

Pomegranates at the University of Georgia Ponder Farm (Tifton)



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Fruit quality and nutritional value

- Fruit quality affected by:
 - Cultivar
 - growing region
 - Climate
 - Maturity
 - Cultural practice
 - Storage
- Pomegranate is rich source of organic acids, phenolic compounds, sugars, water-soluble vitamins and minerals.



Medical Use

- Long history of use in folk medicine.
- Fruit contains:
 - Anticarcinogenic
 - Antimicrobial
 - Antiviral compounds
 - Strong antioxidant activity of polyphenols

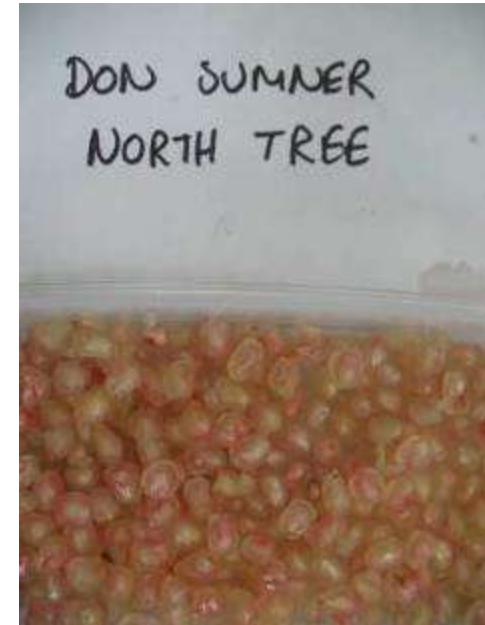


Medical Use

- Animal and human clinical studies show pomegranate health benefits:
 - Improve blood lipid profile
 - Reduce blood pressure
 - Improve endothelial function
 - Anti-tumor activity
 - Anti-atherosclerotic activity

Variation in Fruit Types

- Considerable variation exists in:
 - Seediness
 - Color
 - Tartness
 - Sweetness
 - Size



Production in South Georgia

- Research plantings available at:
 - **Byron Farm**, USDA-ARS-SE Fruit & Tree Nut Research Lab (Byron)
 - 20 varieties
 - Planted in 1976.
 - **Ponder Farm**, Univ. of Georgia (Ty Ty)
 - 24 varieties
 - Planted in 1990-1993.
 - **Tifton Campus**, Univ. of Georgia (Tifton)
 - 24 varieties
 - Planted in 2010.



Pomegranate varieties at UGA

Variety	Ponder Farm	Tifton Campus	Variety	Ponder Farm	Tifton Campus
A7:23		x	Molla Nepes		x
AKA		x	Old Harmon	x	
Azadi		x	Parfyanka		x
Cloud	x		Pink	x	x
Comb Sweet	x		R-19	x	x
Crab	x		R-2	x	x
Cranberry	x	x	R-25		x
Desertnyi		x	R-26	x	x
Don Sumner North		x	R-30		x
Don Sumner South		x	R-33		x
DS North	x		R-5		x
DS South	x		R-6		x
Eve	x		R-8	x	x
Fleshman	x		R-9	x	x
Gissarskii Rozovyi		x	Rose	x	
Granada	x	x	Sweet	x	
I-8	x	x	Thomson	x	
King	x		Utah Sweet	x	
Mae	x		Wonderful (California)		x
Mae II	x		Wonderful (Tifton)	x	x
Medovyi Vahsha		x			



Methodology

- 20 cultivars at Ponder Farm (Ty Ty)
- Harvest: Manually, early in the morning.
 - Early harvest: 24 Sept. 2010
 - Late harvest: 8 Oct. 2010
- Design: RCBD with factorial arrangement (20 cultivars x 2 maturity stages x 2 shelf life = 80 treatments) and 4 replications.



Physical Analysis

- Every fruit from each cultivar, maturity stage, shelf life and replication was assessed for:
 - **Fruit weight** (balance having an accuracy of 0.001 g)
 - **Size** (equator and pole) using digital micrometer
 - **Skin color** (L^* , a^* , b^*) using colorimeter
 - **Smoothness** (rating 1-5) and surface defects like crack, sunscald and bruise using rating scale 1-3
 - **Decay**: fruit surface (*Cercospora*) and internal rotting rated using 1-3 rating scale

Chemical Analysis

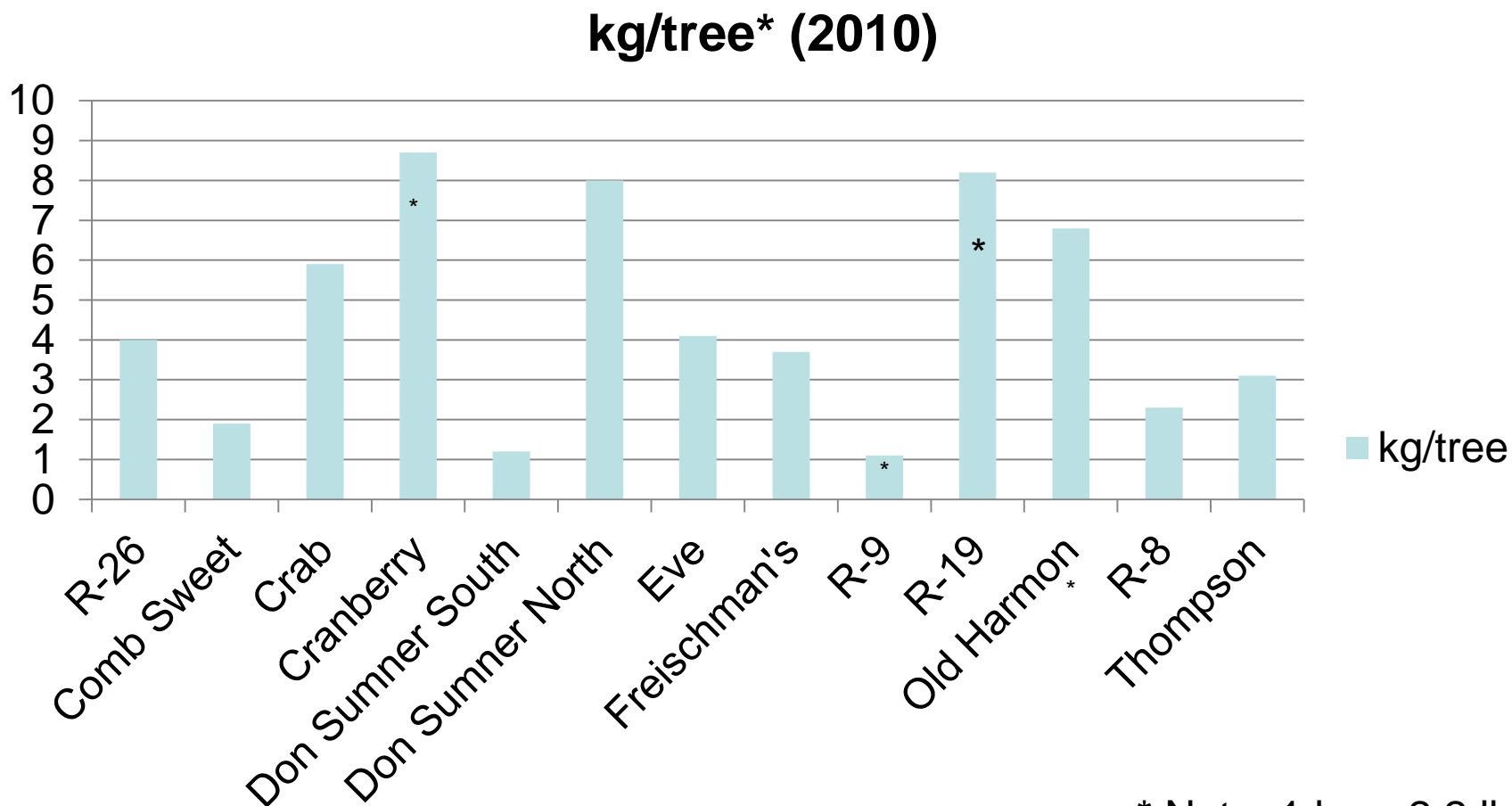
- Arils **weight** (50 arils). Arils squeezed using a cheese cloth to produce the aril juice.
- **Total Soluble Solids** (TSS) - Digital refractometer.
- **Titrateable Acidity** (TA) - Metrohm titration system.
- **Total phenol content** in arils juice - Spectrophotometer
- **Antioxidant activity** in arils juice - two methods:
 - DPPH assay - Spectrophotometer
 - TOSC assay - GC
- **Total anthocyanins content** in arils juice - HPLC



Sensory Analysis

- 20 pomegranate cultivars.
- Panelists (UGA horticulture staff and others)
- Questionnaire on consumer attitudes
- Panelists were asked to evaluate and score separately fruit using a panel score sheet.
- Scoring based on a scale of 1-5 (sweetness and seed hardness) or 1-3 (taste).

