Phytochemicals content of Selected Kenyan Orange Fleshed Sweetpotato (OFSP) varieties

MPU COP

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Introduction- Developmental challenge

- Mulnutrition- 153 million people severely food insecured in SSA
- Challenges remain in meeting SDGs 1 and 2 (FAO, 2016).
- Staples critical to food nutrition and security
- Major staple-maize faced with challenges e.g.MLN, drought episodes
- Alternative crops e.g. Sweetpotato critical-OFSP Biofortified- value added Nutritious products

Why OFSP Sweetpotato?

- Provitamin A carotenoids.
- **Low-medium glycemic index (GI)** (Fetuga et al., 2014).
- **Antioxidants** such as flavonoids, vit. C, phenolics and anthocyanins (Pochapski, et al., 2016).
- **Resilient**, grows in marginal lands
- **Dual** purpose:
  - Both leaves and roots are utilized
  - Cash and food security crop

Why this research…….

- Despite their nutritional role in sweetpotato, phytochemicals vary in fresh and processed products.
- These variations influence quality and stability of processed products-*yet to be fully established.*
- Analysis of phytochemicals- mainly focused on beta carotene with limitations on other beneficial phytochemicals.
- Give additional important information for promotion of OFSP.

Objective

To develop OFSP products with high nutritional (phytochemicals) quality

Research activity

Quantification of phytochemicals and anti-oxidant properties of released OFSP roots and leaves.

Sampling-7 OFSP varieties and 2 local varieties as controls-KALRO KK

Sample preparation and analysis: Phenolics, Flavanoids, Vitamin C, Oxalates, tannins, phytates, total antioxidant ppty

Lab analysis

<u>Standard methods used in analysis-FANEL LAB</u>

Dry matter Content: Oven drying (AOAC, 2012)

Vitamin C content: HPLC-ASEAN Manual (2012), modified

Phenolics, Tannins, Flavanoides & antioxidant activity: Micro-titre plate reader.

Phytates-K-PHYT 11/15 Kit.

Oxalates-HPLC-Nguyen and Savage, 2015

Glicemic response-Digestion DNSA-Argyri et al. (2016)

Results-Dry matter Content: Significant varietal differences; low in OFSP roots (most below 30%), low in leaves than roots

