Pear Consumer Preference Testing

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I. Objective

- To **identify the pear sensory characteristics considered to be desirable by consumers** in the Pacific Northwest (PNW).

THE PACIFIC NORTHWEST
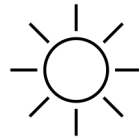
BRITISH COLUMBIA

WASHINGTON

MONTANA

OREGON

IDAHO

WYOMING

NORTHERN CALIFORNIA

II. Methods

2. Pears' selection

☀

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❄❄❄

- 720*
- 642*
- 417*
- 573*
- Bartlett*
- Seckel*

- Starkrimson
- 804
- 391
- Sylvania
- Summer Blood Birne

- Bosc*
- Comice*
- Concorde*
- Gem (not ripened)*
- Green Anjou*
- Paragon*

- Abate Fetel
- Forelle
- Packham's Triumph
- Red Anjou
- OHUS-US783012-022
- US79453-007

Total: 23 varieties

2.1 Descriptive analysis (DA)

- **Trained sensory panel for the profiling of 23 pear' varieties**

- **N=10**, 80% women

- **Summer:** training time:**1.5h*10 sessions= 15h**

- Pears used for summer training: USDA varieties and commercially available (Bartlett, Starkrimson, D'Anjou, Asian, Bosc)

- **Winter:** refreshing training time:**1.5h*3 sessions= 4.5h**

- Pears used for winter training: commercially available (Bartlett, D'Anjou, Asian, Bosc, Red Anjou)

