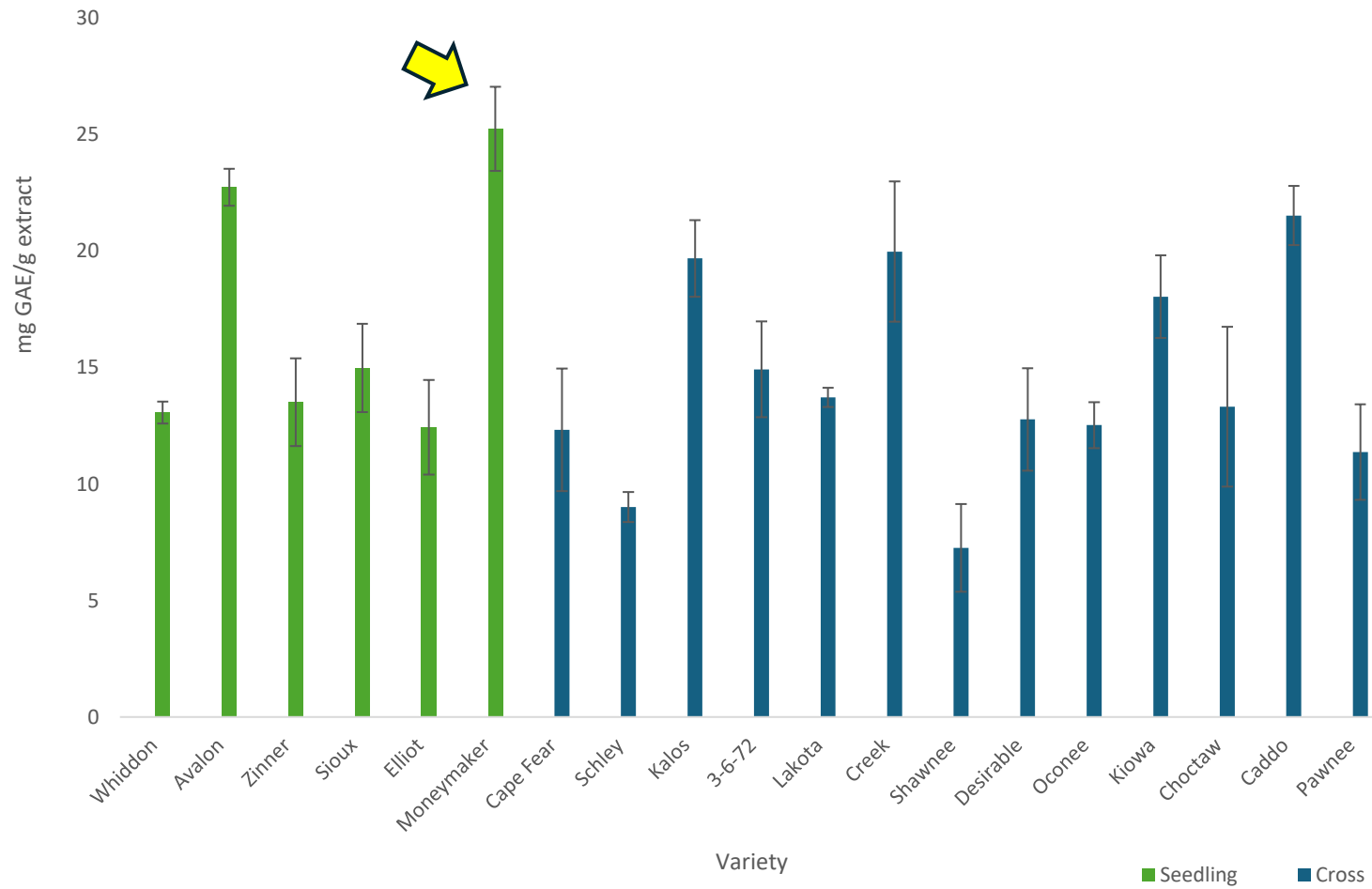
Highest oil yield:
Sioux **77.46%**

19 GA Varieties Harvest Year 2025: Water Activity



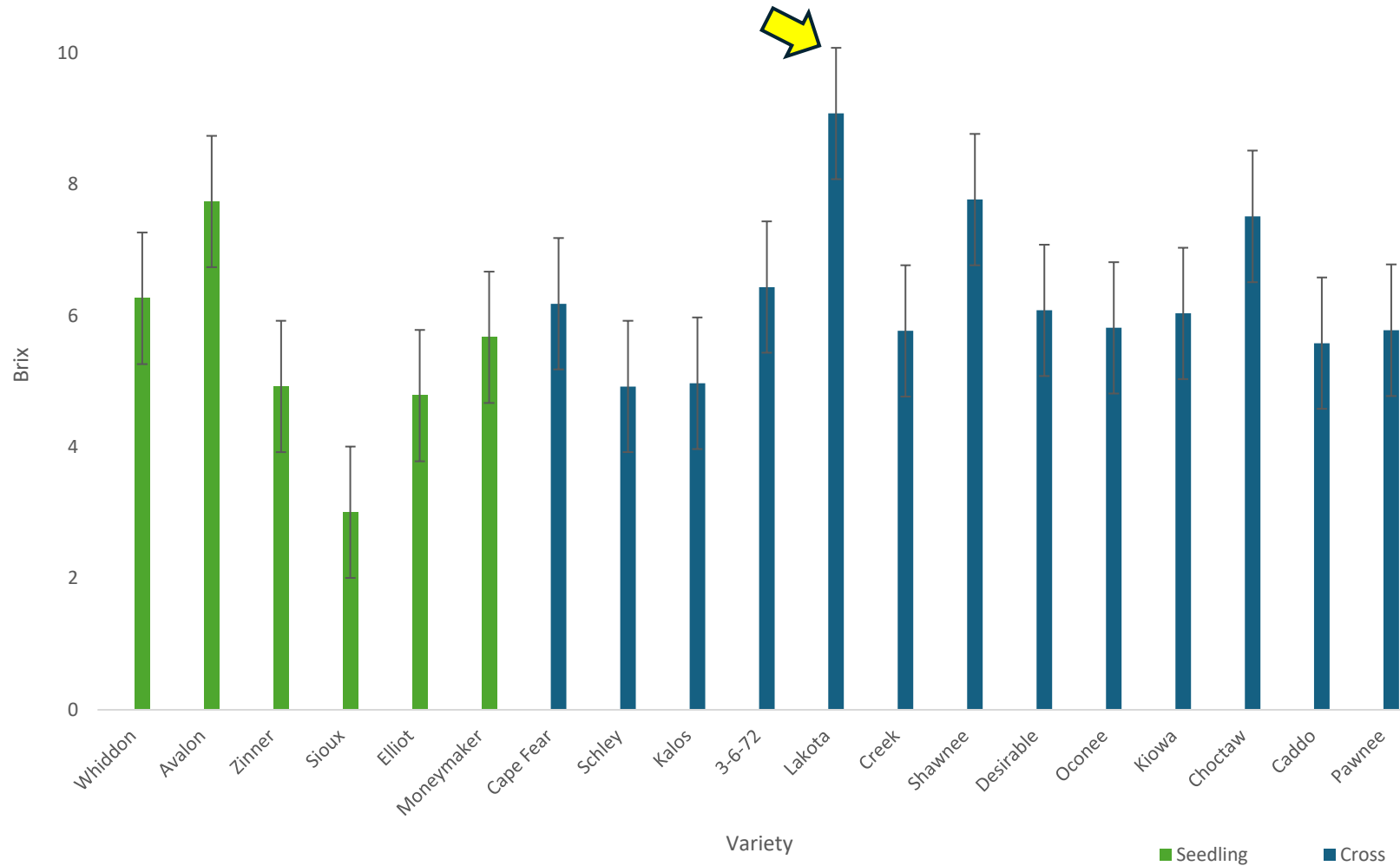
Lowest a_w : Kalos **0.45**

19 GA Varieties Harvest Year 2025: Total Polyphenol Content



Highest TPC: Moneymaker
25.25 mg GAE/g extract

19 GA Varieties Harvest Year 2025: Brix



Highest Brix: Lakota **9.08**

26 TX Varieties

Harvest Year 2024