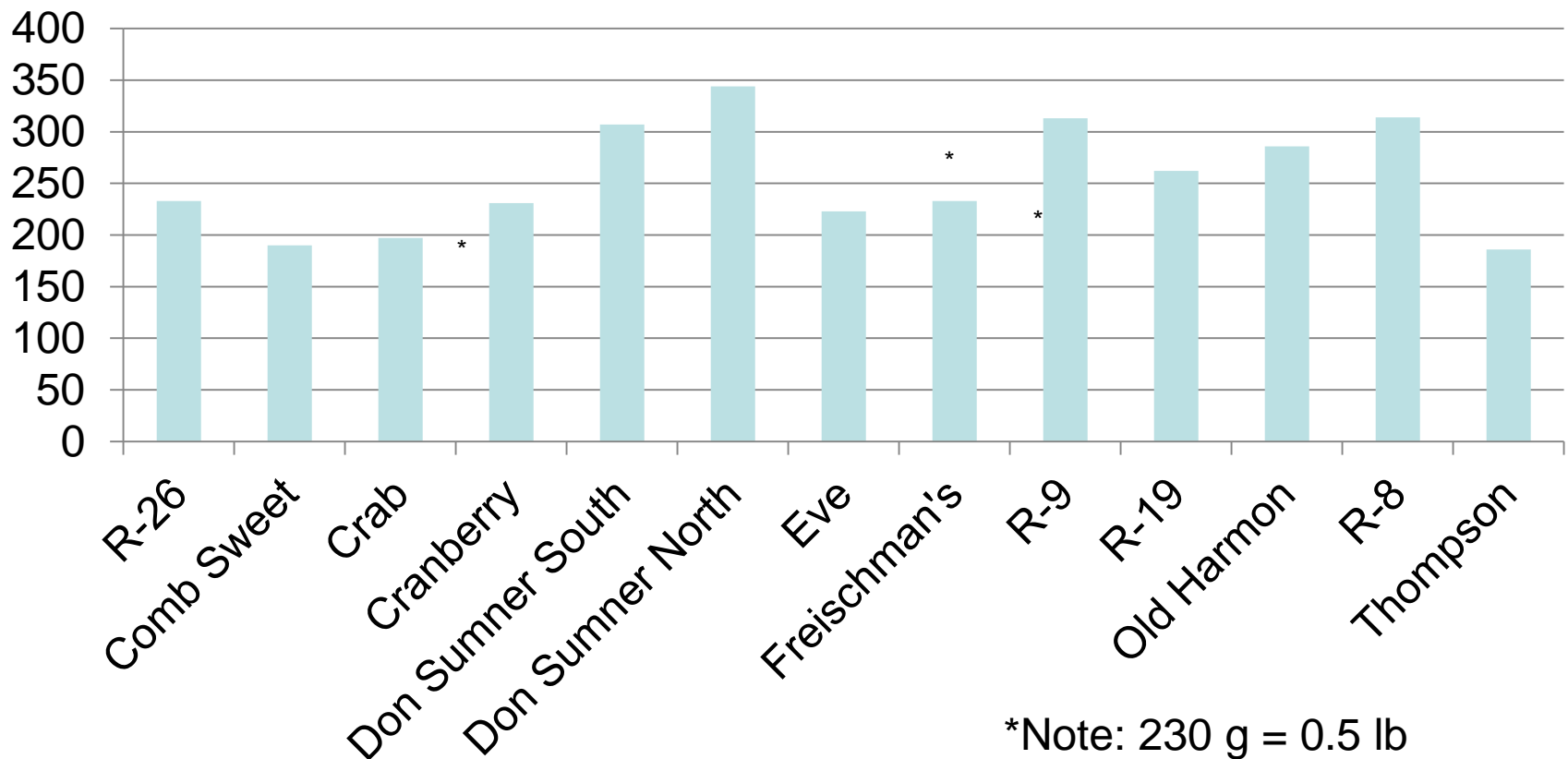
Yield per tree



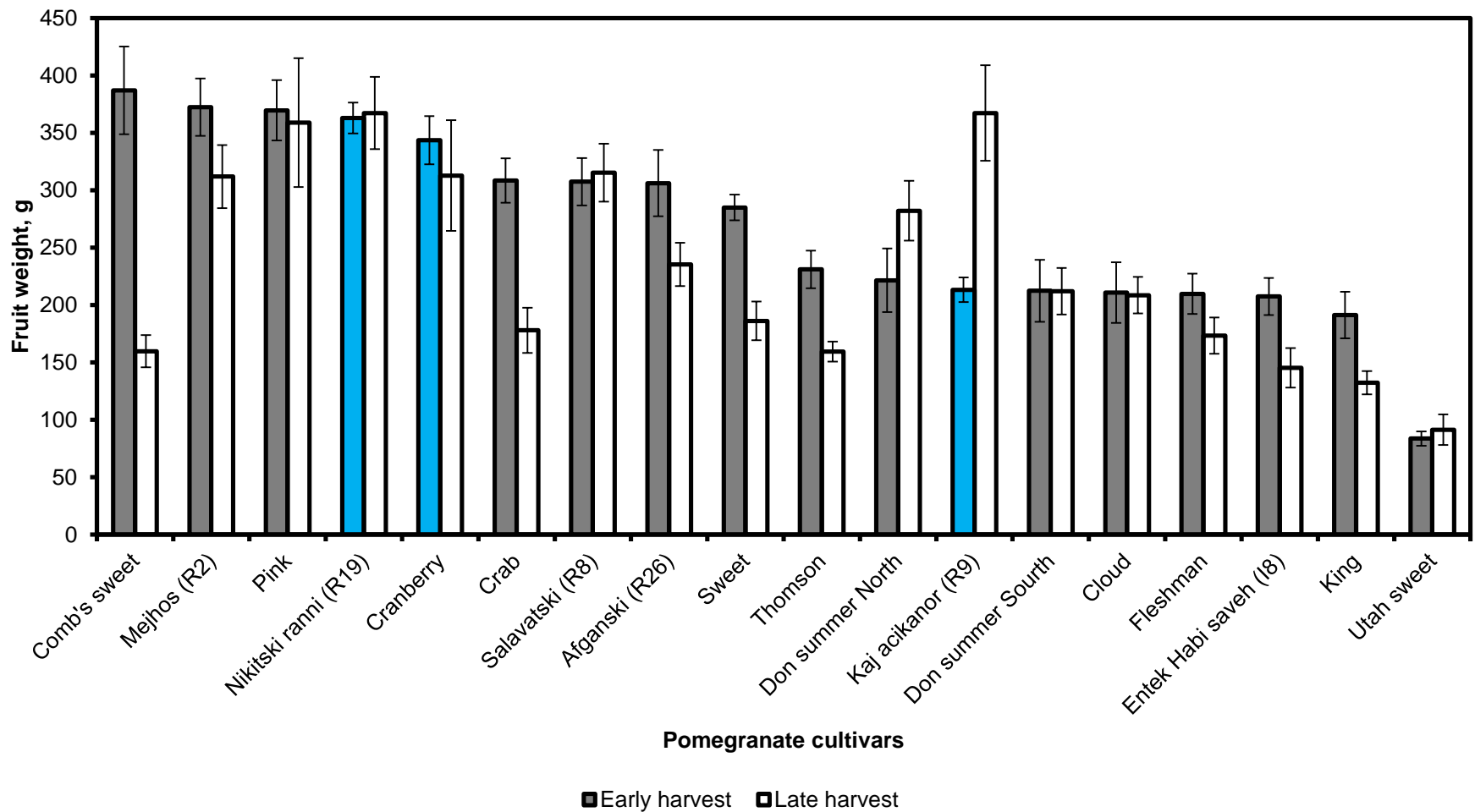
* Note: 1 kg = 2.2 lbs

Fruit weight

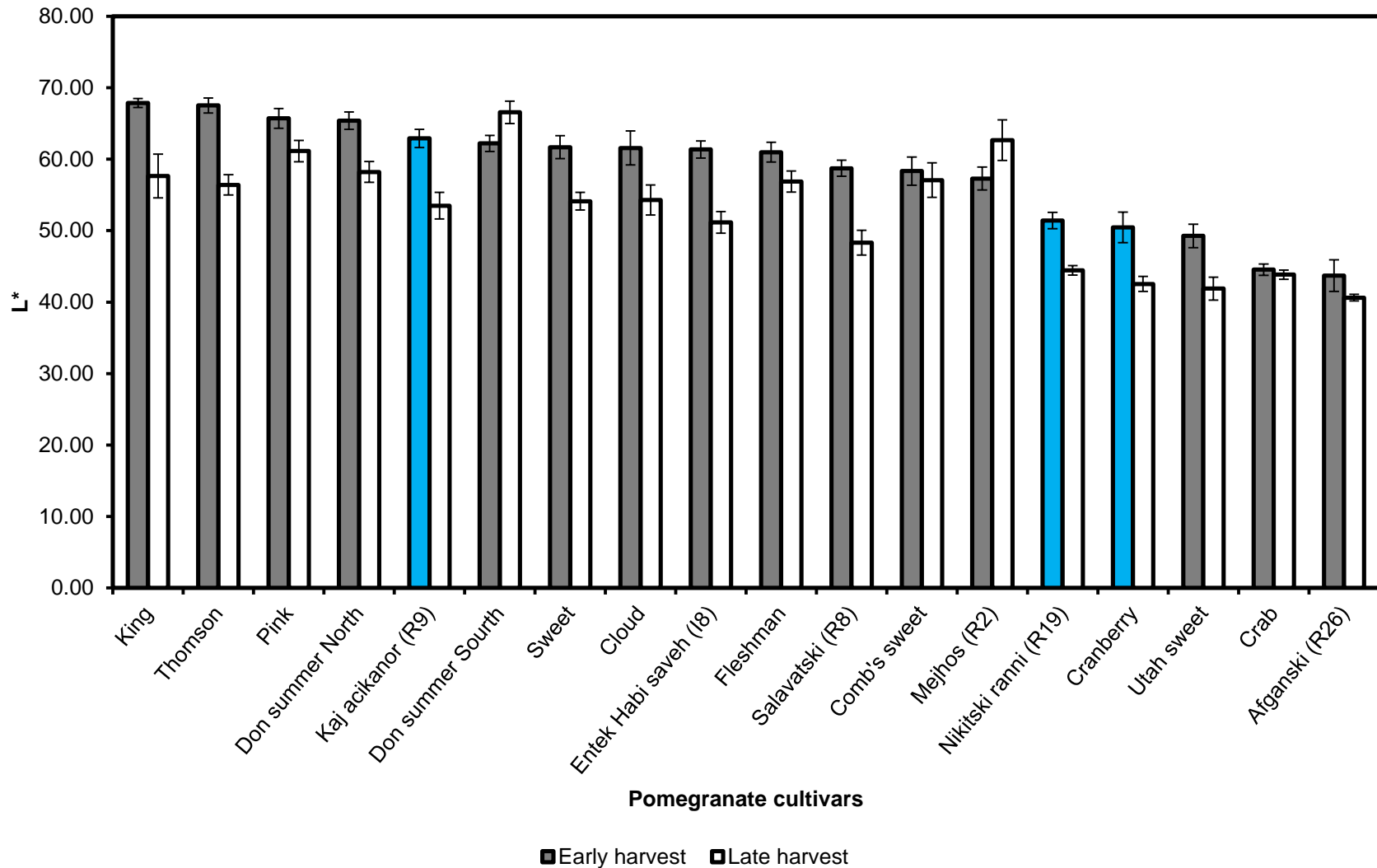
g/fruit* (2010)