- **Appearance**

- **Aroma, taste, flavor and texture attributes**

- 15cm continuous scale
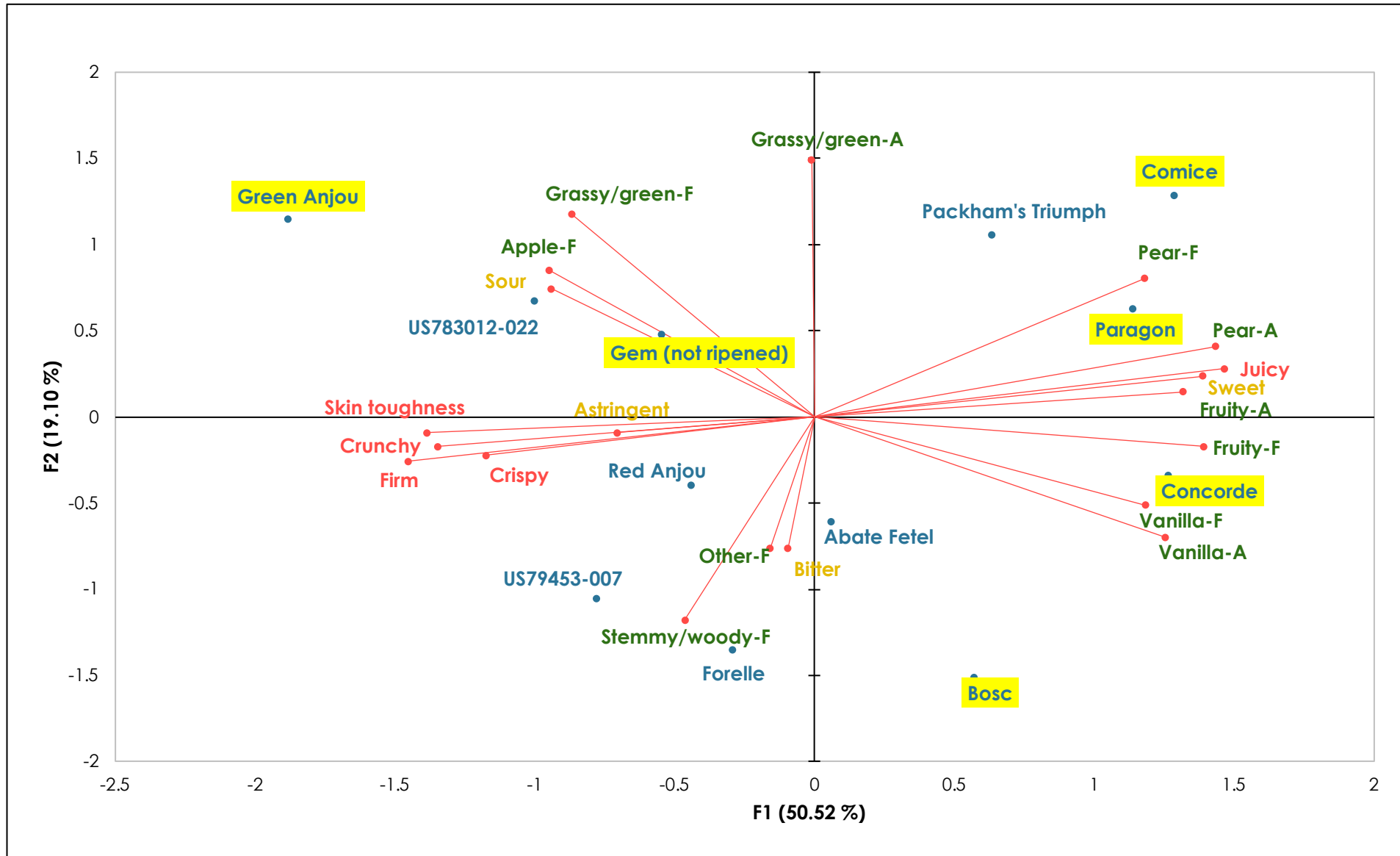
3.1 Results-Trained panel
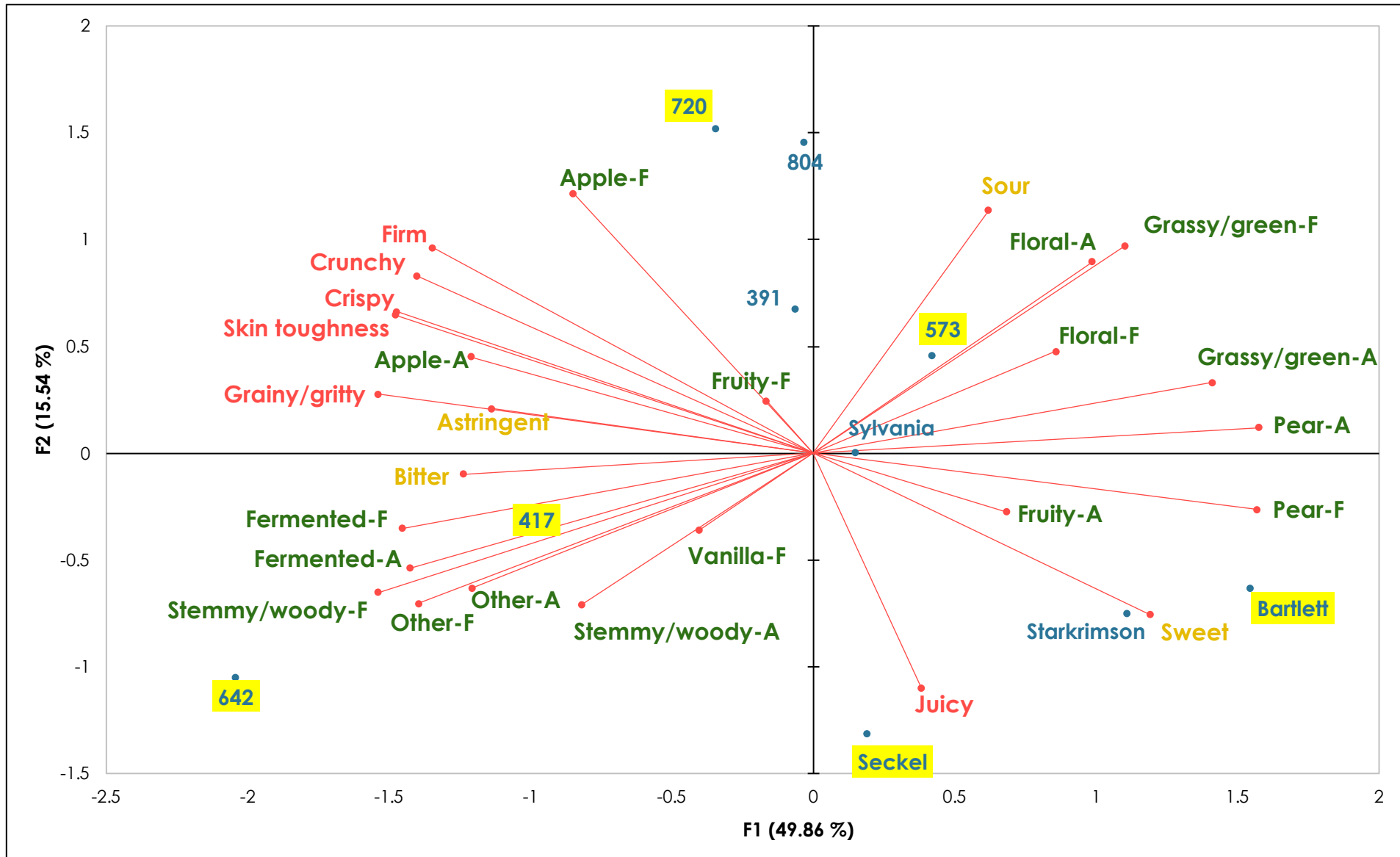
PCA of all significant attributes of the **summer season pears** as determined by the trained panel (n=10)
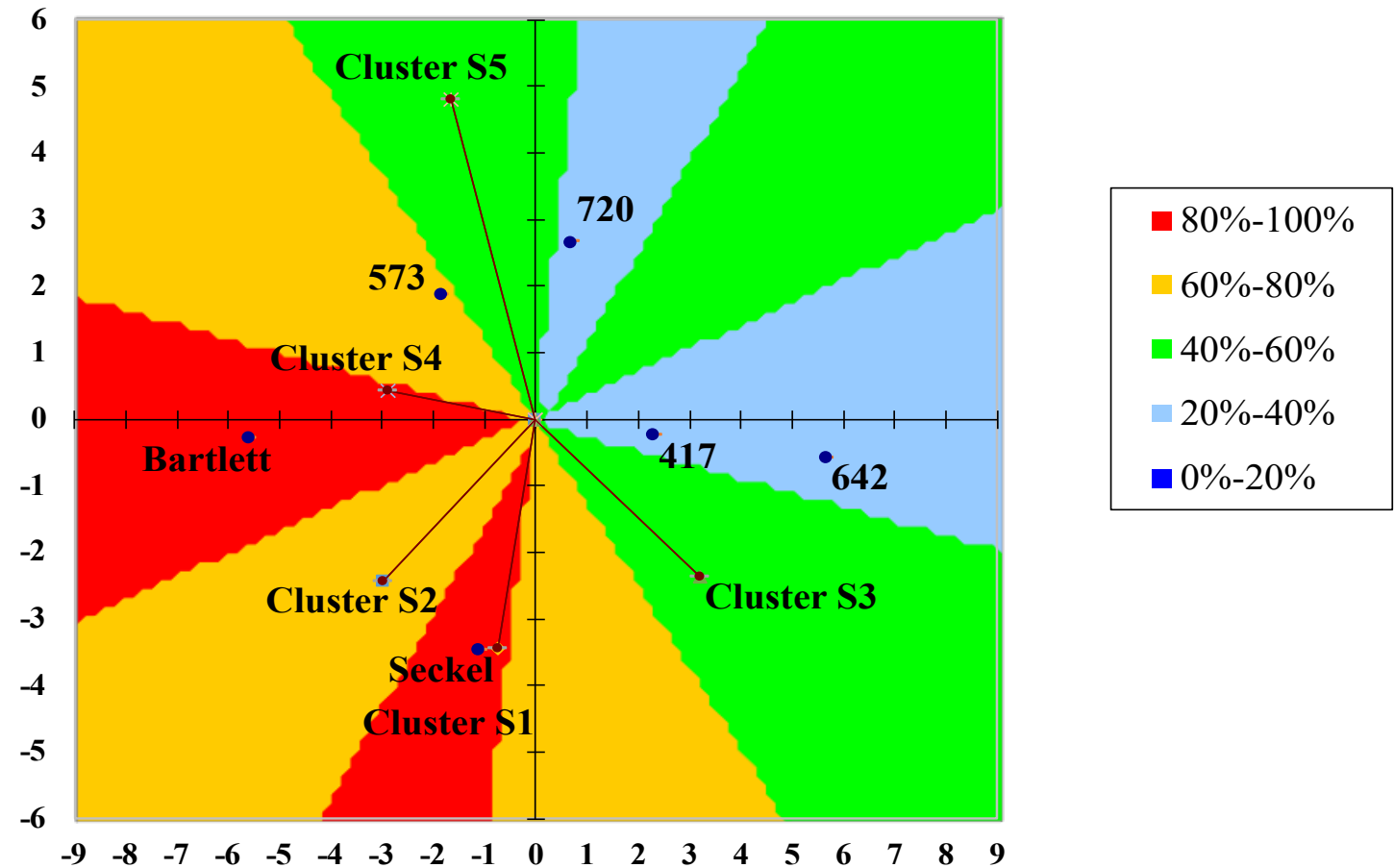
PCA of all significant attributes of the **winter season pears** as determined by the trained panel (n=10)