26 TX Varieties Harvest Year 2024

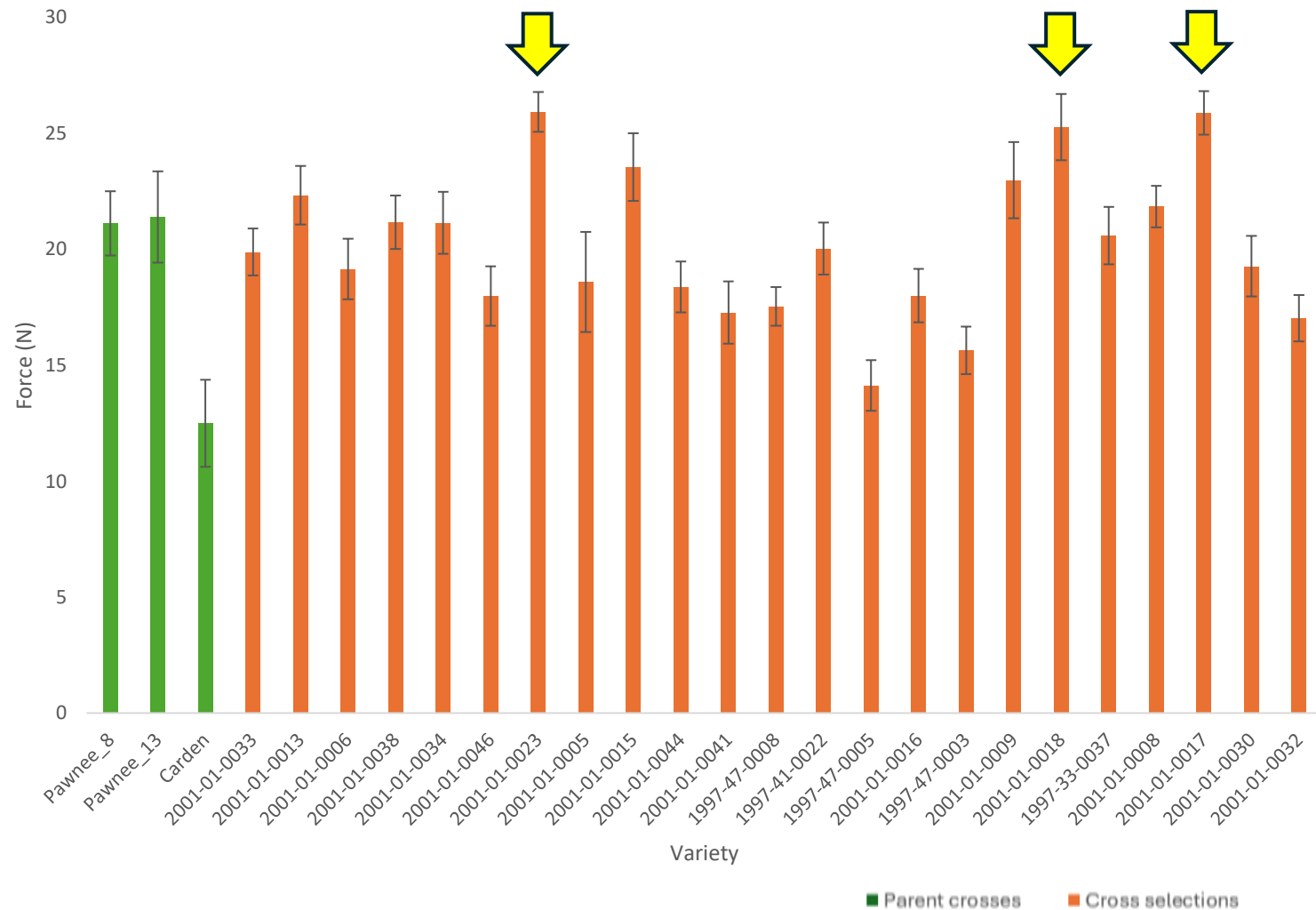


2001-01-0015: Avg kernel wt. **3.47 g**

1997-47-0003: Avg kernel wt. **1.29 g**

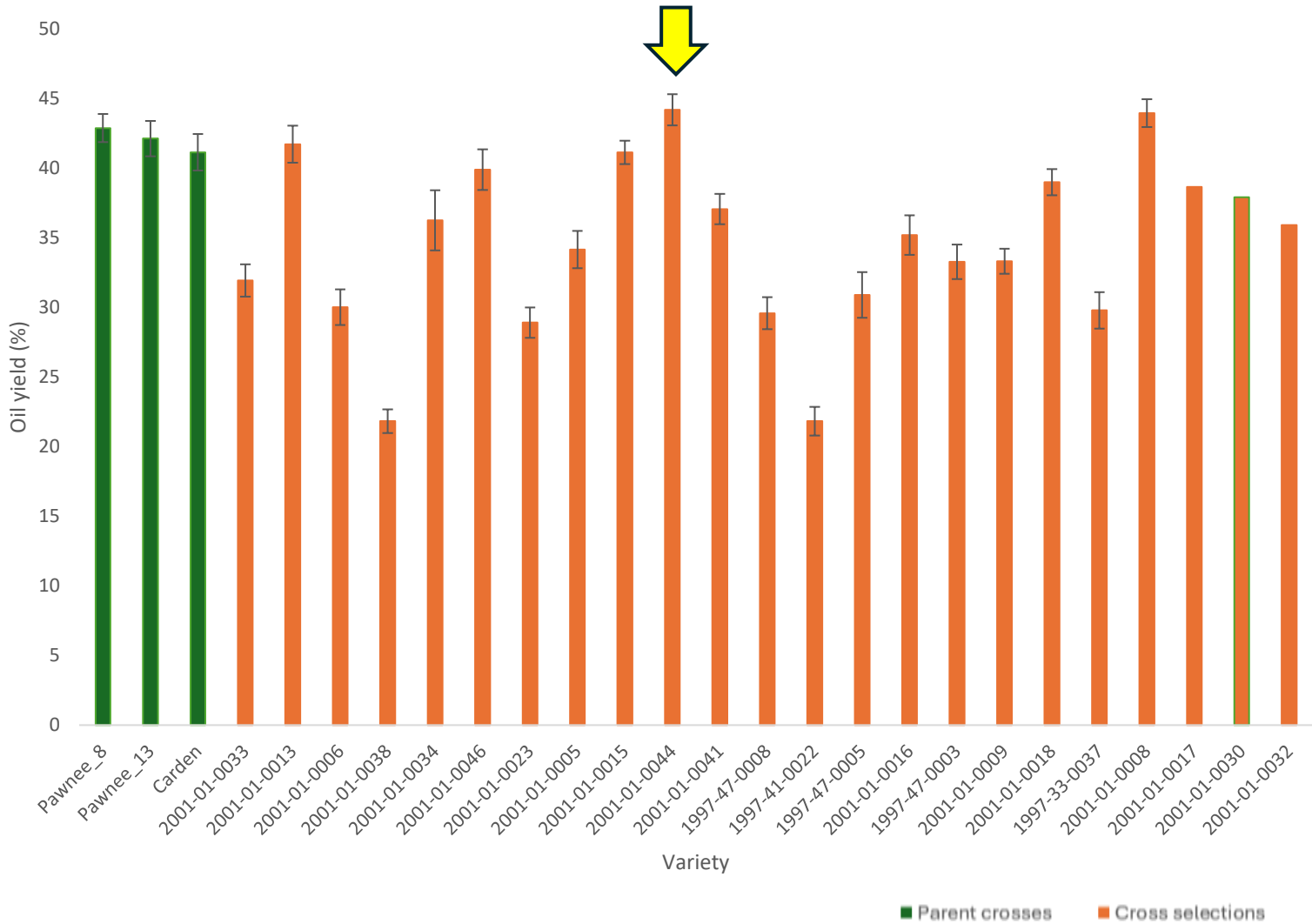
Figure 2. Twenty-six TX pecan varieties from top to bottom and left to right: Pawnee_8, Pawnee_13, 2001-1-34, Carden, 2001-01-0005, 2001-01-0015, 2001-01-0044, 2001-01-0041, 1997-47-0008, 2001-01-0038, 