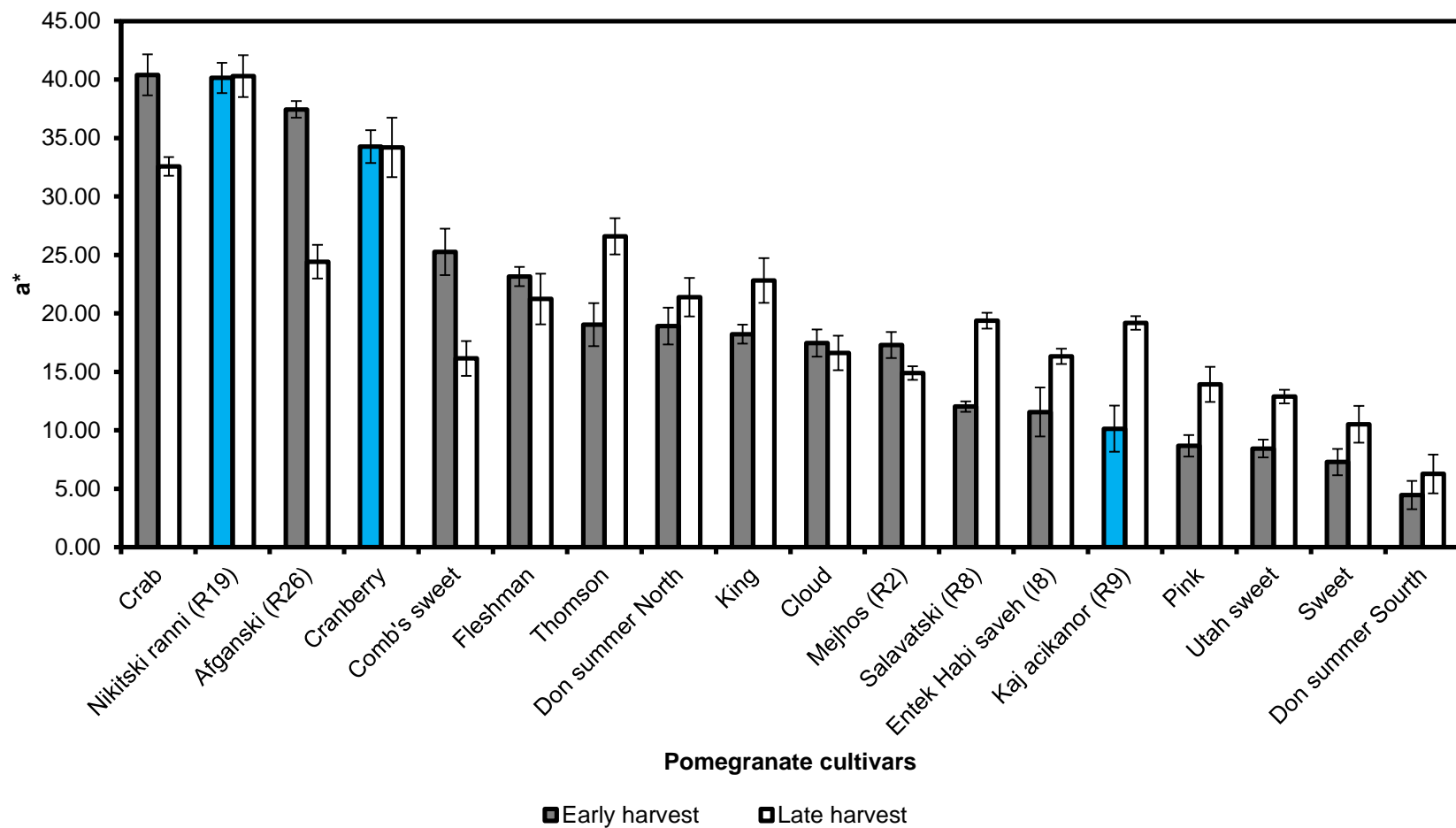
Fruit weight, g



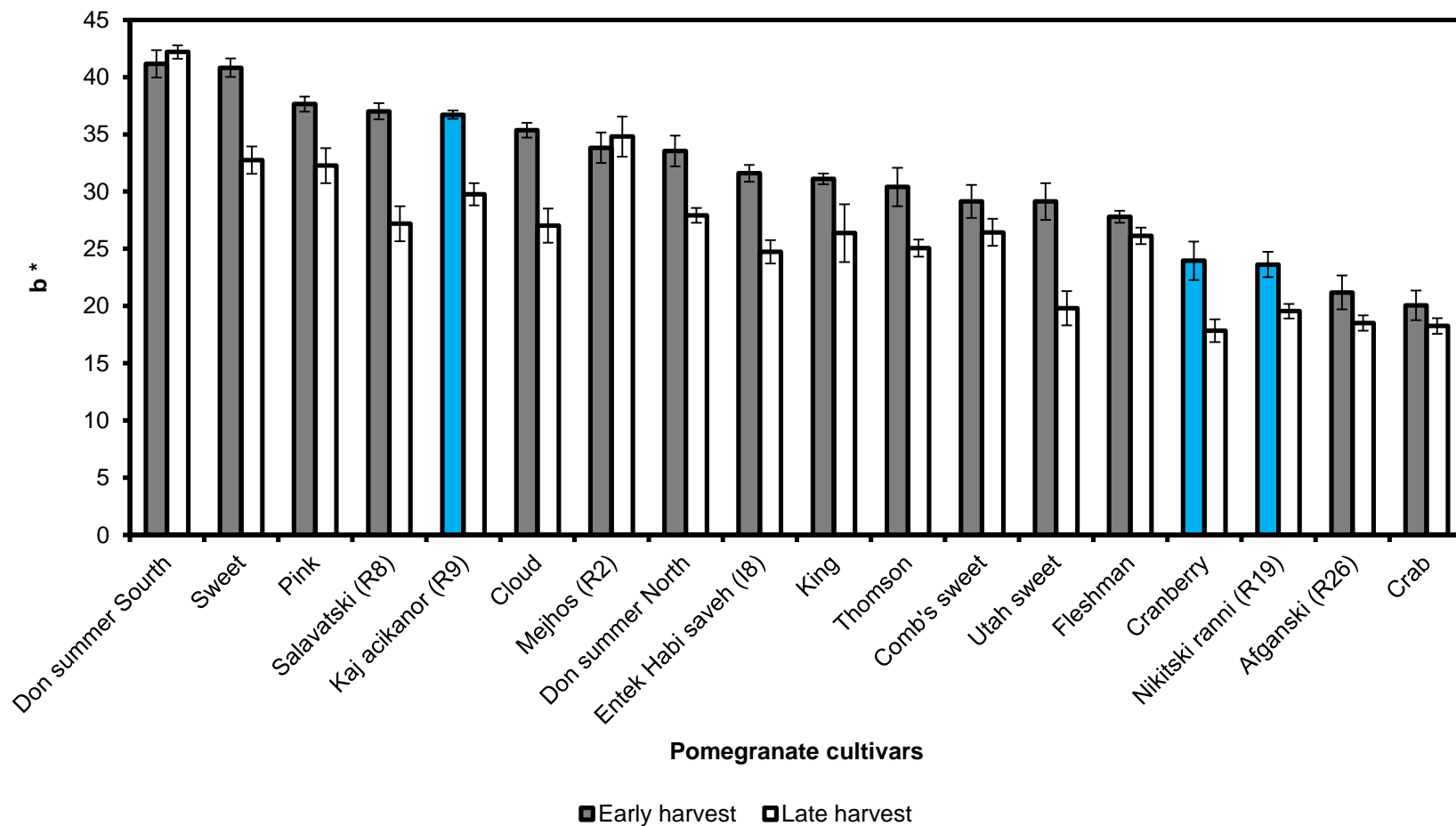
L* [a measure of color]



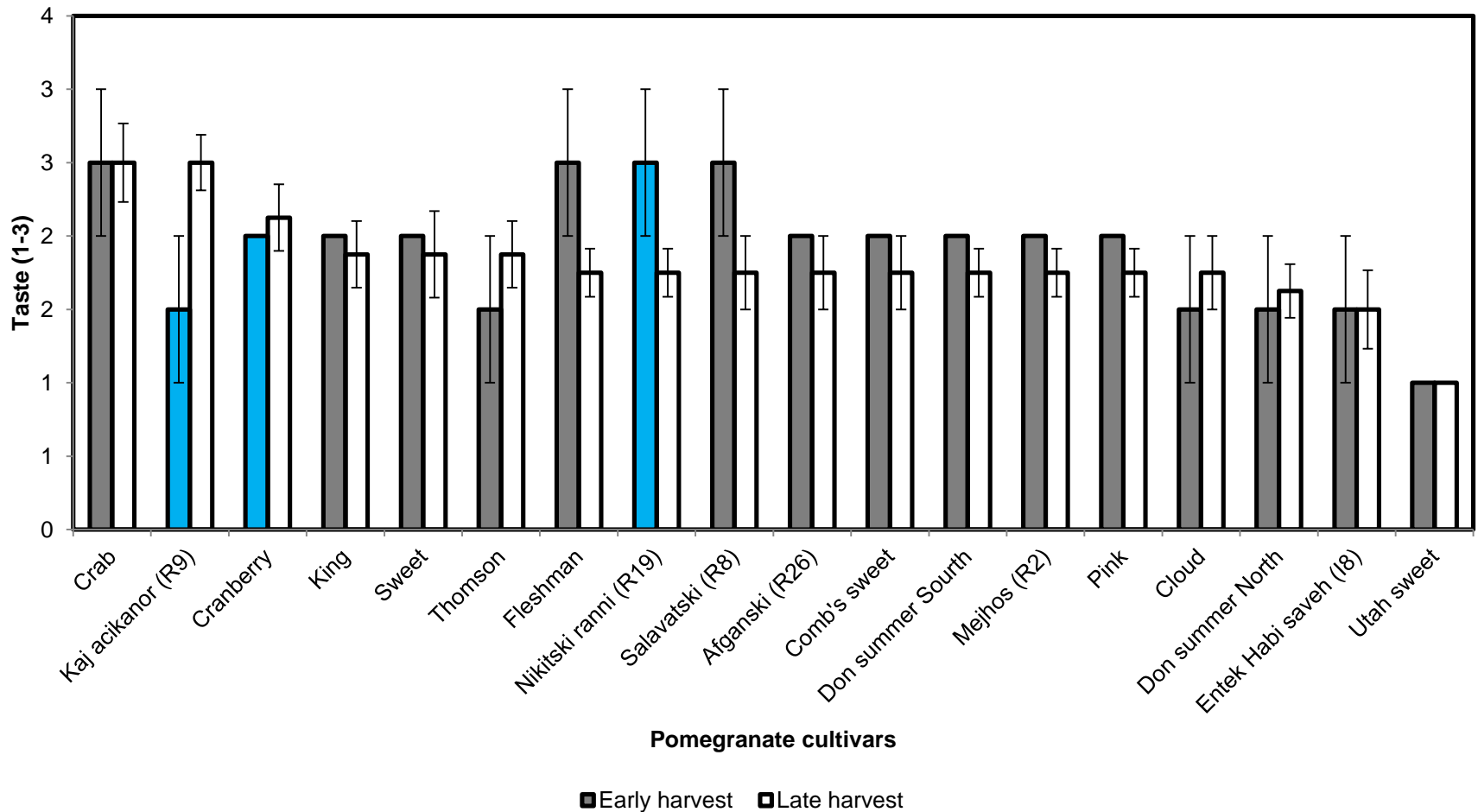
a* (redness)



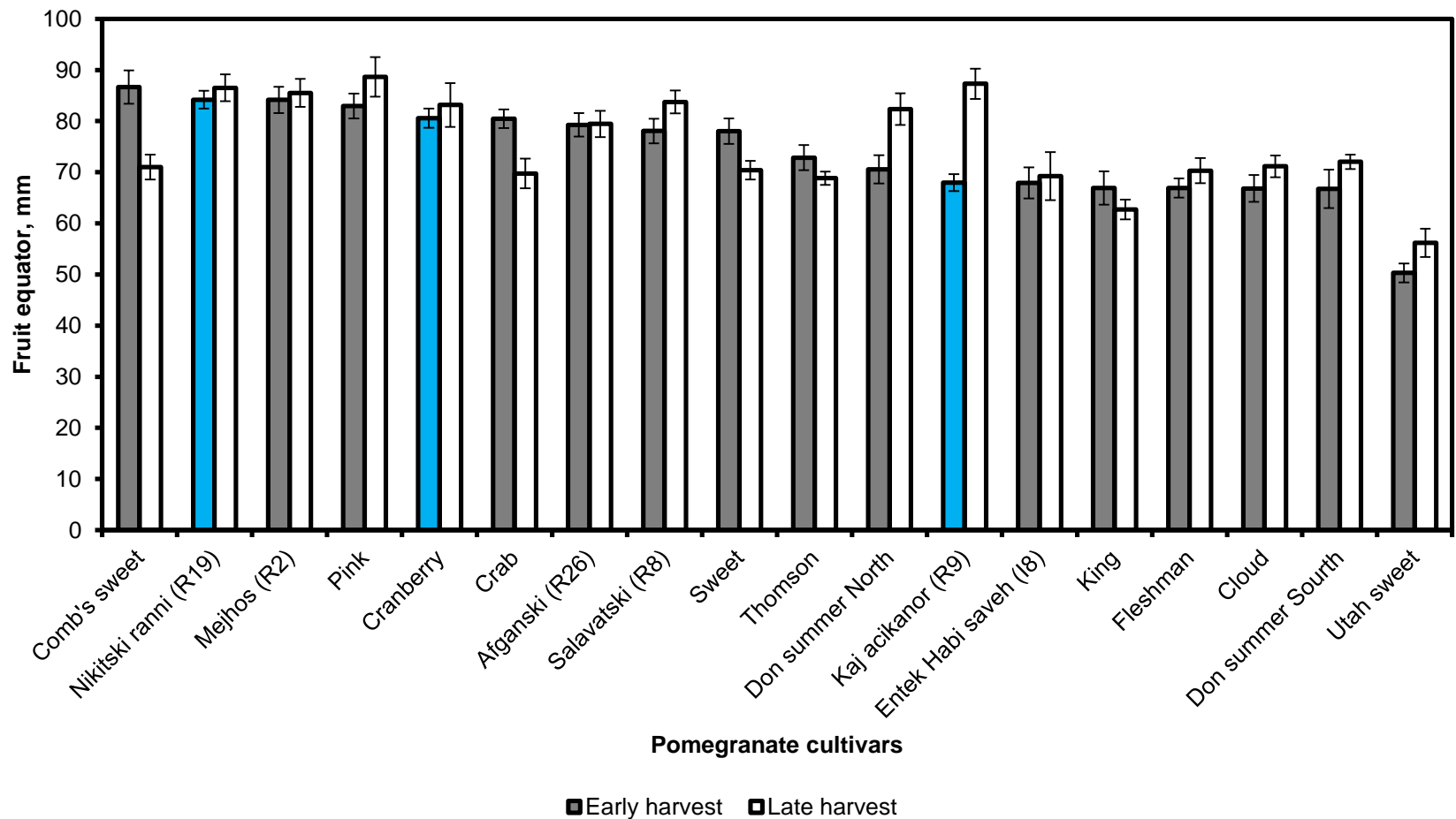
b^* (yellowness)