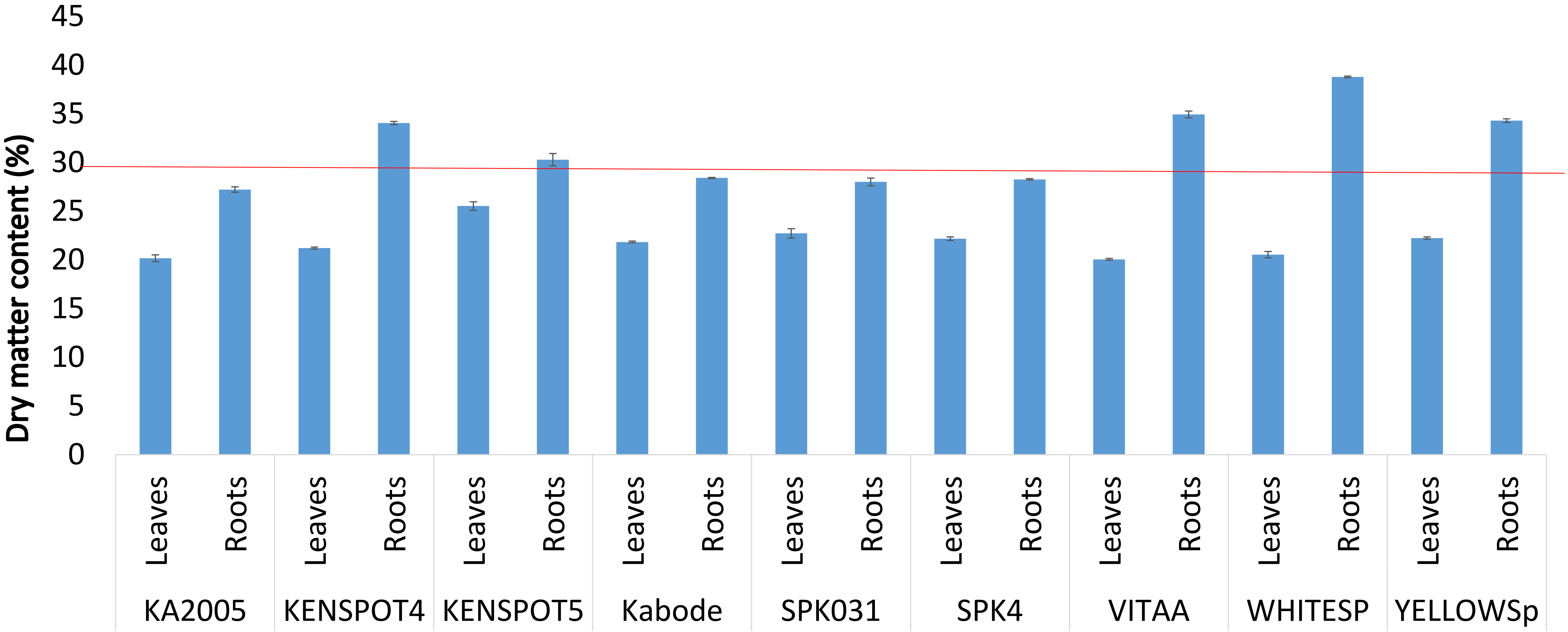

Fig. 1: Dry matter content in seven Kenyan OFSP varieties. The bars indicate standard error of means

Corotenoids in roots and leaves- higher variation in leaves

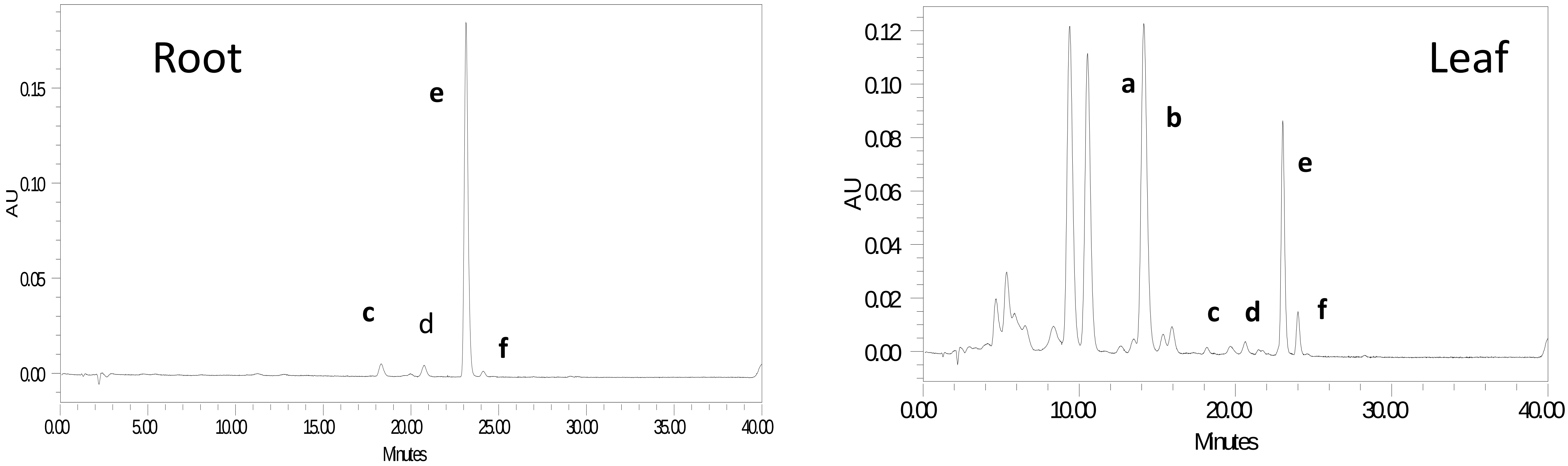

Figure 2: Carotenoids chromatogram for raw roots and leaves. a=Lutein, b=Zeaxanthin, c=β-cryptoxanthin, d=13 Cis β-carotene, e=All trans β-carotene, f= 9 Cis β-carotene.