1997-41-0022, 2001-01-0013, 1997-47-0005, 2001-01-0016, 2001-01-0023, 1997-47-0003, 2001-01-0009, 2001-01-0033, 2001-01-0018, 1997-33-0037, 2001-01-0046, 2001-01-0008, 2001-01-0017, 2001-01-0030, 2001-01-0006, 2001-01-0032

26 TX Varieties Harvest Year 2024: Firmness



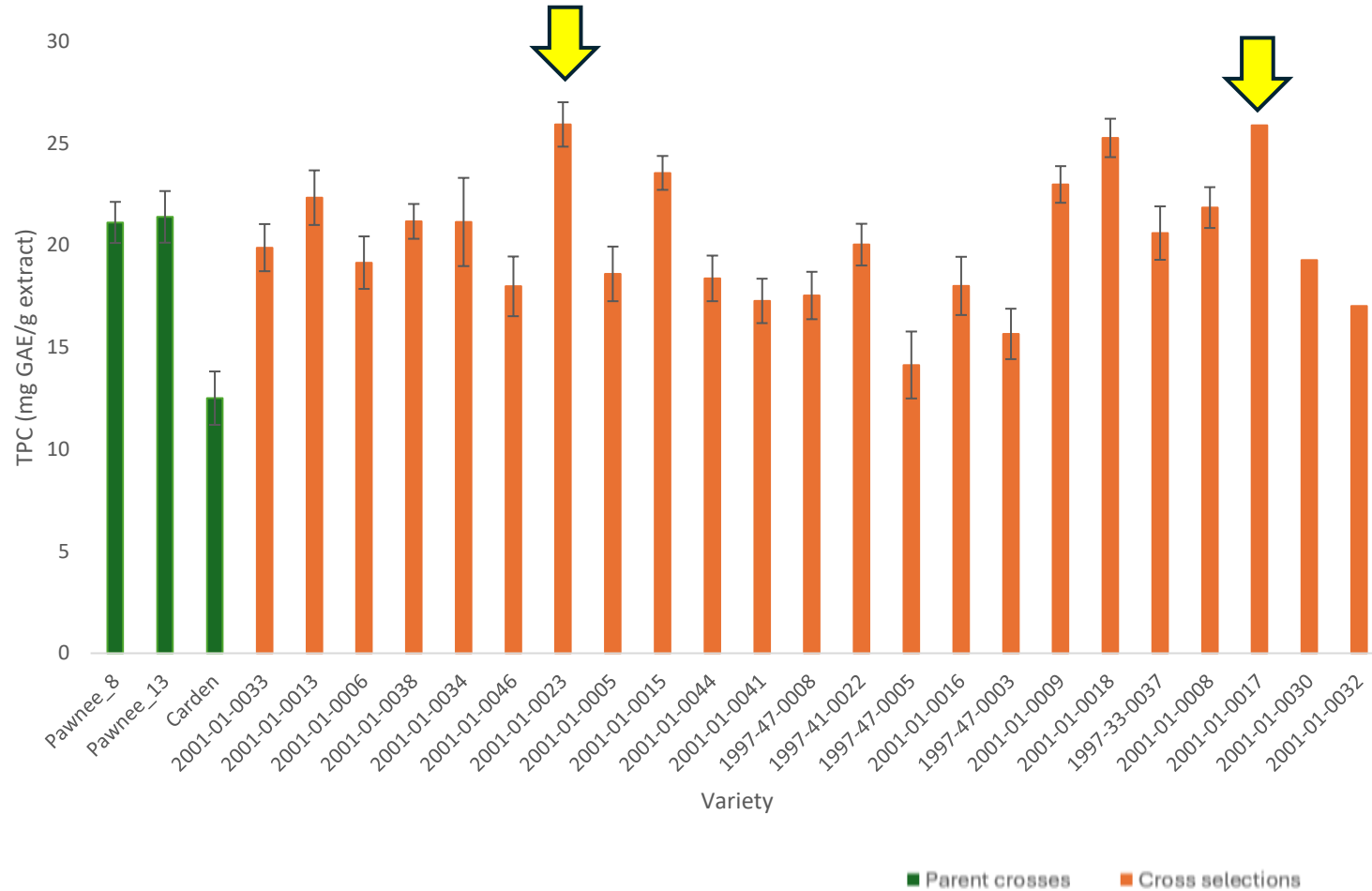
Highest firmness values:
2001-01-0023 **25.93 N**
2001-01-0017 **25.89 N**
2001-01-0018 **25.27 N**