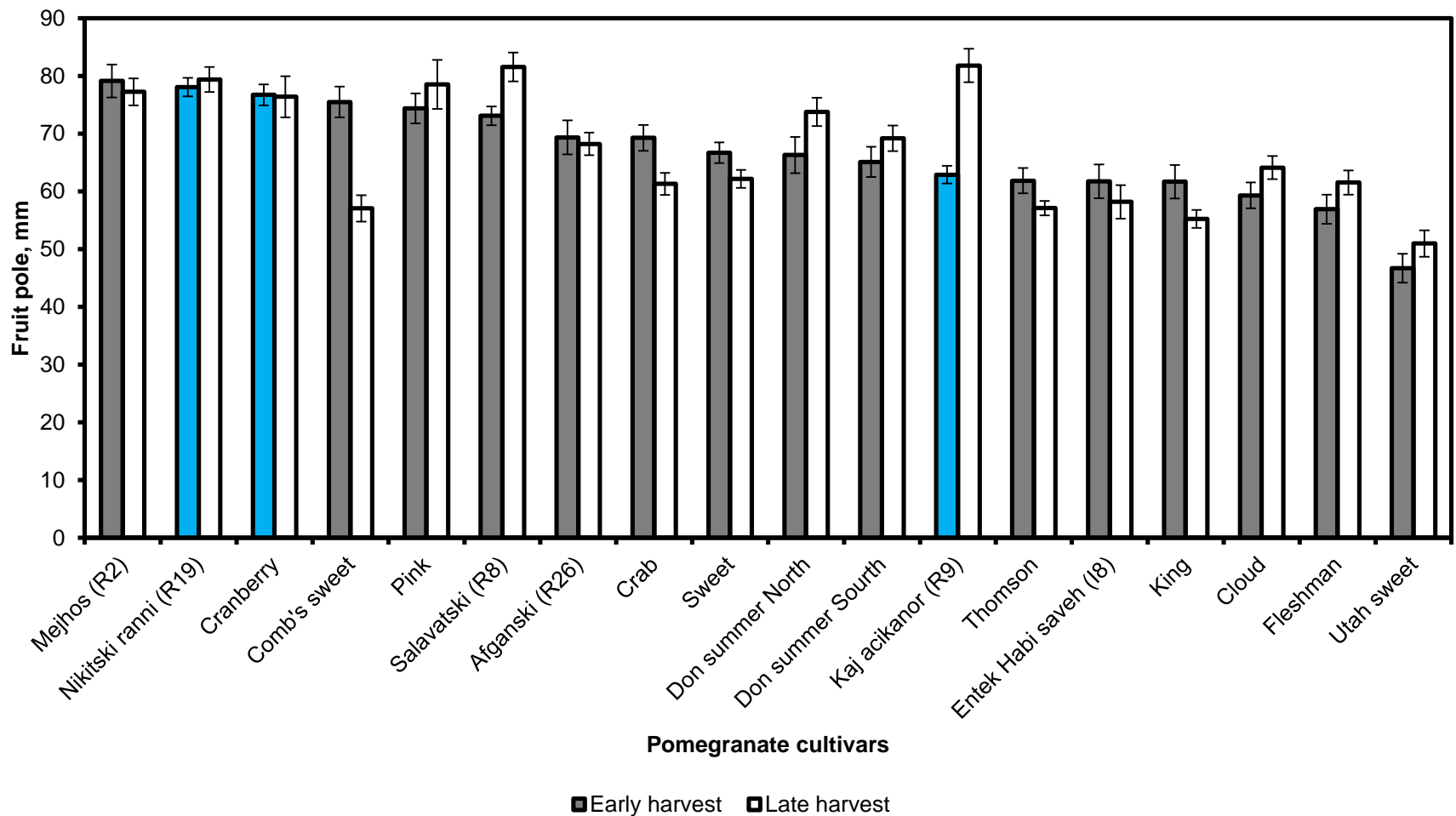
Taste (1= poor, 3 = excellent)