Carotenoids content: Differed significantly (*P*≤ 0.05) among varieties and plant parts, the leaves indicating significantly (≤0.05) higher values than roots

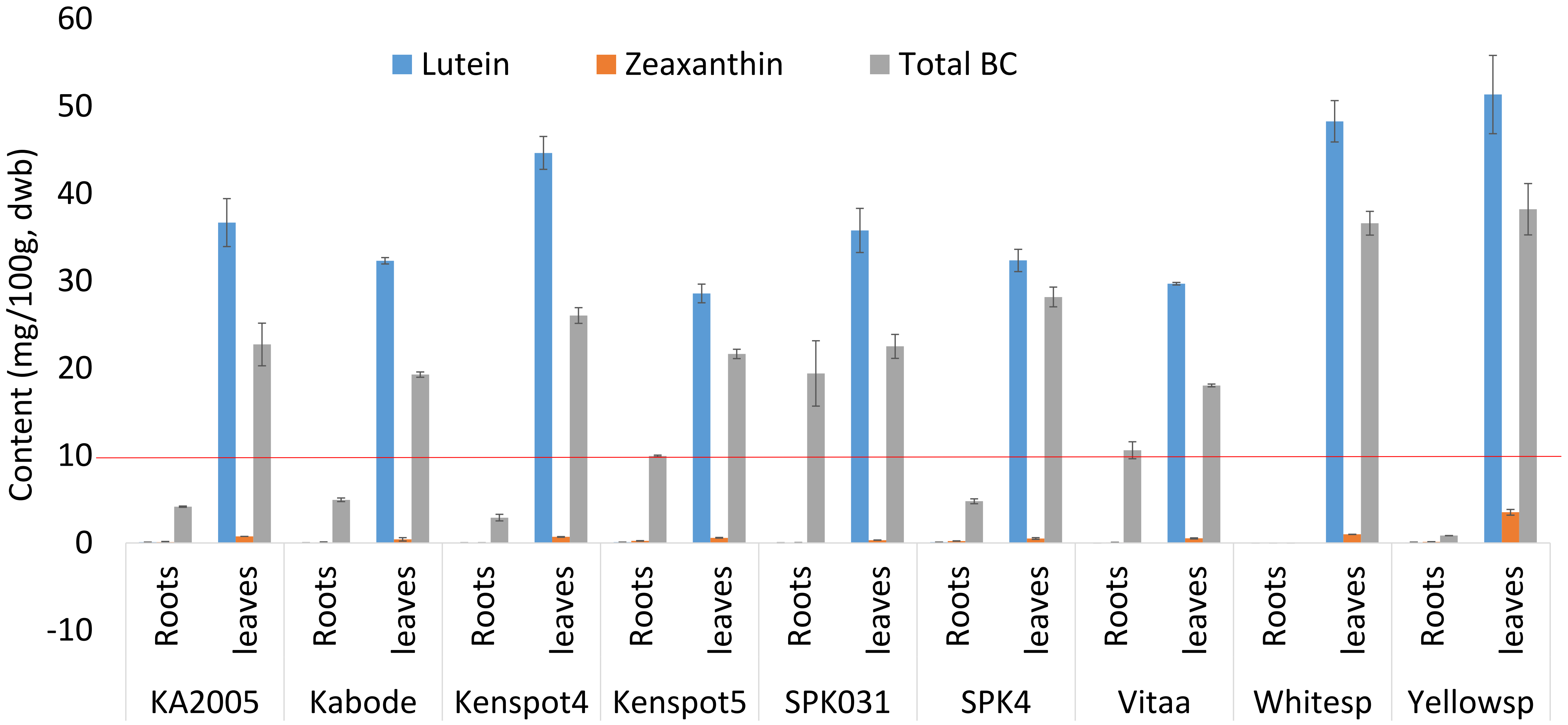

Fig. 2: Variations in carotenoids content among nine sweetpotato varieties. Bars are standard error of means