3.2 Results-Preference map

BOOTH #3

Preference map of sensory profiling data for six **summer pear varieties** explaining 71.8% of the total variance overlaid by consumer liking data **(n=107)**

Legend:
- 80%-100%
- 60%-80%
- 40%-60%
- 20%-40%
- 0%-20%

Preference map of sensory profiling data for six **winter pear varieties** explaining 81.4% of the total variance overlaid by consumer liking data **(n=112)**
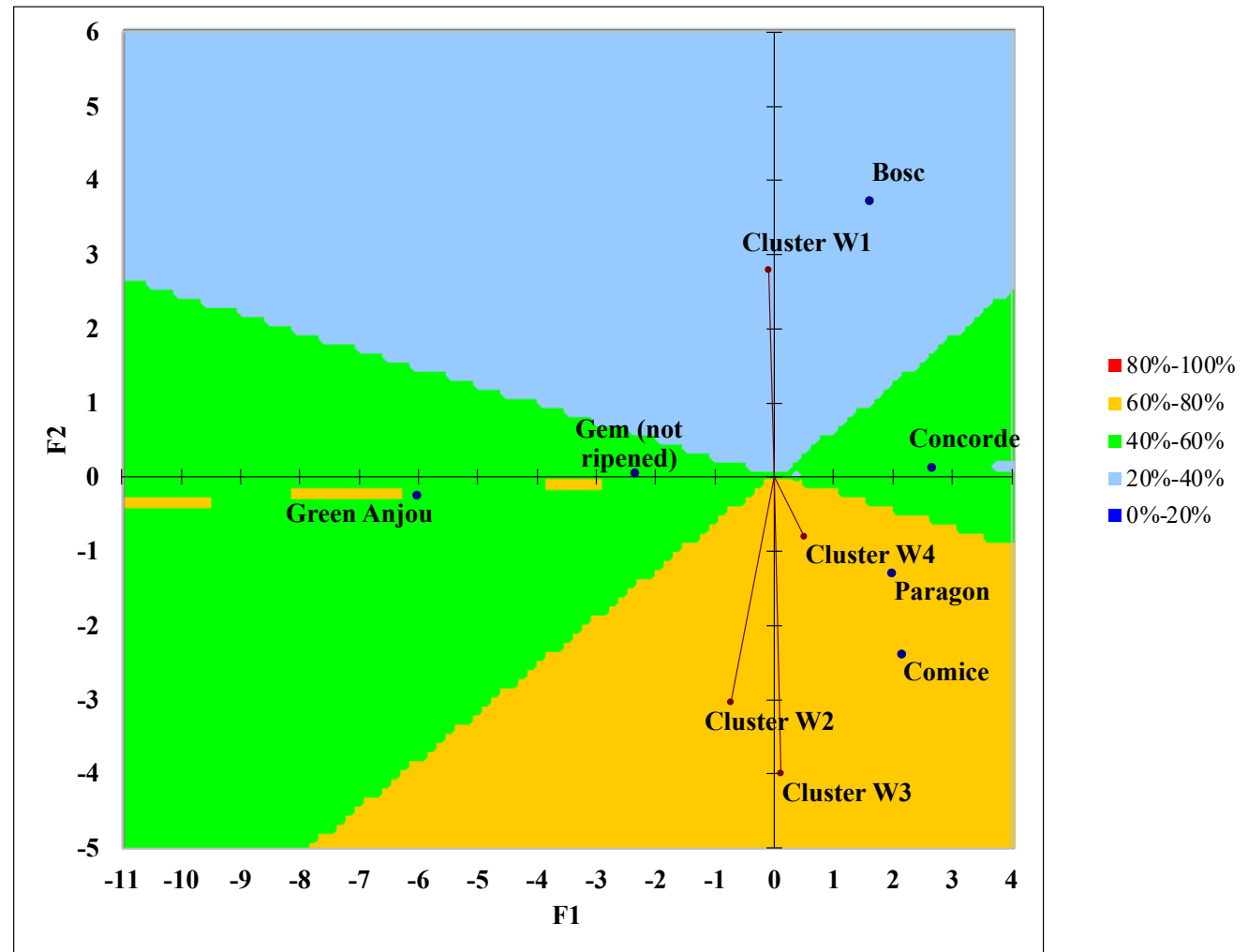
Summer pears: Clusters' characterization (n=107)

Cluster S1

n= 33
73% women

Most preferred variety: **Seckel**

↓

Mostly characterized for its **juicy texture**

2nd: Bartlett
3rd: 417

Favorite pear variety was: 24% Asian pears, 24% Bosc, and 21% Bartlett

Cluster S2

n= 29
69% women

Most preferred variety: **Bartlett**

↓

pear aroma, grassy/ green aroma, pear flavor, sweet taste, and juicy texture

2nd: Seckel
3rd: 573

Favorite pear variety was: Bartlett

Cluster S3

n= 8
100% women

Most preferred variety: **642**

↓

stemmy/woody aroma, fermented aroma, stemmy/woody flavor, fermented flavor, bitter taste, astringent, and grainy/gritty texture.

2nd: 417
3rd: Seckel

Favorite pear variety was: Asian pears

Cluster S4

n= 27
63% women

Most preferred variety: **Bartlett**

↓

pear aroma, grassy/ green aroma, pear flavor, sweet taste, and juicy texture

2nd: 573
3rd: Seckel

Favorite pear variety was: Bartlett

Cluster S5

n= 10
50% women

Most preferred variety: **573**

↓

floral aroma, green/grassy flavor, floral flavor and *sour taste*

2nd: 720
3rd: Bartlett

Favorite pear variety was: Bartlett

*expressed having *tried some of the newer varieties and liked them too,* or they made comments such as: *no particular favorite; I like the unique differences,* and *I like ripe pears that have a complex sweetness, some tartness and juiciness.*

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Winter pears: Clusters'characterization (n=112)

Cluster W1

n= 29
41% women

Most preferred variety: **Bosc**

↓

Mostly characterized for its **stemmy/woody flavor**

2nd: Gem (not ripened)
3rd: Concorde

Favorite pear variety was: Green Anjou (21%), Comice (17%), Bartlett (14%) and Bosc (10%)