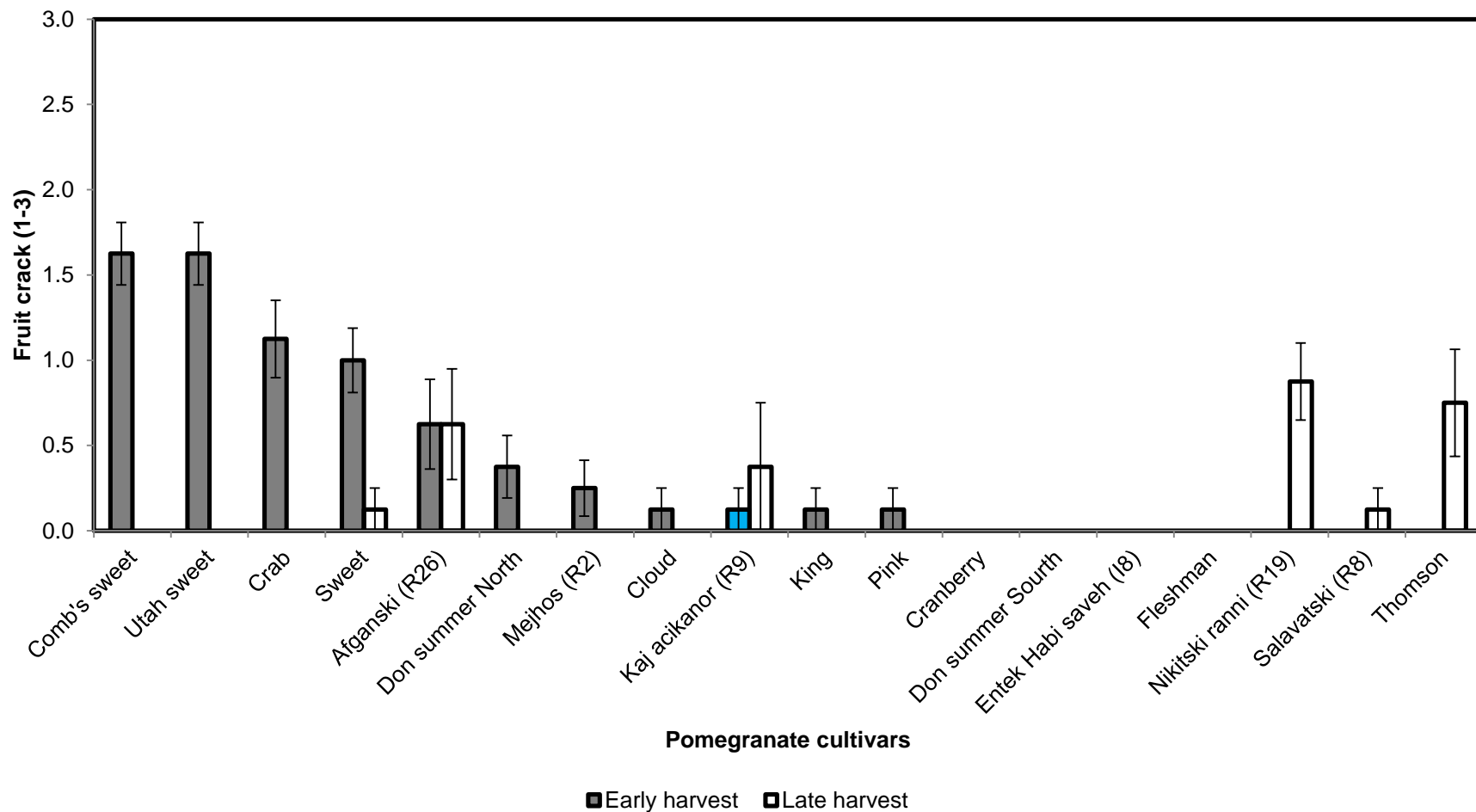
Fruit diameter, mm



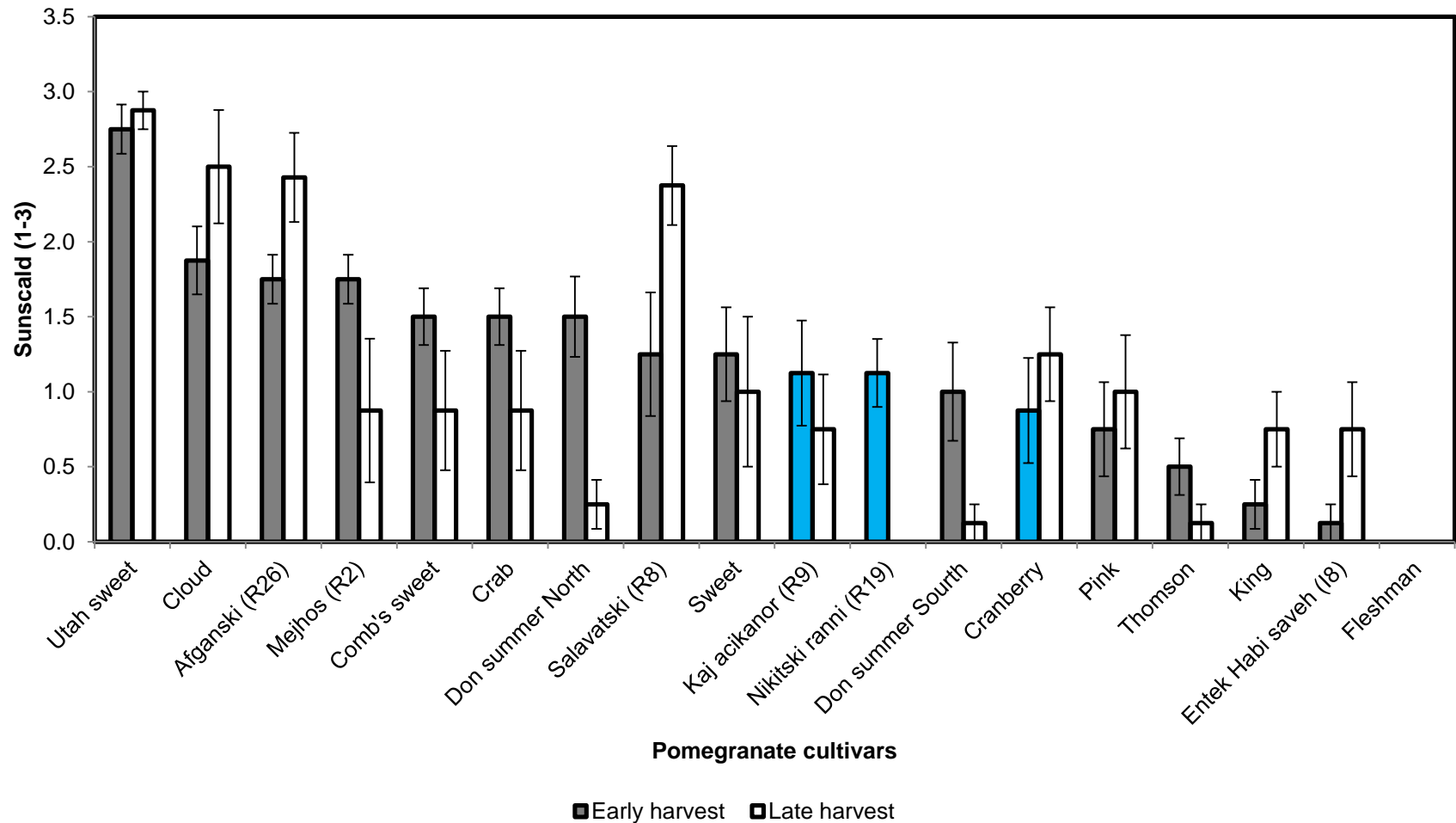
Fruit length, mm



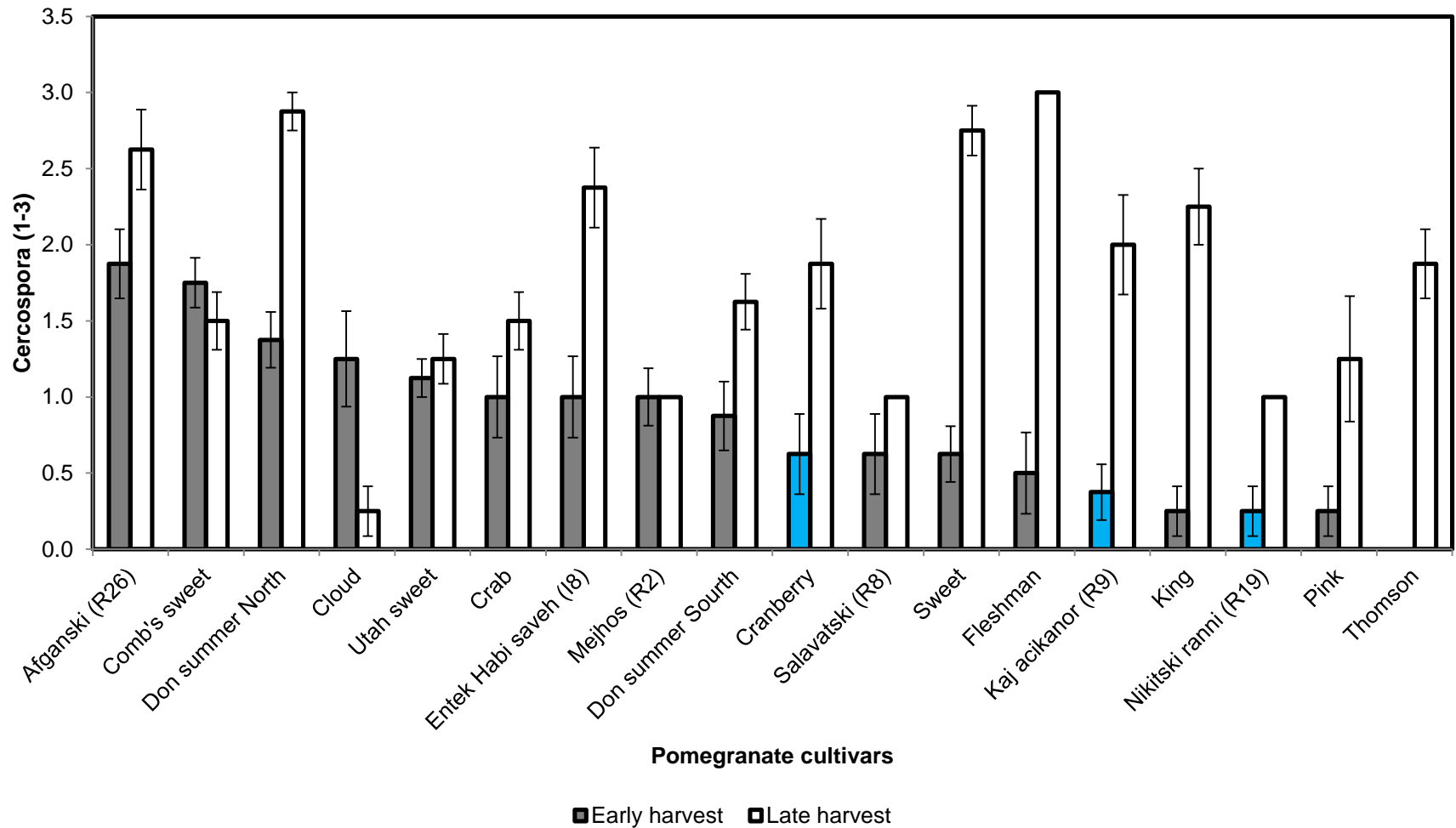
Degree of Fruit Cracking(1-3)



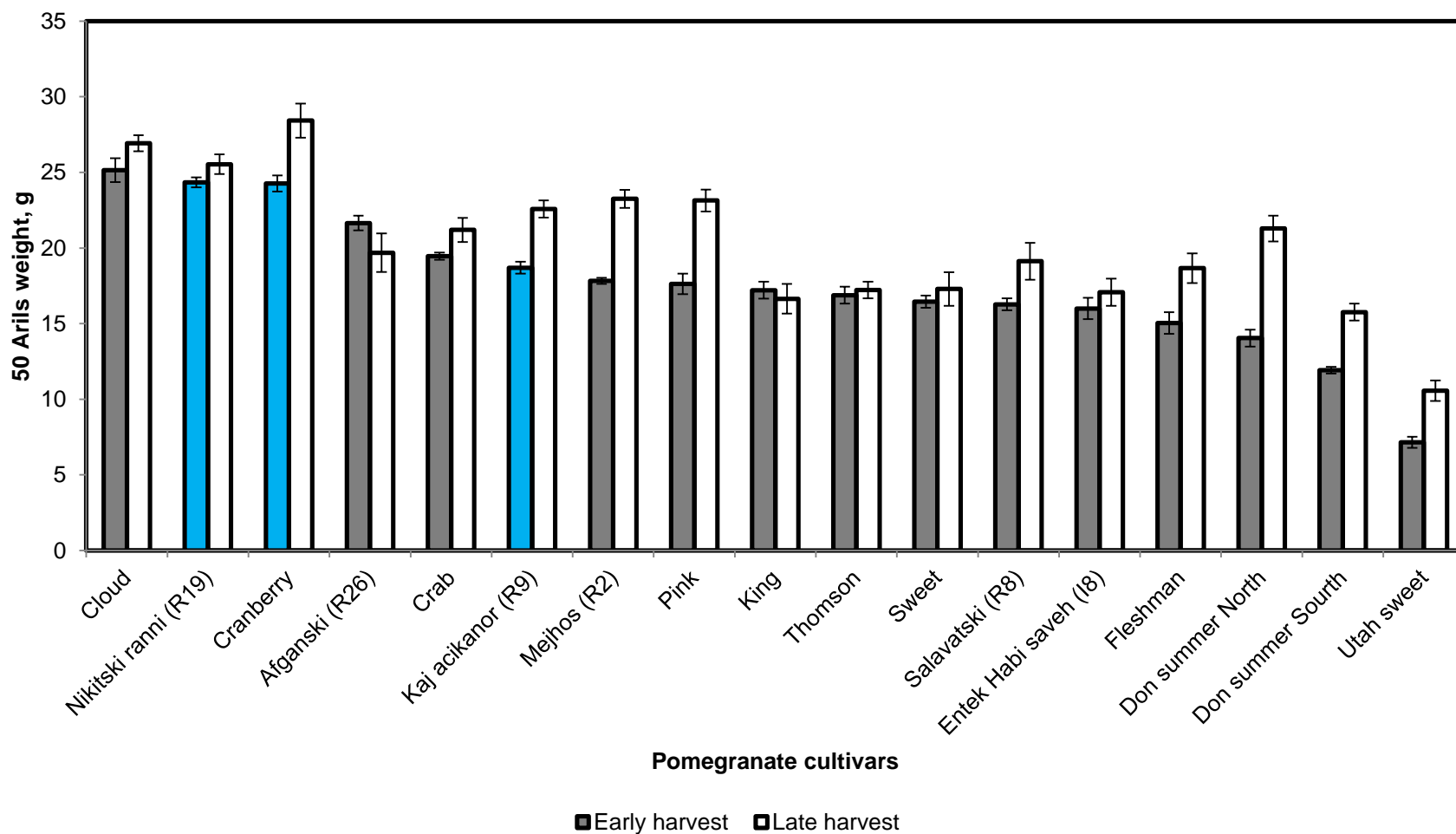
Degree of Sunscald (1-3)



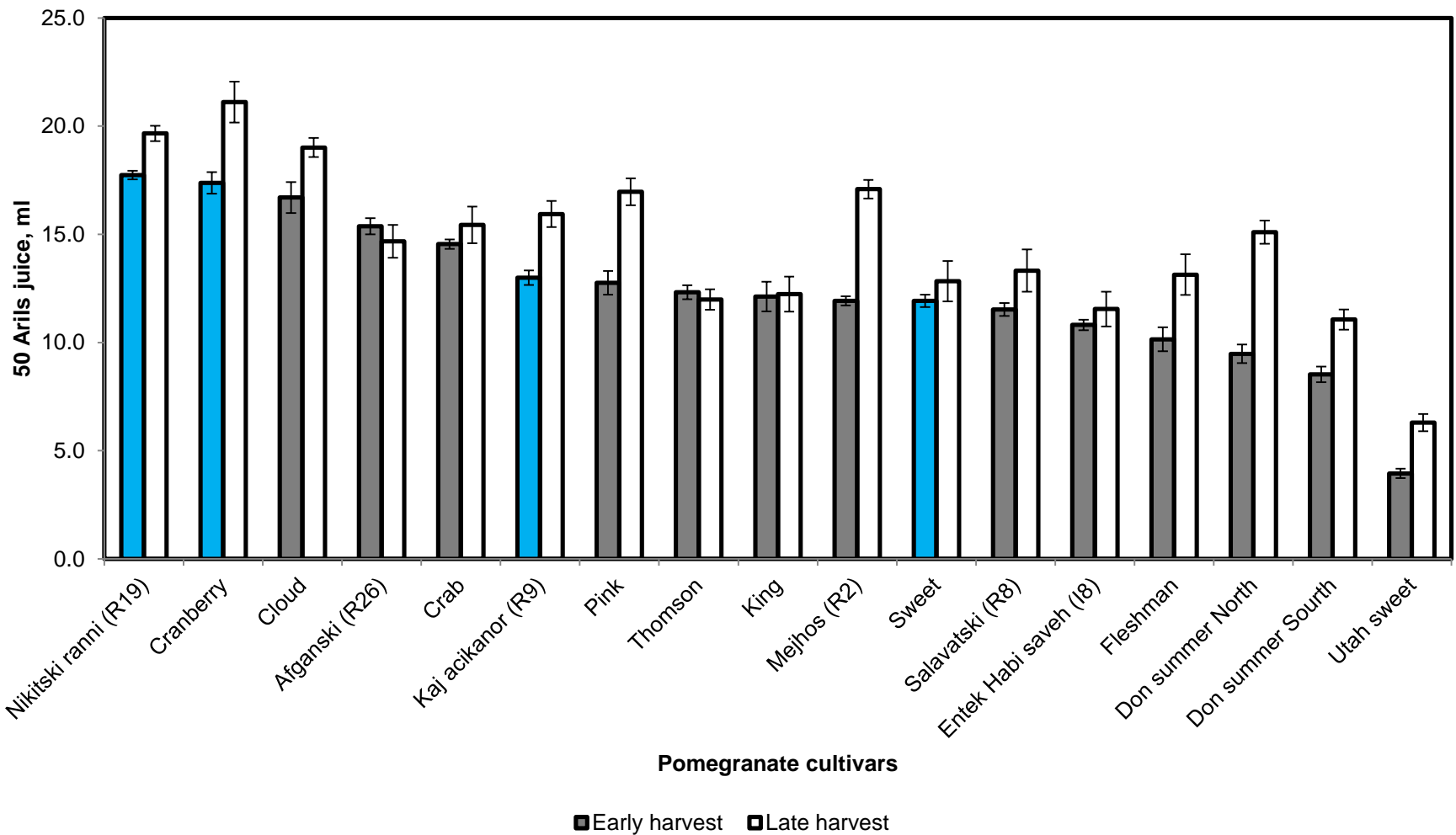
Amount of Cercospora (1-3)