Vitamin C: varied significantly (P≤0.05) among the sweetpotato varieties regardless of the plant part- higher in leaves. **Roots: 4.53-19.05** but Leaves: **46.64-349.05** mg/100g dwb

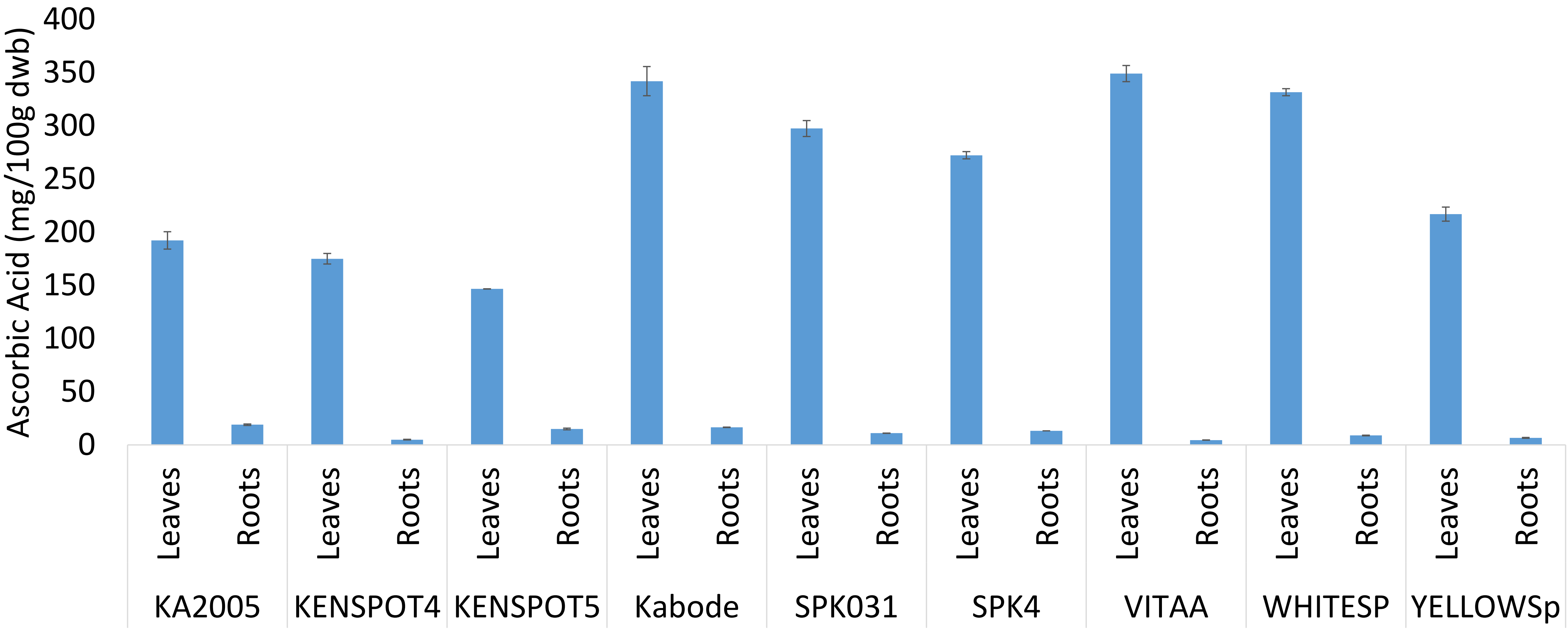

Fig. 3: Vitamin C content in sweetpotato varieties. Bars indicate standard error bars

Flavanoids and phenolics: Flavanoids: **ND-25.8 CE/100** g in roots; **4097-7316** CE/100 g in leaves. Phenolics: **ND-224** GAE/100 g in roots; **4496-6801** GAE/100 g in leaves