Cluster W2

n= 12
58% women

Most preferred variety: **Comice**

↓

pear aroma, fruity aroma, pear flavor, fruity flavor, sweet taste, and juicy texture

2nd: Green Anjou
3rd: Paragon

Favorite pear variety was: Bartlett (42%) and Asian pears (25%)

Cluster W3

n= 45
62% women

Most preferred variety: **Comice**

↓

pear aroma, fruity aroma, pear flavor, fruity flavor, sweet taste, and juicy texture

2nd: Paragon
3rd: Green Anjou

Favorite pear variety was: Bartlett (24%) and Red Anjou (16%)

Cluster W4

n= 25
56% women

Most preferred variety: **Comice**

↓

pear aroma, fruity aroma, pear flavor, fruity flavor, sweet taste, and juicy texture

2nd: Paragon
3rd: Concorde

Favorite pear variety was: Bartlett (44%)
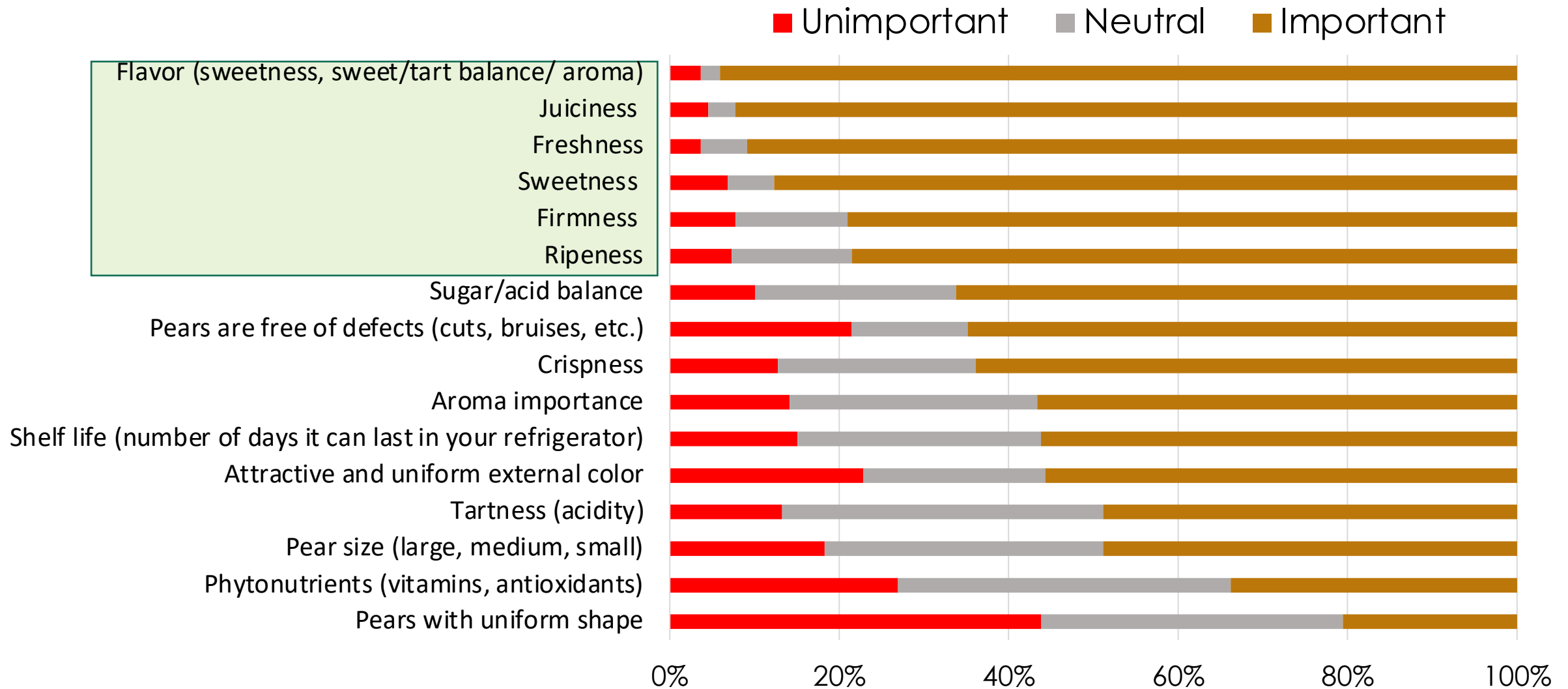
Comice

Preference map-
Takeaways

- ***Pear aroma, pear flavor, sweet, sour* and *juicy***: most contributing attributes to the liking of the summer pears.

- *Fermented aroma, stemmy-woody aroma, fermented flavor, stemmy-woody flavor, grainy-gritty*: attributes associated with a reduction in consumer liking.

- **Summer varieties:** 573, Bartlett and Seckel were identified as having the broadest appeal, satisfying between 60% and 80% of the consumers.

- **Winter varieties**: 75% of the consumers identified Comice and Paragon as the most appealing varieties.

- **PM and the characterization generated by responses to the questions used for the cluster characterization:** these two approaches together may be useful to **better understand consumers' preferences for pears and to generate more addressed marketing to increase or promote the consumption of some specific varieties.**