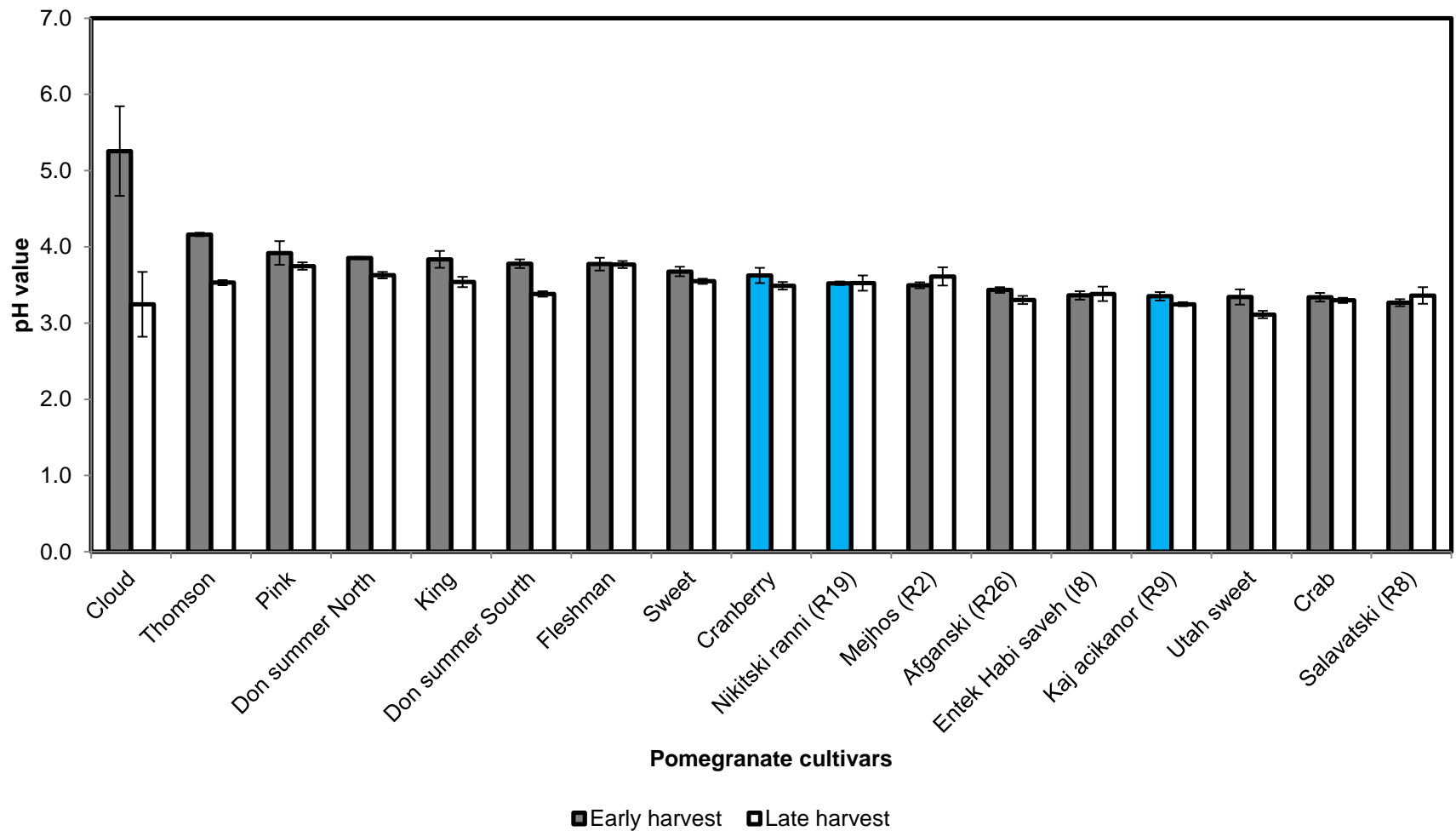
Weight of 50 arils, g



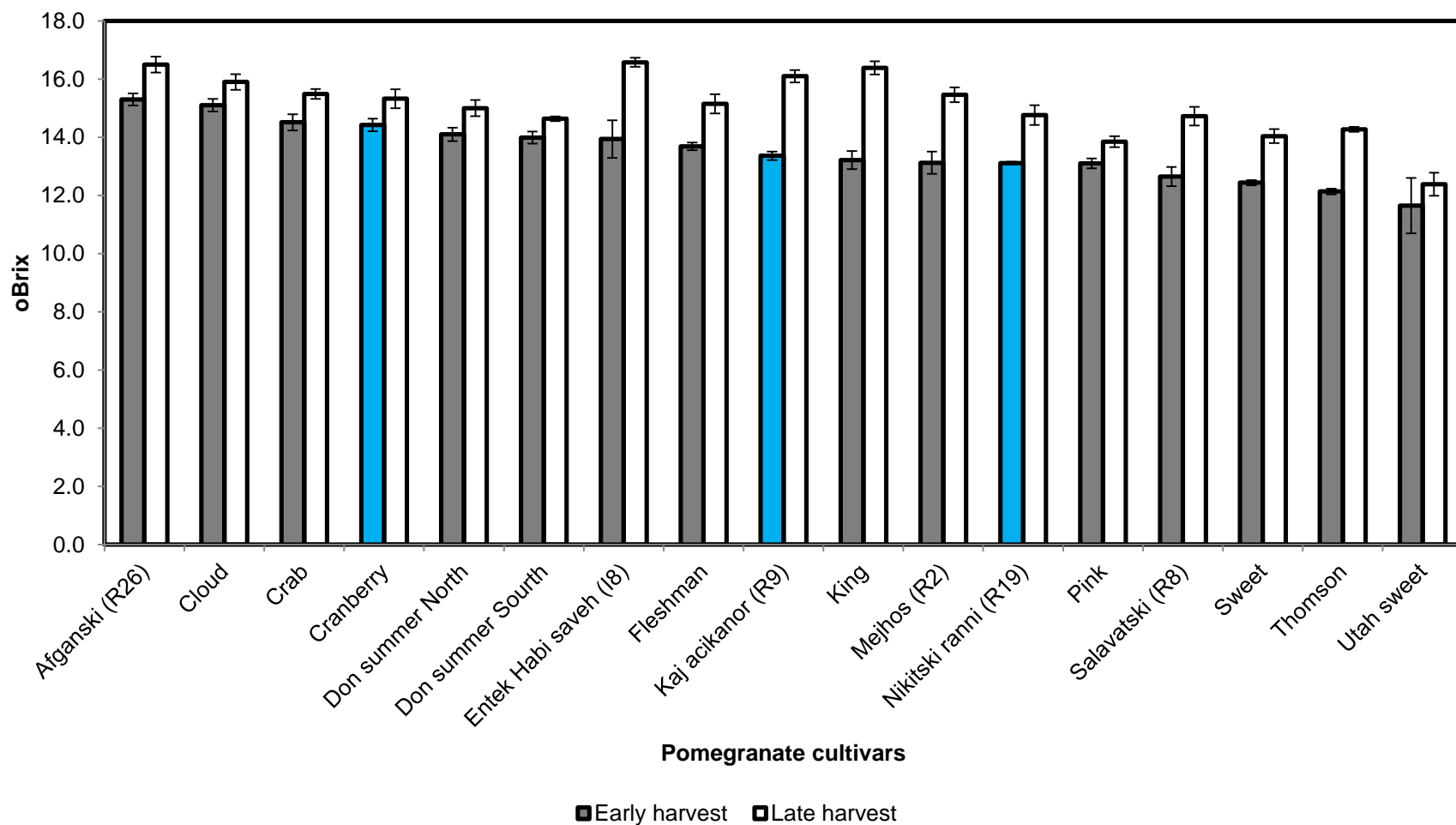
Amount of Juice in 50 arils, ml



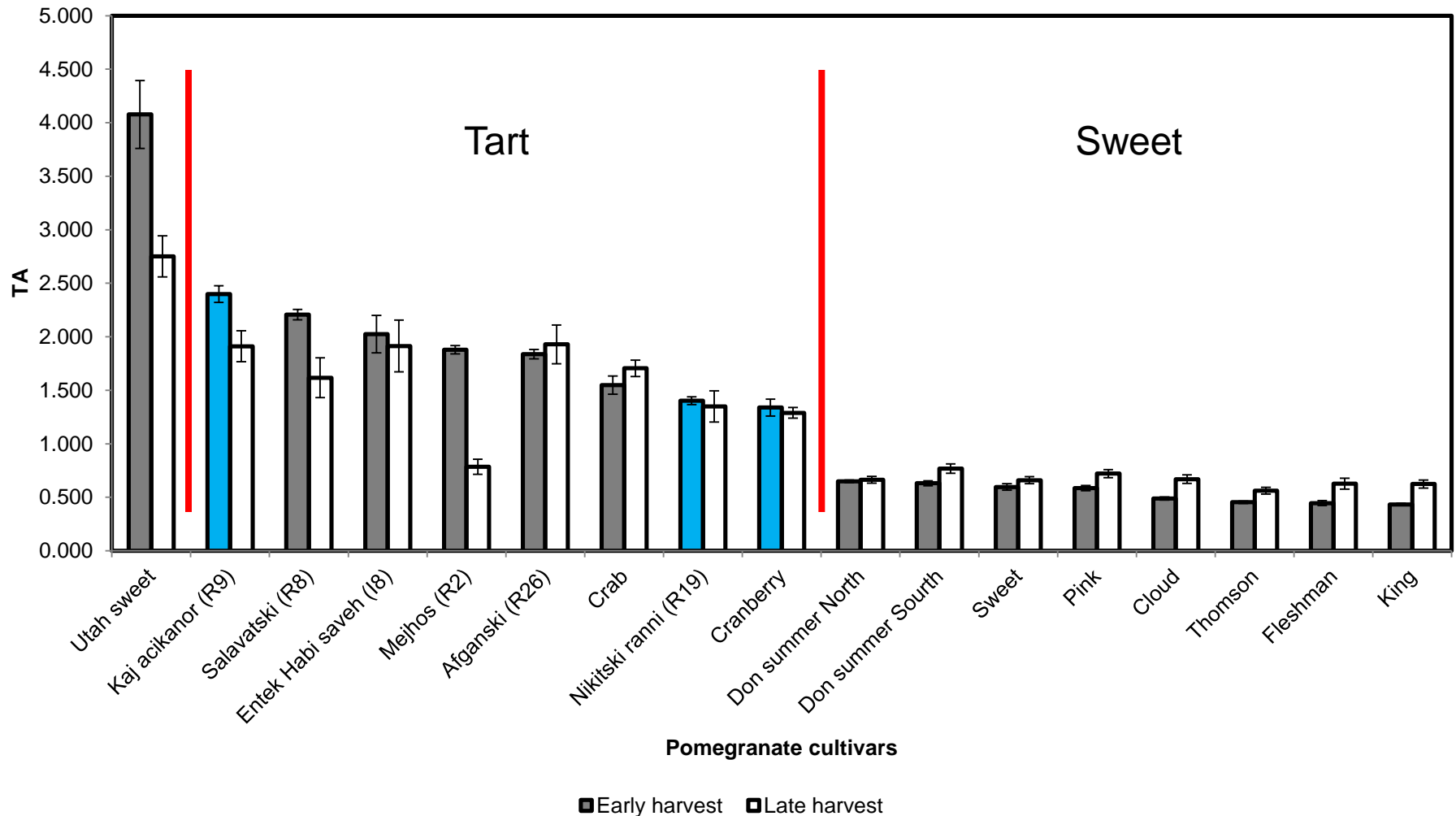