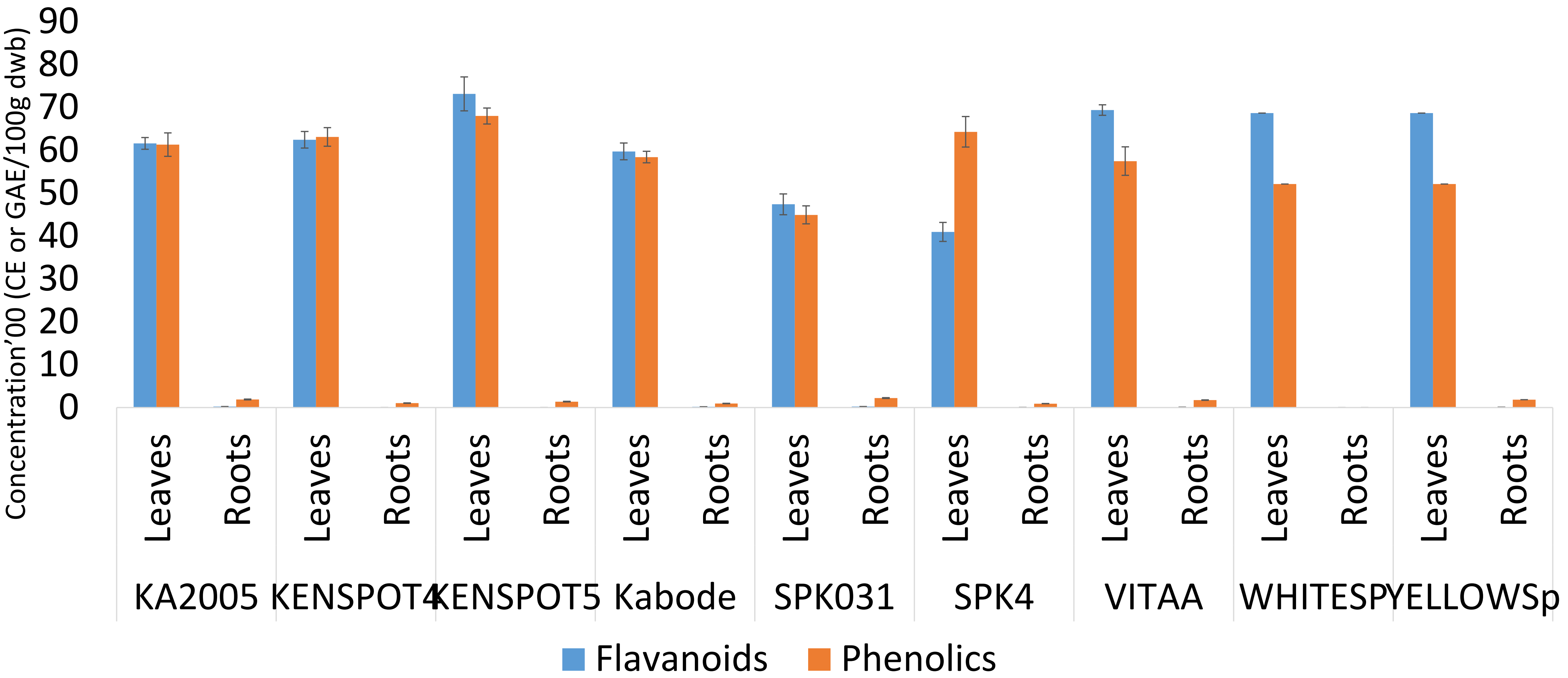

Fig. 4: Flavanoids and phenolics in sweetpotato. Bars indicate standard error bars

Phytates: High in leaves (1.14-4.43 g/100g), lowest in roots (0.05-0.42 g/100g)