3.3 Results-Consumer testing
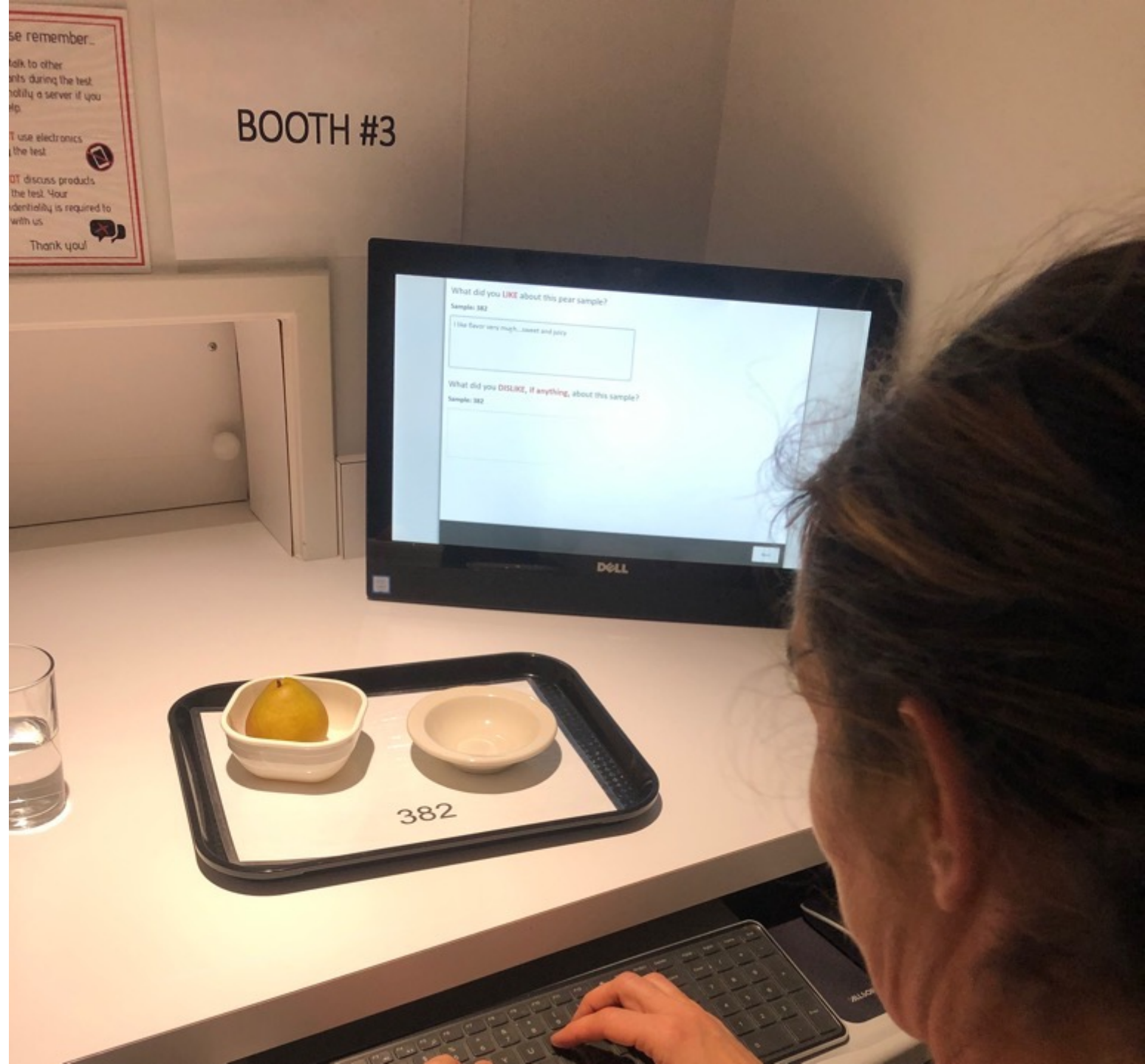
Please rate the importance of the following fresh pears characteristics when purchasing them, n=219

Legend: ■ Unimportant ■ Neutral ■ Important

Categories (top to bottom):
- Flavor (sweetness, sweet/tart balance/ aroma)
- Juiciness
- Freshness
- Sweetness
- Firmness
- Ripeness
- Sugar/acid balance
- Pears are free of defects (cuts, bruises, etc.)
- Crispness
- Aroma importance
- Shelf life (number of days it can last in your refrigerator)
- Attractive and uniform external color
- Tartness (acidity)
- Pear size (large, medium, small)
- Phytonutrients (vitamins, antioxidants)
- Pears with uniform shape

X-axis: 0%, 20%, 40%, 60%, 80%, 100%

Please indicate to what extent you TRUST the following sources of information on how the food you eat is produced, n=219
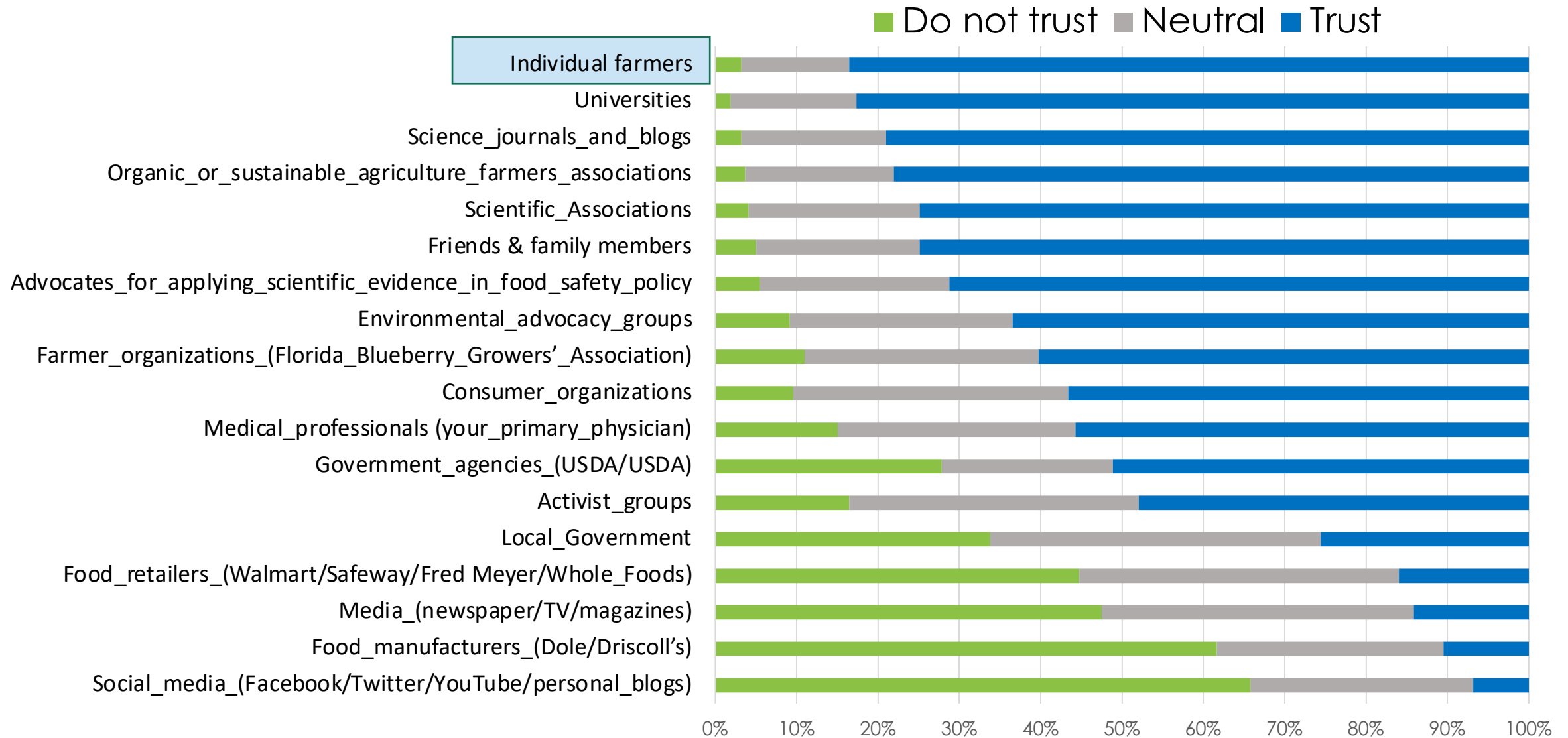
Types of pears you have eaten in the last year (CATA) n=219