Juice pH



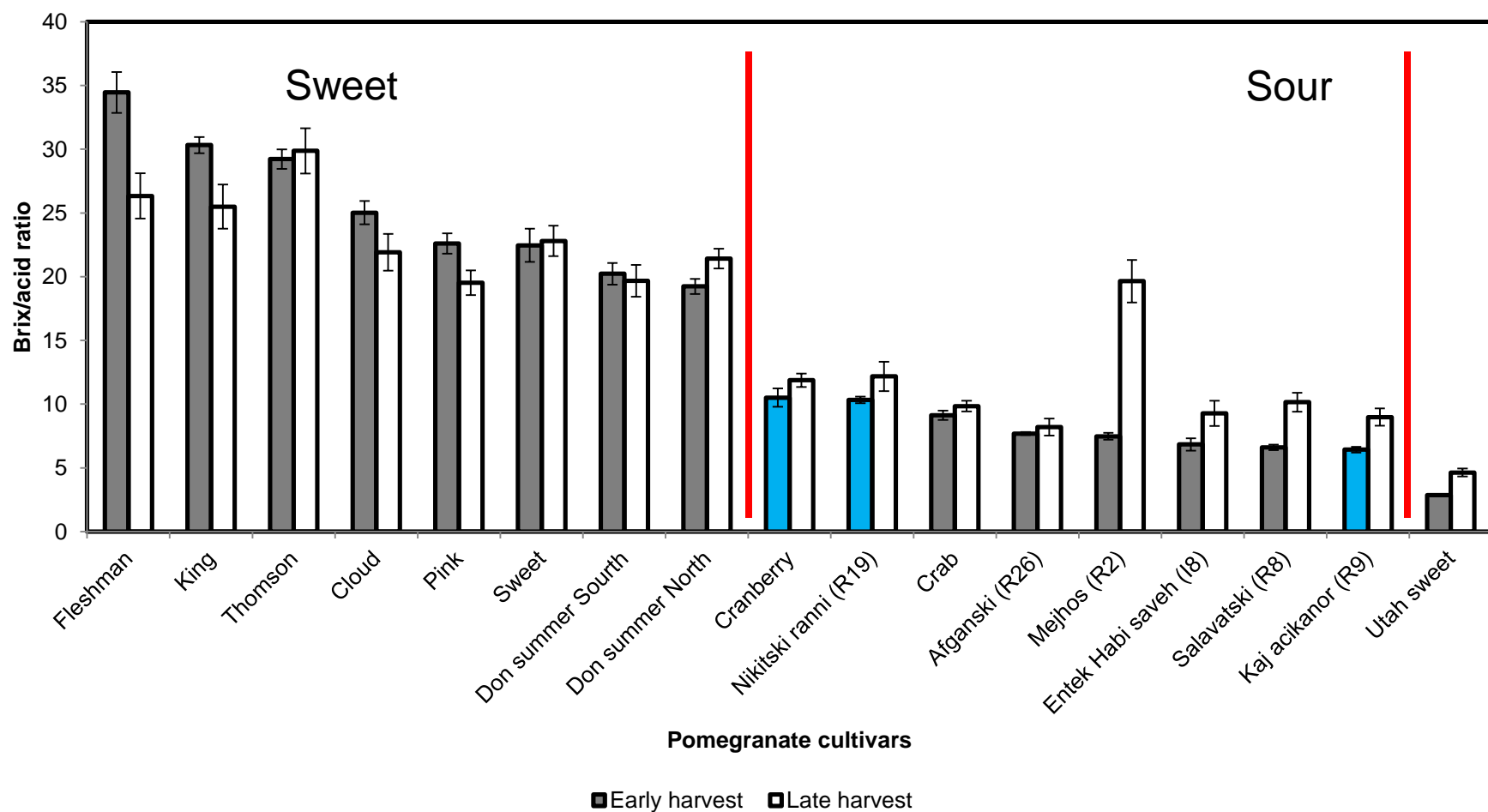
Juice Total Soluble Solids(%)



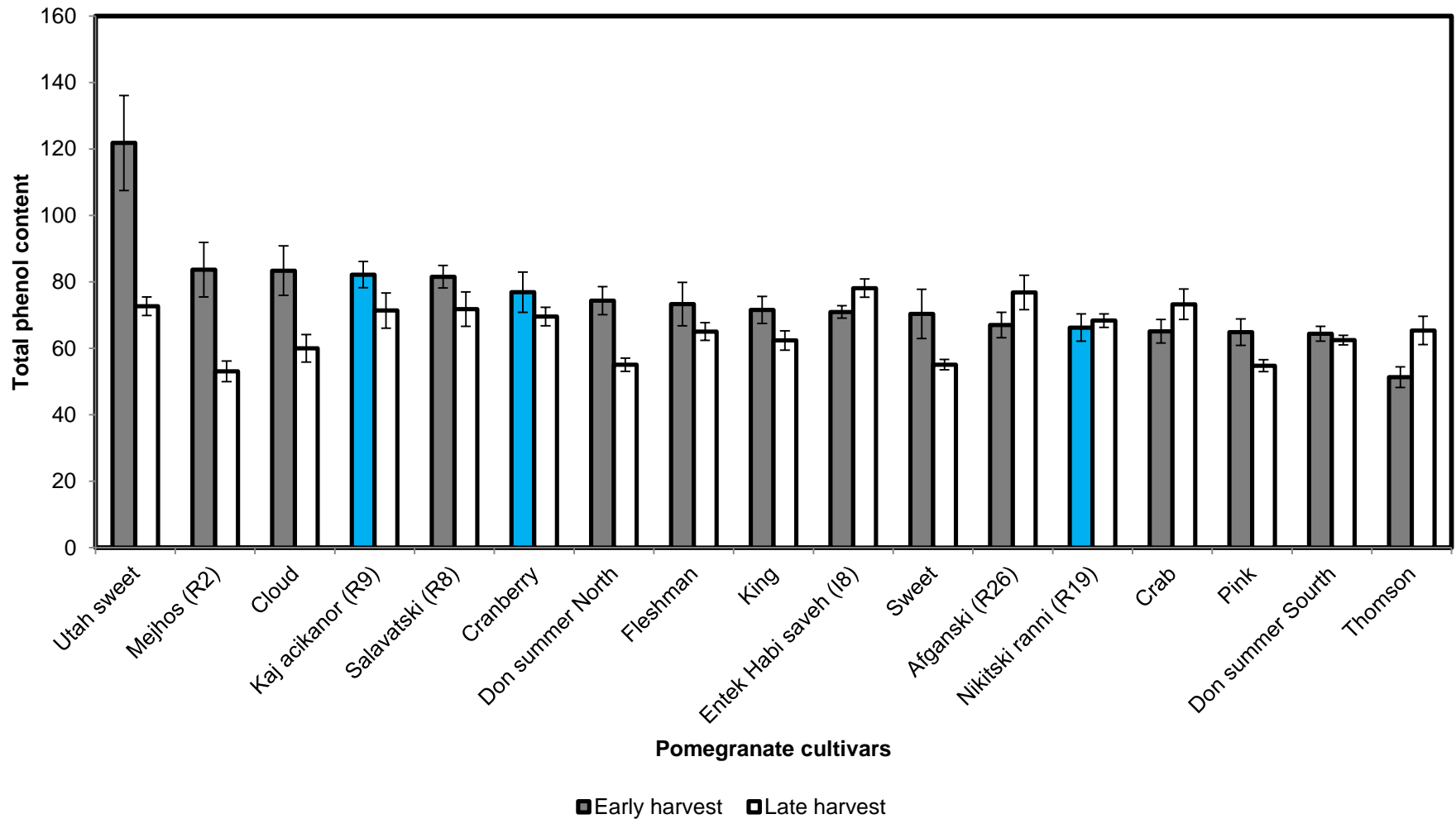
Titratable Acidity (% citric acid)