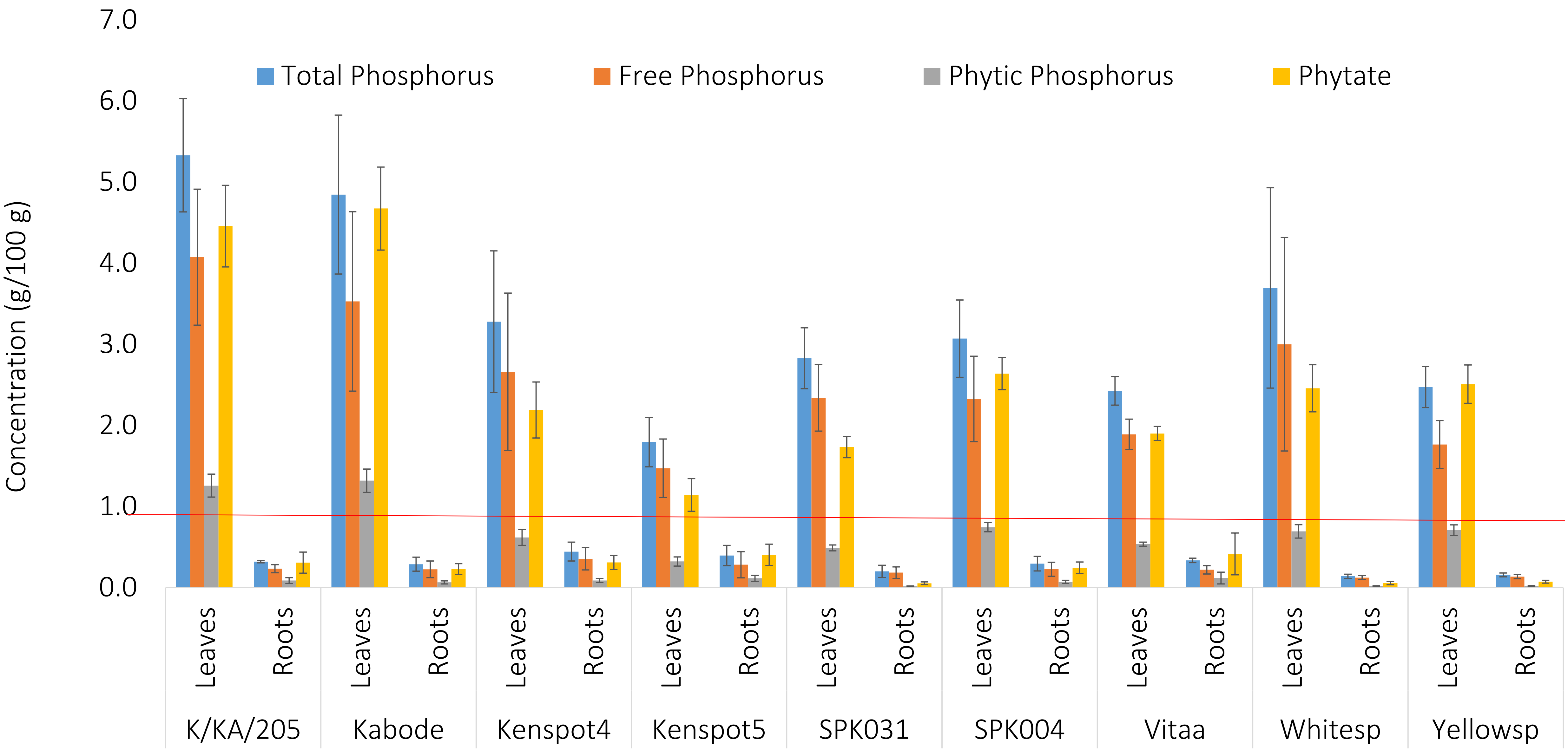

Fig.5: Phytates content of sweetpotato leaves and roots. Bars indicate standard error of means

Tannins: significantly Higher in leaves (0.9-5.1 g/100g), lowest in roots (ND-0.1 g/100g)