26 TX Varieties Harvest Year 2024: Oil yield



Highest oil yield:
2001-01-0044 **44.20%**

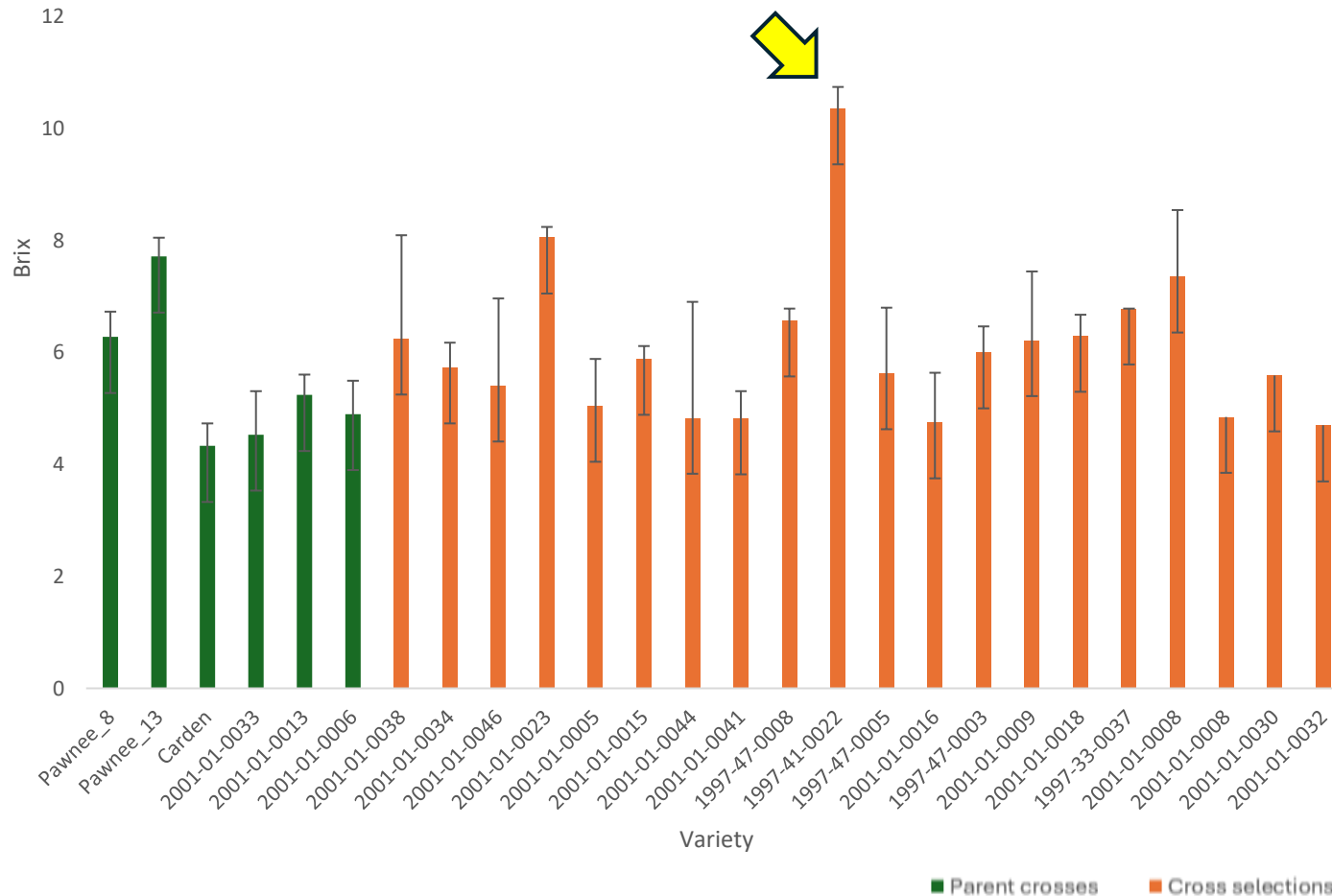
26 TX Varieties Harvest Year 2024: Total Polyphenol Content