Type	Number of Responses
Bartlett	195
Bosc	160
Anjou	142
Asian Pears	139
Red Anjou	114
Comice	104
Concorde	35
Starkrimson	34
Seckel	31
Abate Fetel	29
Packham's Triumph	21
I do not know the varieties	20
Forelle	15
Conference	14
Gem	8
Other	6

Number of Responses
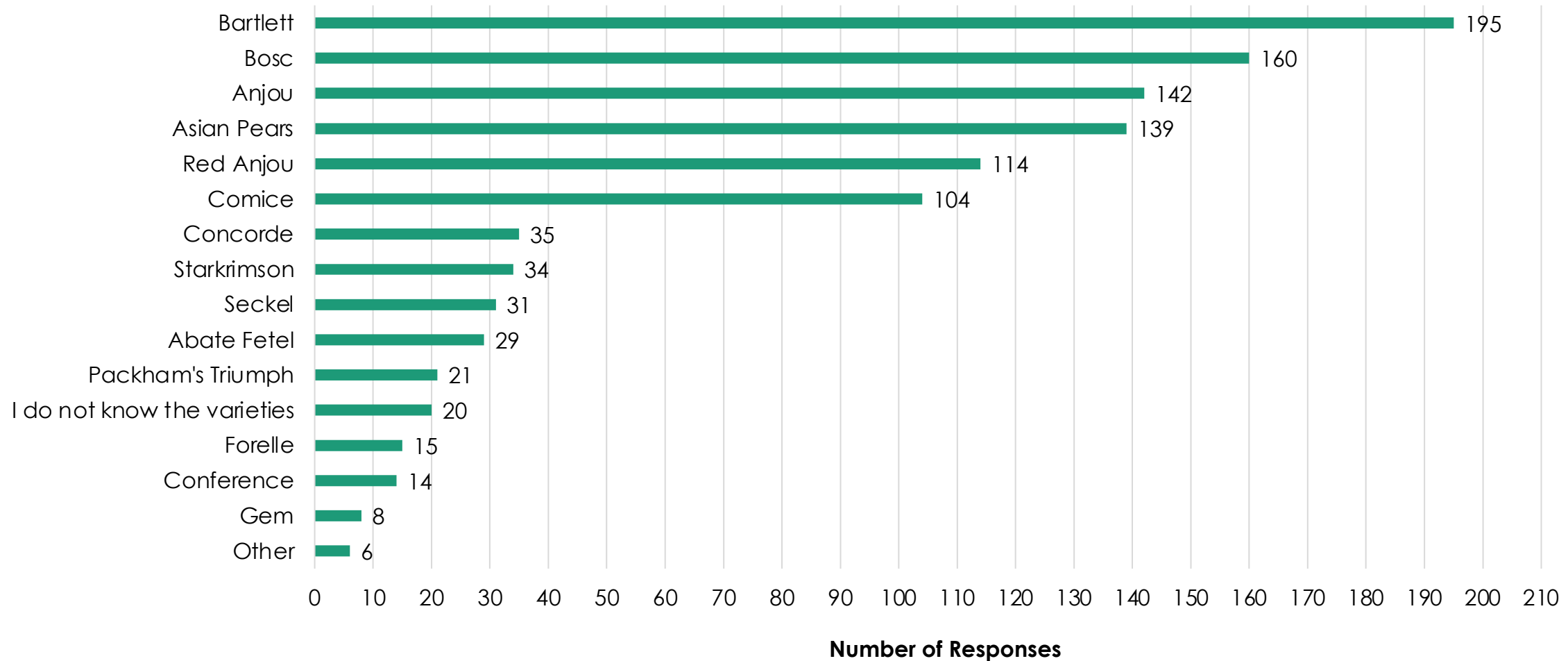
Main questions/concerns about pears

- The wide variety of options and having had *too many bad pears* in the past sometimes *keeps me from wanting to purchase pears.*

- I would be more hesitant to buy a new variety from the supermarket without tasting it, because there is such diversity in flavor and *chance that it could be a bad flavor* and not something my family would enjoy eating.

- How to tell when they are *ripe* and how *best to ripen* them.

- What *varieties are available* and when.

- *Hesitant* to buy unknown varieties because they might be *mealy*, so i usually stick to what i know i like, but because they are expensive, *I don't usually want to get something that might be bad.*

- Knowing when each variety is best to eat *seasonally,* how to know when each one is *ripe*.

- It's difficult to choose pears that are the *right stage of ripeness* and have the qualities of **juiciness, flavor, tartness and sweetness**, and *lacking astringency, mushiness/mealiness.*

- How to get them *the perfect level of ripe*, reduce the mealiness, *reduce the time they go bad.*

Consumer Testing-Takeaways


Key Takeaways

- Consumers want pears that are **flavorful, sweet, juicy, and ripe** (can we label qualities in the store?) – Check the neck MUST be taught.

- They want to **understand when their pears are ripe** and **don't want to waste expensive fruit** or have a bad eating experience.

- They **don't understand how to increase shelf life** through refrigeration.

- **Fresh, ripe, high-quality fruit is highly desirable**.

- The **varieties that most exhibited these qualities were**: Paragon, Bartlett, Green Anjou, Concorde, Comice, 573 and Seckel

- **Farmers/universities are highly trusted sources of information** about food.

- In-store sampling and food pairings/recipes could drive interest and increased purchases.