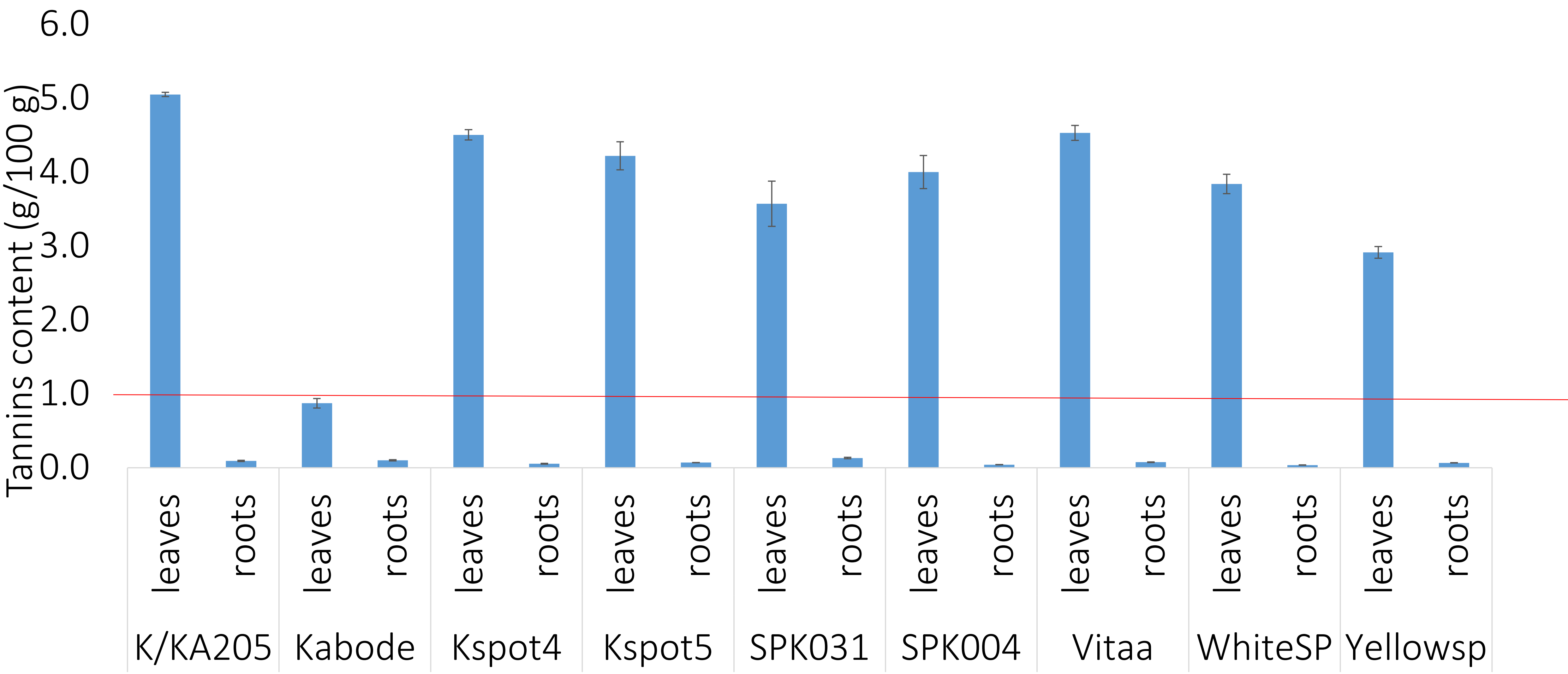

Fig 6. Tannins content in roots and leaves of nine Kenyan sweetpotato varieties. The bars indicate standard error of the means

Oxalate: significantly Higher in leaves (0.9-5.1 g/100g), lowest in roots (ND-0.1 g/100g)