Highest TPC:
2001-01-0023
25.92 mg GAE/g extract

2001-01-0017
25.89 mg GAE/g extract

26 TX Varieties Harvest Year 2024: Brix



Highest brix:
1997-41-0022 **10.36**

21 TX Varieties

Harvest Year 2025

21 TX Varieties Harvest Year 2025

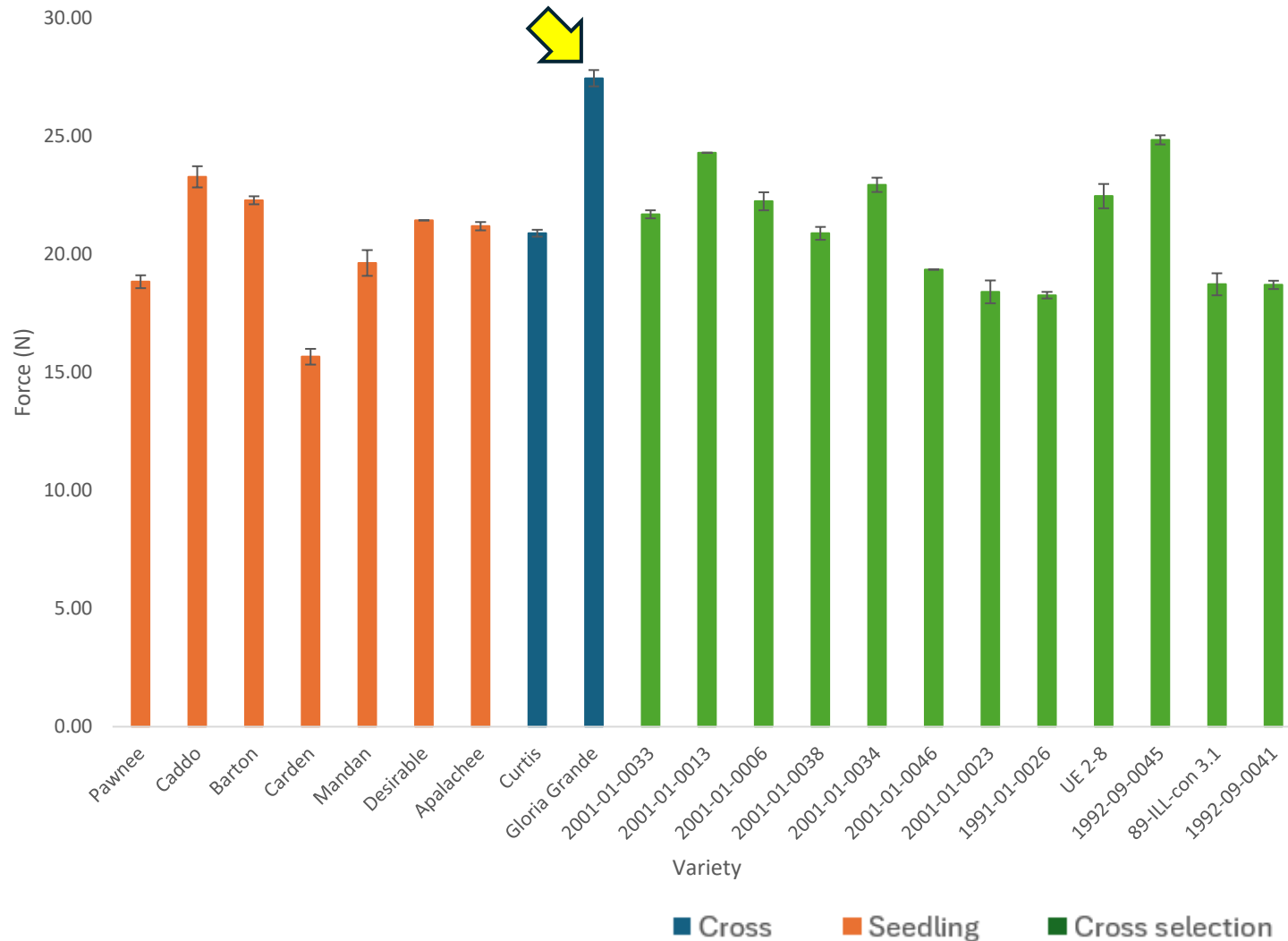


2001-01-0013: Avg
kernel wt. **3.57 g**

Desirable: Avg kernel
wt. **1.44 g**

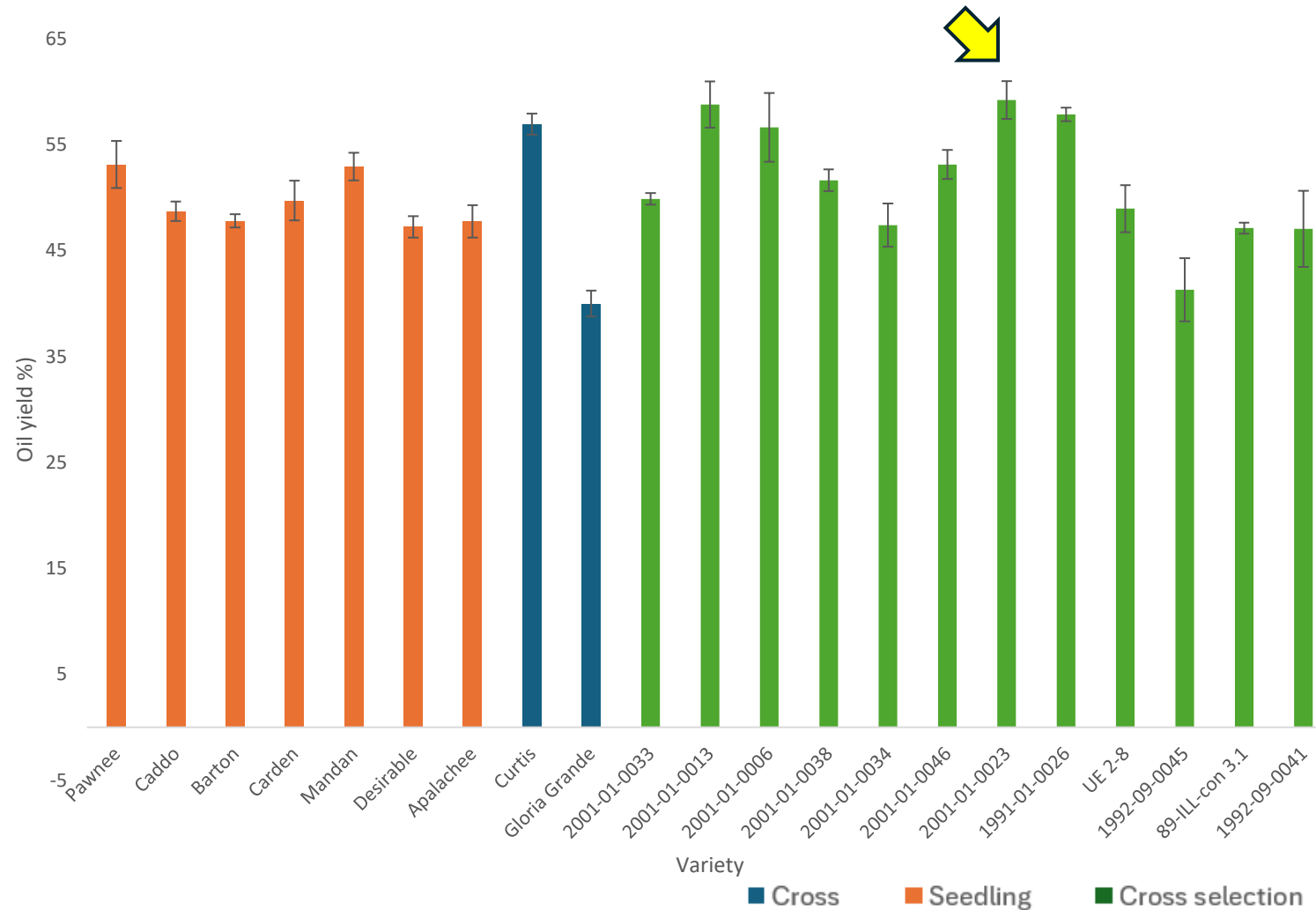
Figure 3. Texas varieties, in-shell and kernels. From top to bottom and left to right: Pawnee, Caddo, Barton, 2001-01-0033, 2001-01-0013, 2001-01-0006, 2001-01-0038, 2001-01-0034, 2001-01-0046, 2001-01-0023, Carden, Curtis, 1991-01-0026, Mandan, Gloria Grande, UE 2-8, Desirable, 1992-09-0045, 89-ILL-con 3.1, 1992-09-0041, Apalachee.