3.4 Results-Willingness to pay (WTP)

Willingness to pay – **Summer varieties**
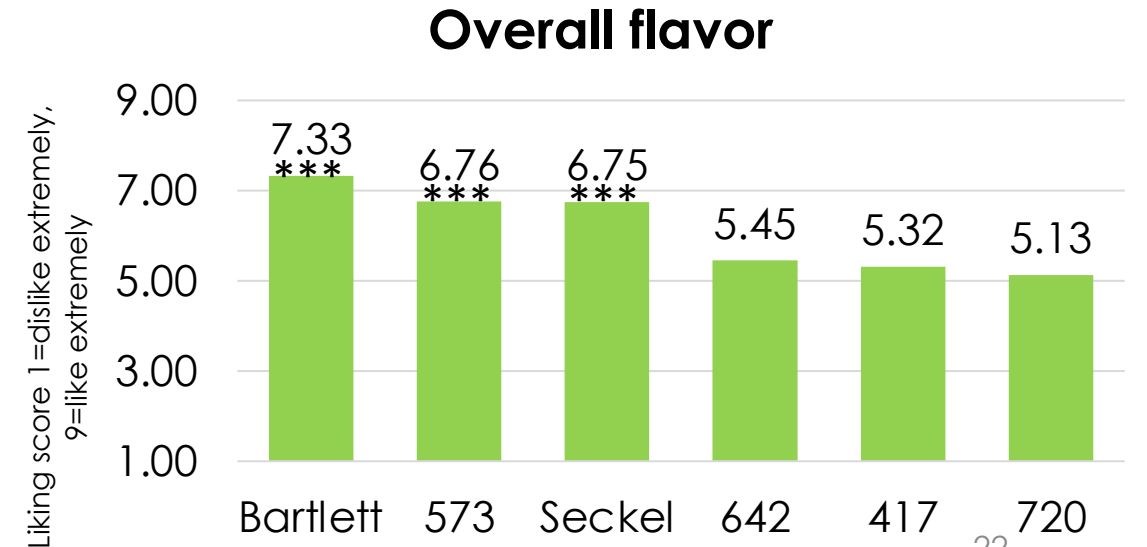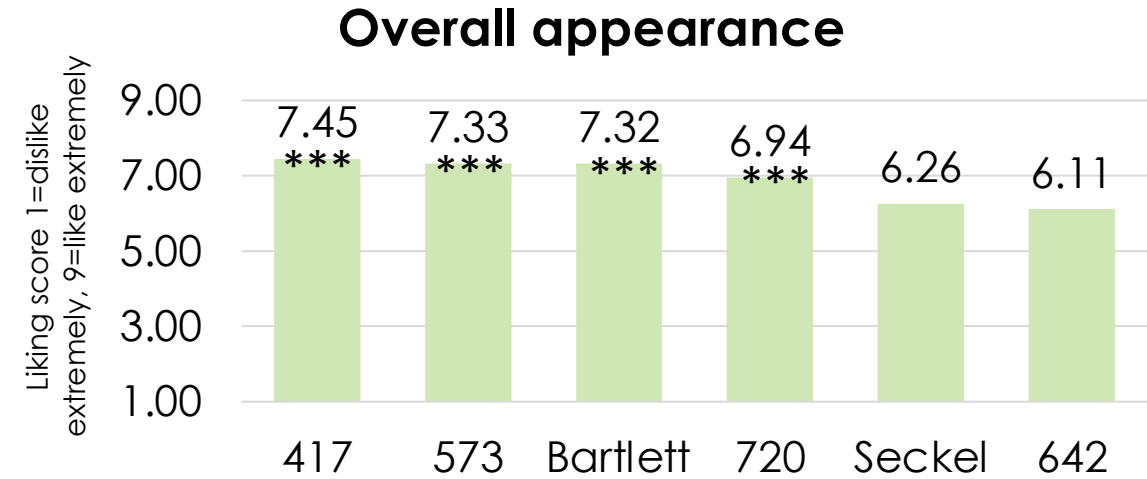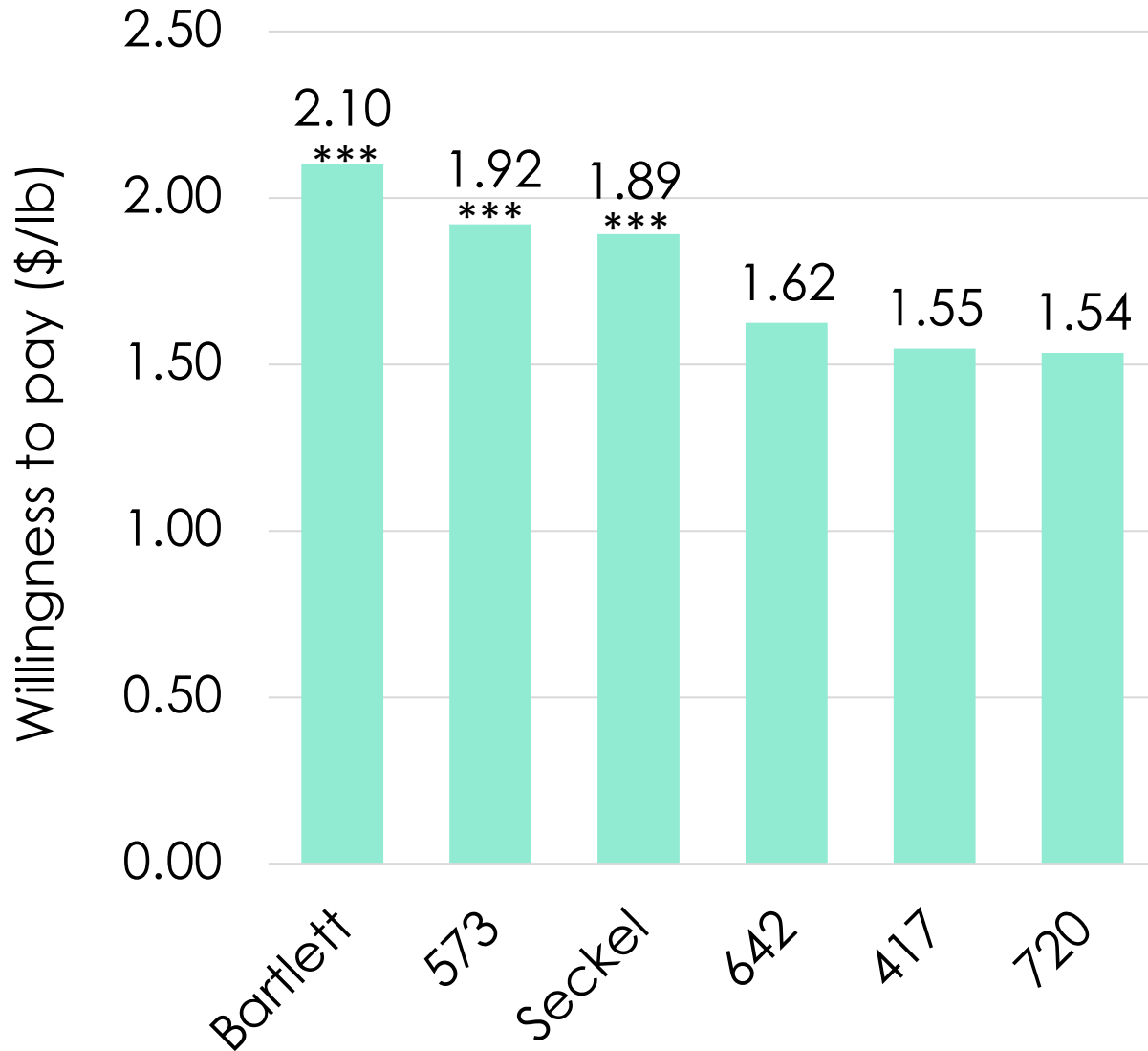
Summer pears: Willingness to pay (WTP) by key sociodemographics-**Age**