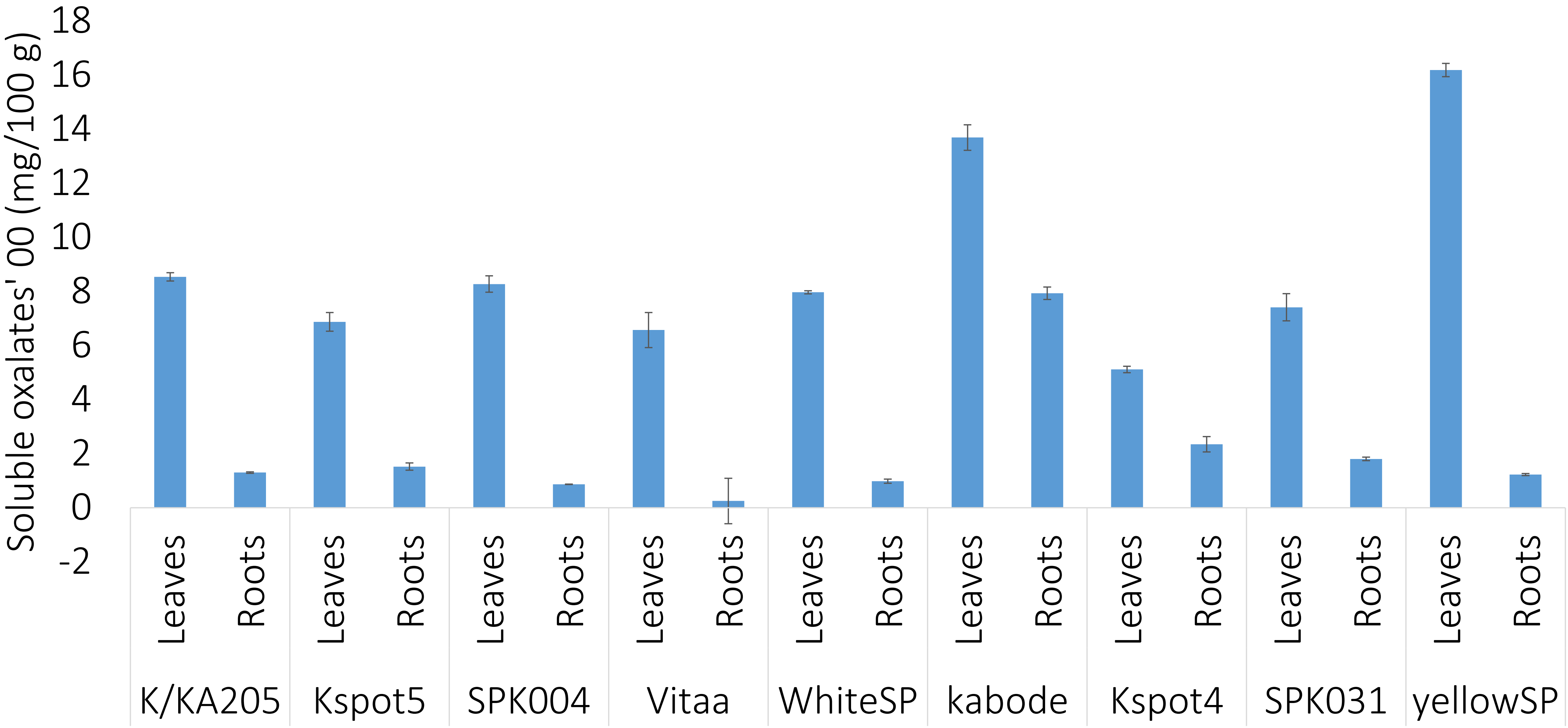

Figure 7: Soluble oxalates in roots and leaves of nine Kenyan sweetpotato varieties. The bars indicate standard error of the means.

Phytochemicals and antioxidant property: Significant correlation noted

Table 1: Pearson correlation (r) between phytochemicals and antioxidant property

Parameter	Ascorbic Acid	Flavanoids	Phenolics	Total Carotenoids	Beta Carotene
Antioxidant property	0.931	0.964	0.975	0.923	0.831
P value	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001

Antinutrients and antioxidant property: Significant correlation noted-lower than beneficial

Table 2: Pearson correlation (r) between phytochemicals and antioxidant property

Parameter	phytates	tannins	oxalates
Antioxidant property	0.796	0.885	0.778
P value	<0.0001	<0.0001	<0.0001

Conclusions

- There is a wide variation of the phytochemicals in sweetpotato leaves and roots, leaves being superior in all aspects evaluated including antioxidant properties.
- The current information is important for diets and ration formulations.
- Determination of the effects of processing methods on these phytochemicals would, however, give a better picture of the actual amounts being ingested by consumers of different OFSP products. **See poster**.

Acknowledgement

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