21 TX Varieties Harvest Year 2025: Firmness



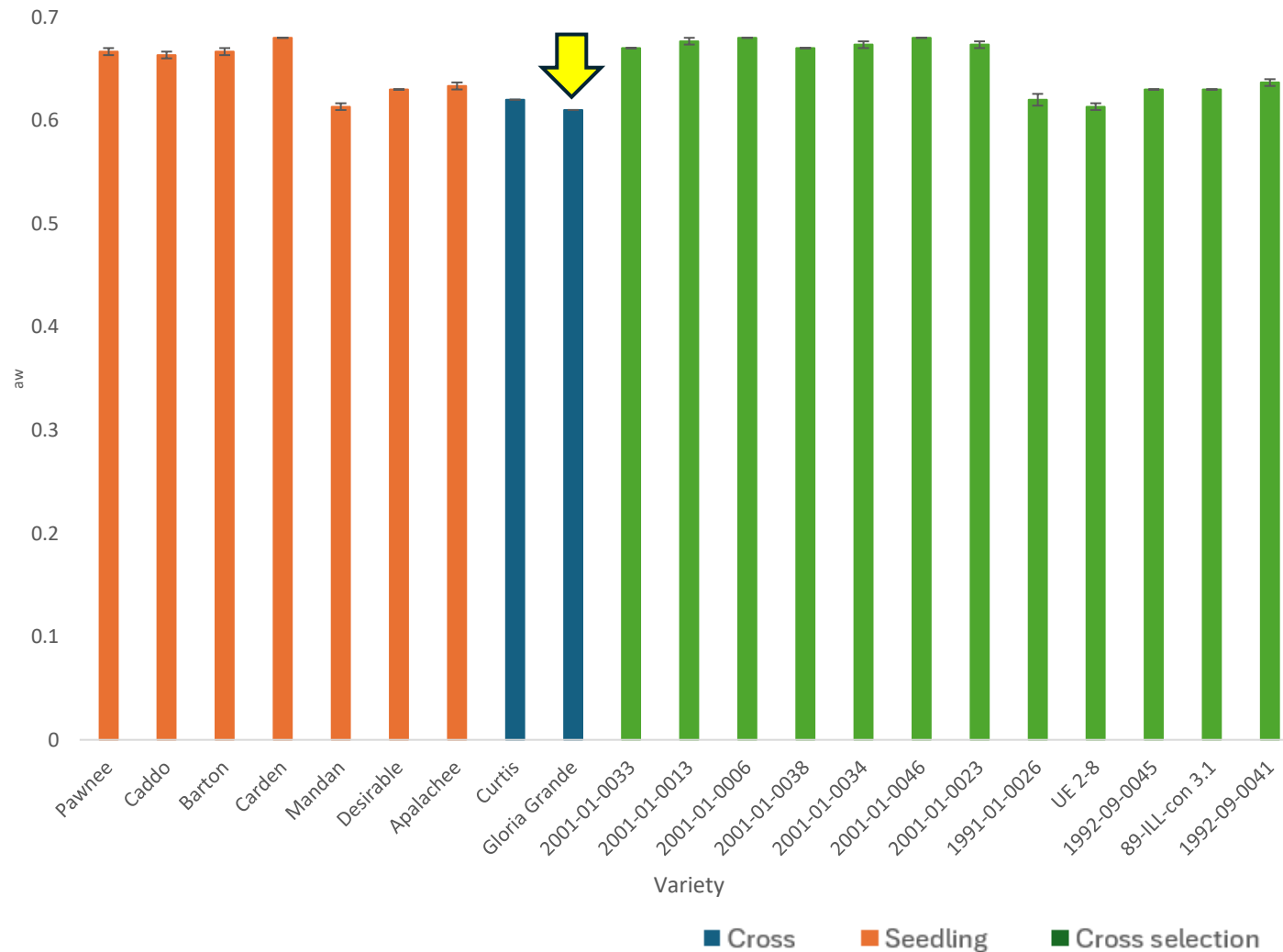
Highest Firmness value:
Gloria Grande **27.46 N**