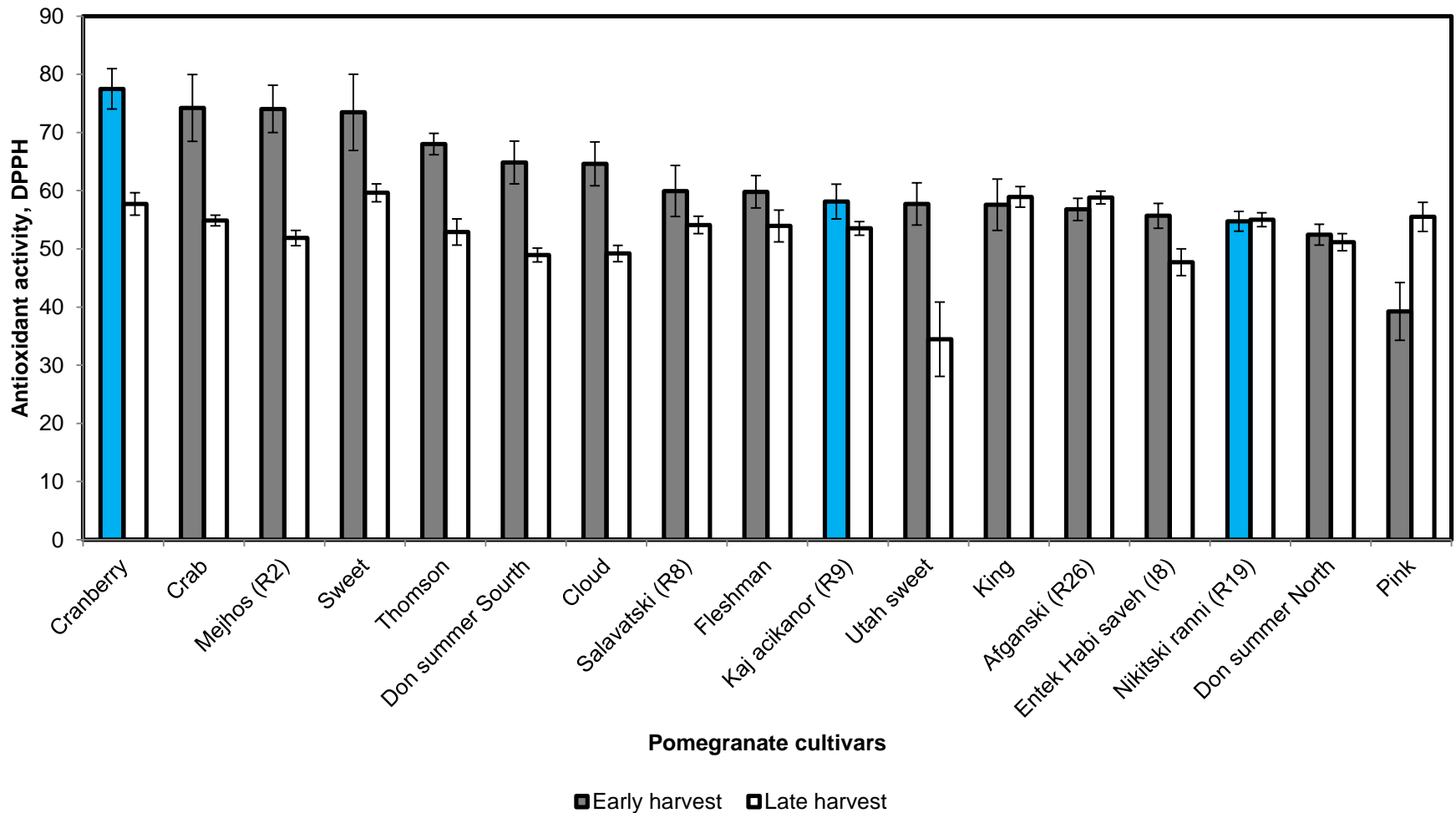
TSS:acid ratio



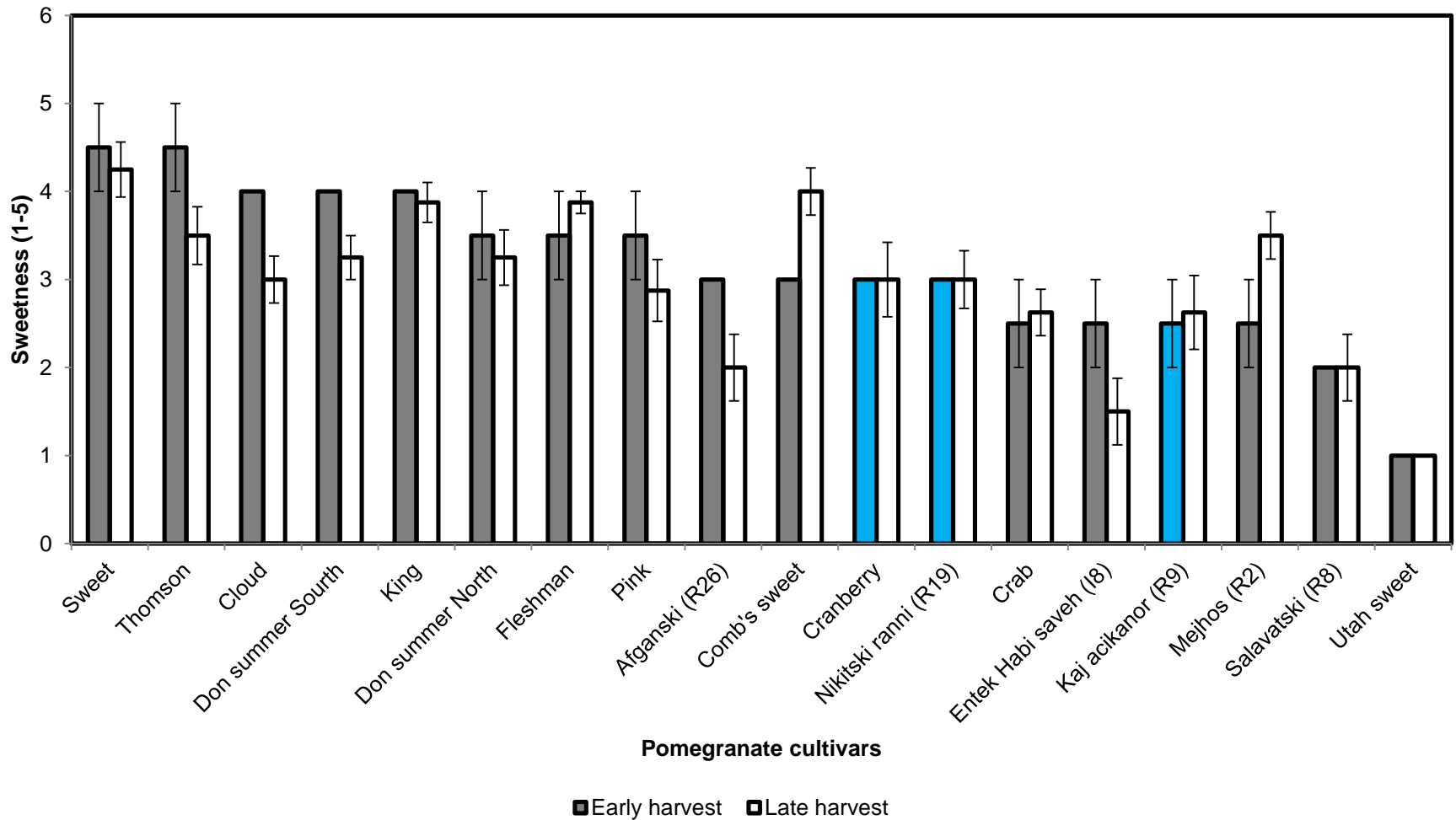
Total phenol content



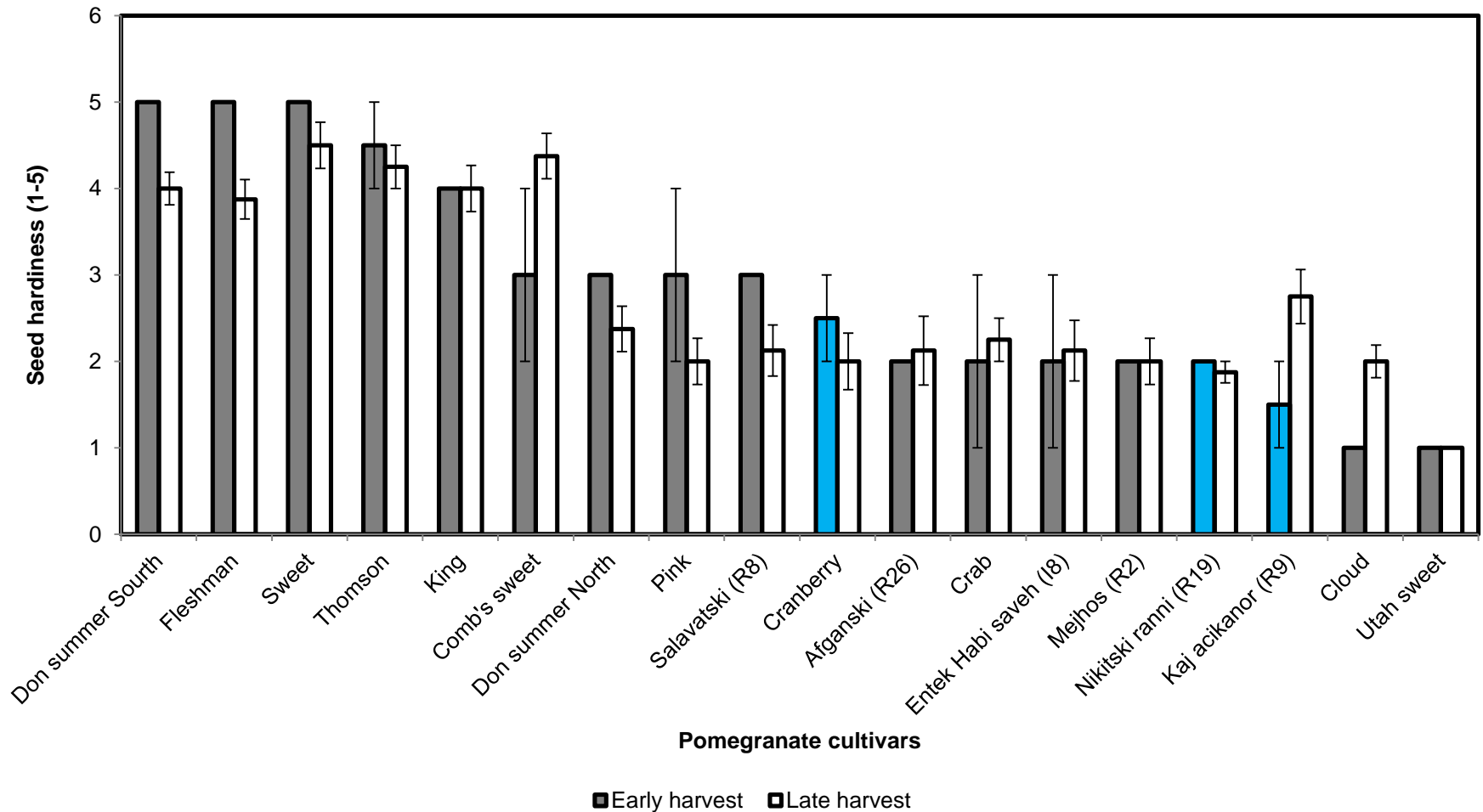
Antioxidant activity, DPPH assay



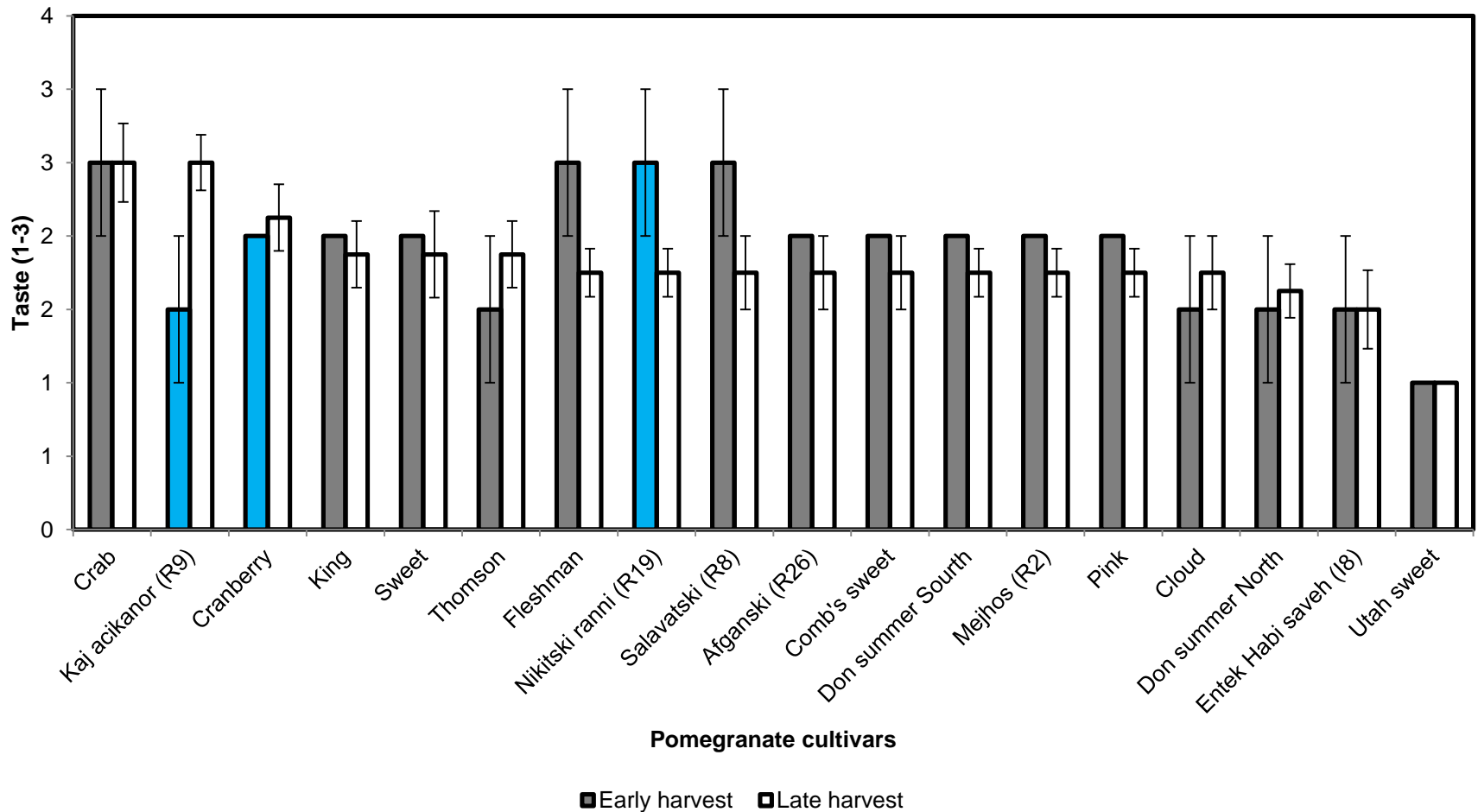
Sweetness rating(1-5)



Seed hardness(1-5)



Taste (1= poor, 3 = excellent)



Fruit attributes (2012)

	Fruit Wt (g)	TSS (%)	pH	TA (%)	TSS:TA
CULTIVAR					
Don Summer N	436	13.7 b	5.6 a	02.2 c	6.1 b
R8	364	15.5 a	5.1 b	11.5 b	1.4 c
R9	389	15.2 a	5.0 b	17.6 a	1.0 c
Thompson	379	14.9 a	5.5 a	2.1 c	7.3 a
WEEK					
1	417	14.6	5.3	9.1	3.8
2	389	14.9	5.3	8.1	4.1
3	370	15.0	5.2	7.9	4.0
Cultivar (C)	NS	**	**	**	**
Week (W)	NS	NS	NS	NS	NS
C x W	NS	NS	NS	NS	*

R9 (Kaj acik anor)





CONCLUSIONS

- Large variation in fruit yield, fruit color, taste and juice potential among cultivars.
- **Cranberry** and **R19** had among the highest fruit yield and best postharvest attributes and nutraceutical content.