21 TX Varieties Harvest Year 2025: Oil yield



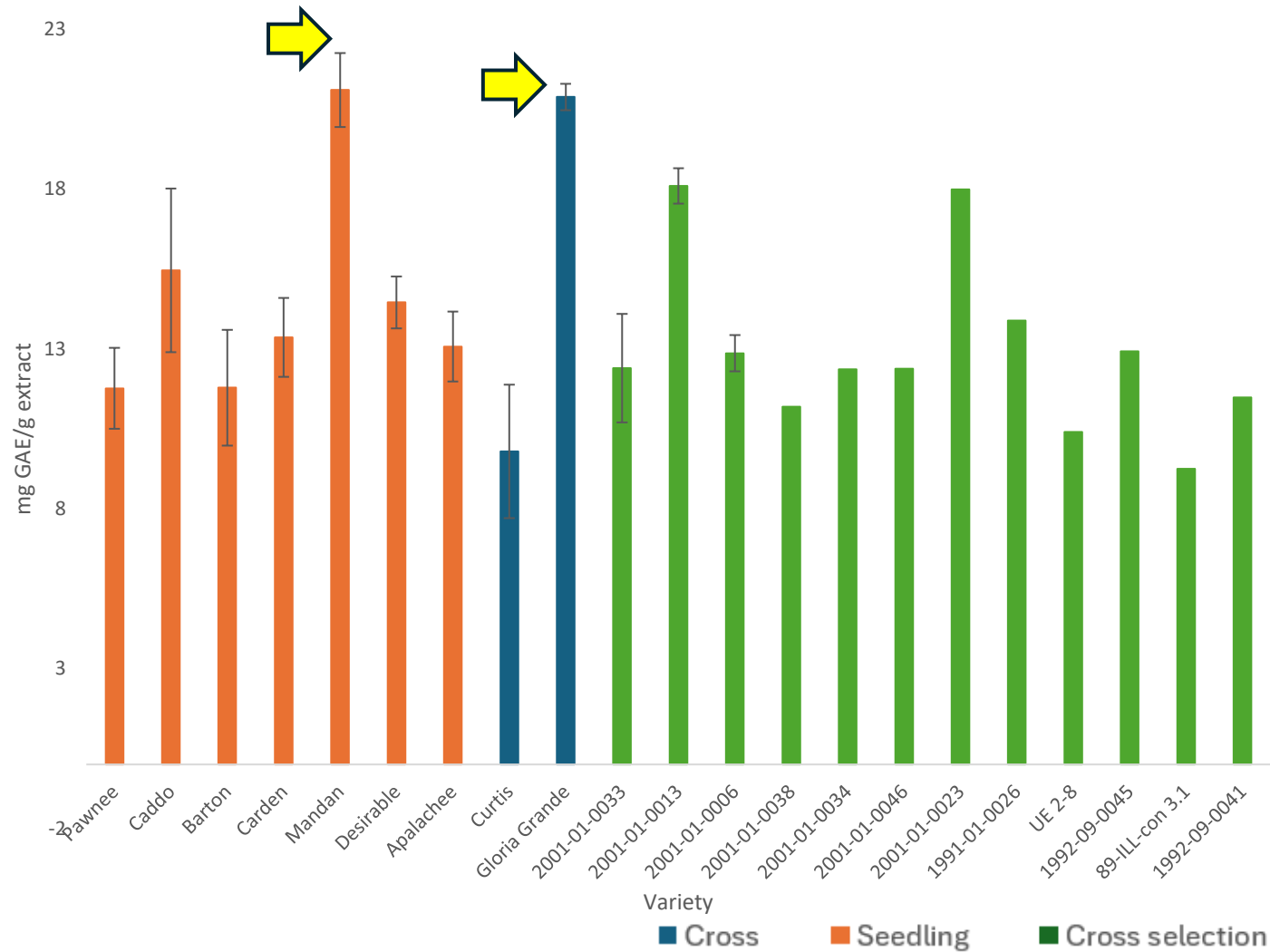
Highest oil yield:
2001-01-0023 **59.20%**

21 TX Varieties Harvest Year 2025: Water Activity



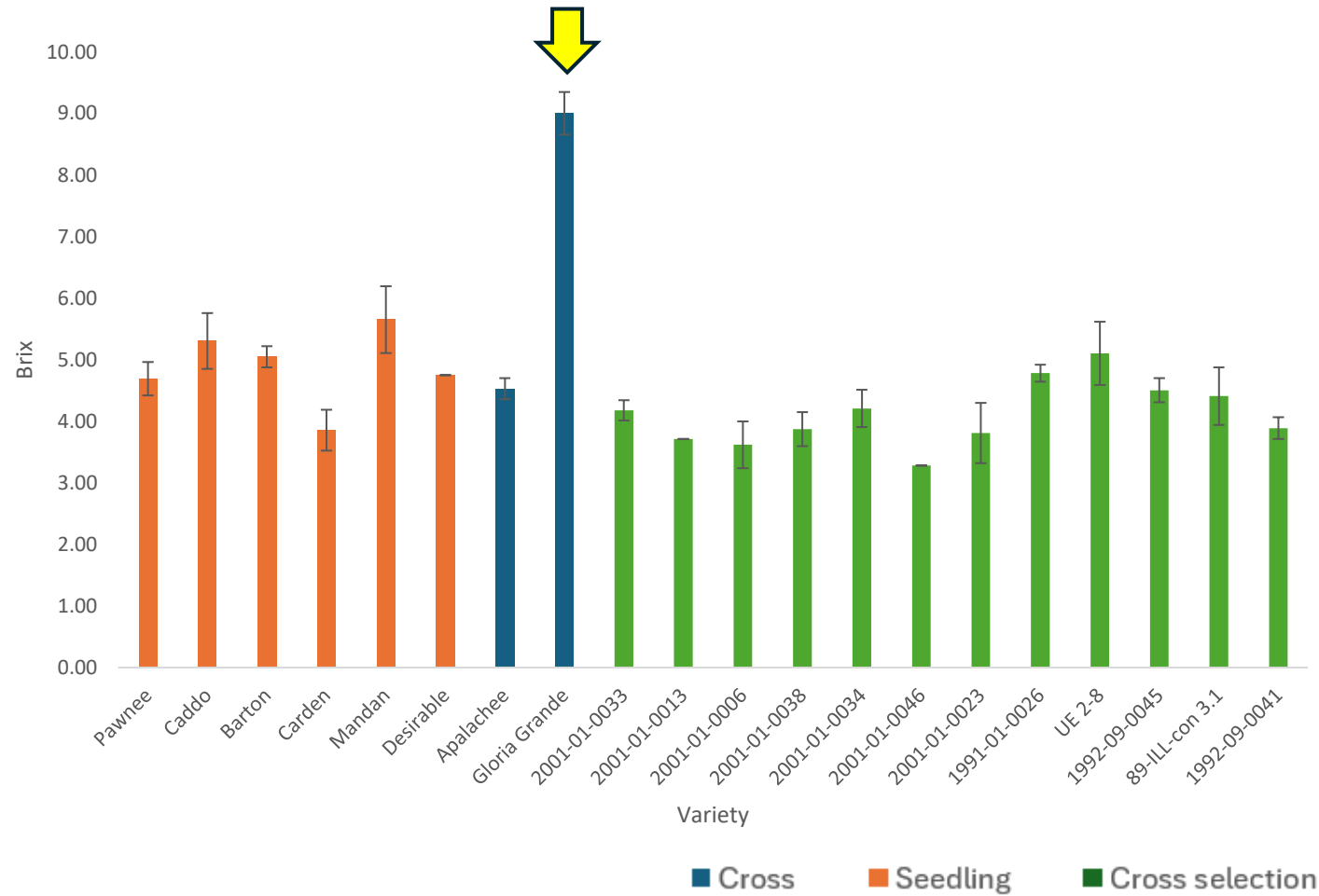
Lowest a_w :
Gloria Grande **0.61**

21 TX Varieties Harvest Year 2025: Total Polyphenol content



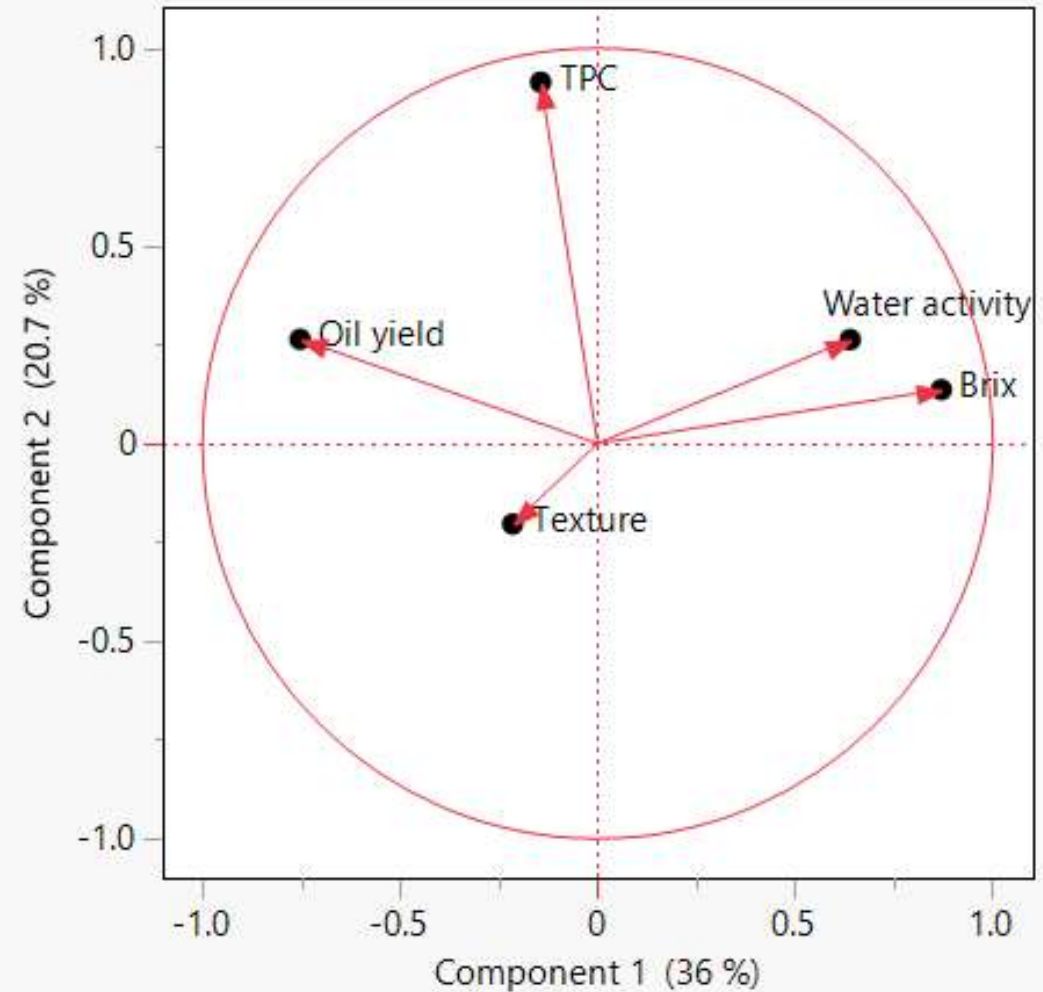
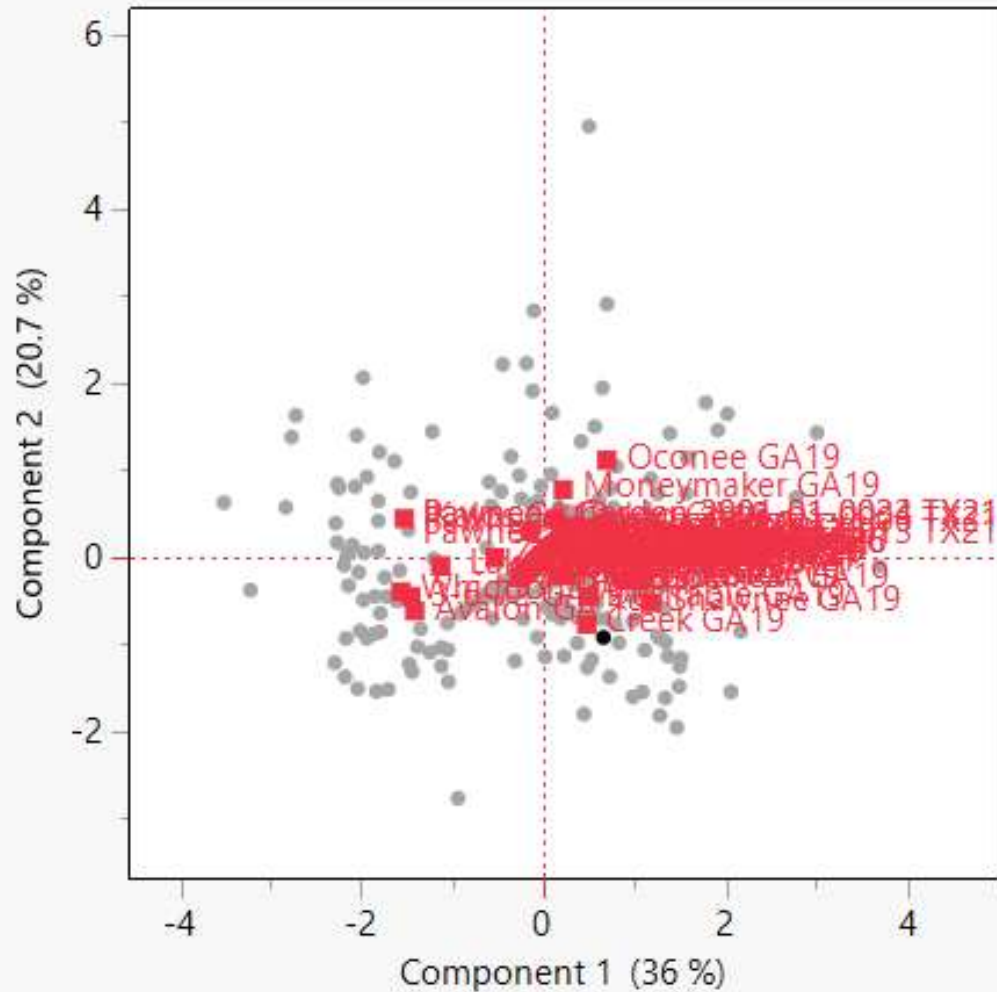
Highest TPC:
Mandan **21.10 mg GAE/g extract**

21 TX Varieties Harvest Year 2025: Brix



Highest brix:
Gloria Grande **9.00**

Principal Component Analysis



Conclusion

Quality characteristics like firmness, oil yield, water activity, total polyphenol content, and brix can be useful for determining the best varieties of pecans for obtaining higher market value in oil production, pecan plant-based beverages, and other novel pecan products.

Some of the selected crosses discussed today could be used to increase sustainability and profitability especially in specialty and health food markets

Acknowledgements

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Questions???