	Age≥35 N=70		Age<35 N=37		
	WTP Mean	WTP std error	WTP Mean	WTP std error	Pairwise t-test comparison
Bartlett	2.11	0.069	2.09	0.076	0.18
720	1.54	0.077	1.53	0.085	70.14
642	1.63	0.075	1.62	0.082	60.15
573	1.92	0.070	1.91	0.077	50.17
417	1.55	0.077	1.54	0.084	0.14
Seckel	1.90	0.070	1.89	0.076	0.17

Single, double, and triple asterisks (*, **, ***) indicate statistical significance at the 10%, 5%, and 1% levels

Summer pears: WTP by key sociodemographics- Income

	Income < 60K/year		Income ≥ 60K/year		Pairwise t-test comparison
	WTP Mean	WTP std error	WTP Mean	WTP std error	
Bartlett	2.04	0.072	2.16	0.071	-2.29**
720	1.47	0.081	1.59	0.078	-1.85*
642	1.56	0.079	1.68	0.076	-1.96*
573	1.86	0.073	1.98	0.072	-2.25**
417	1.49	0.081	1.61	0.078	-1.86*
Seckel	1.83	0.072	1.95	0.071	-2.27**

Single, double, and triple asterisks (*, **, ***) indicate statistical significance at the 10%, 5%, and 1% levels

Summer pears: WTP by key sociodemographics- frequency of consumption

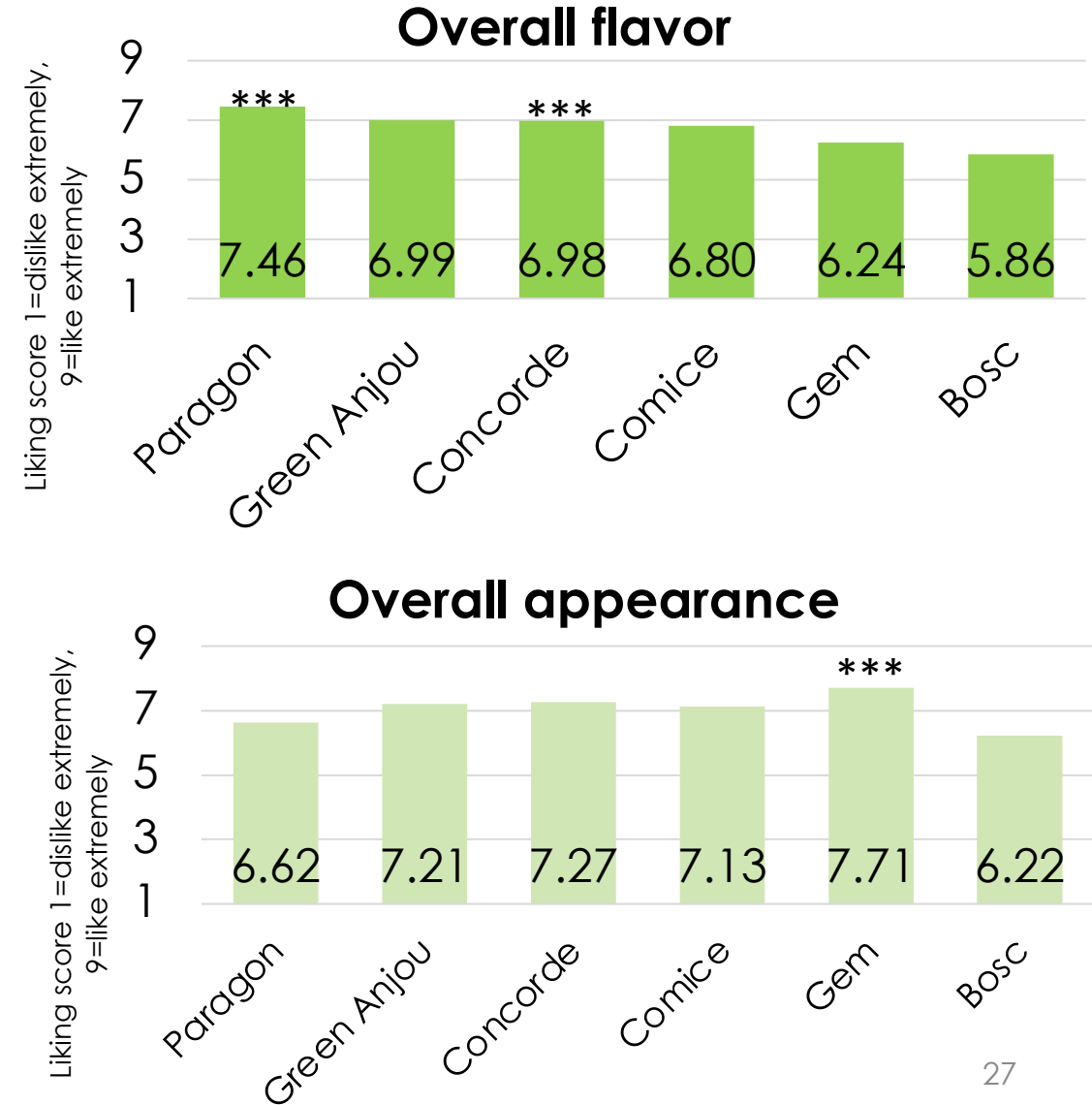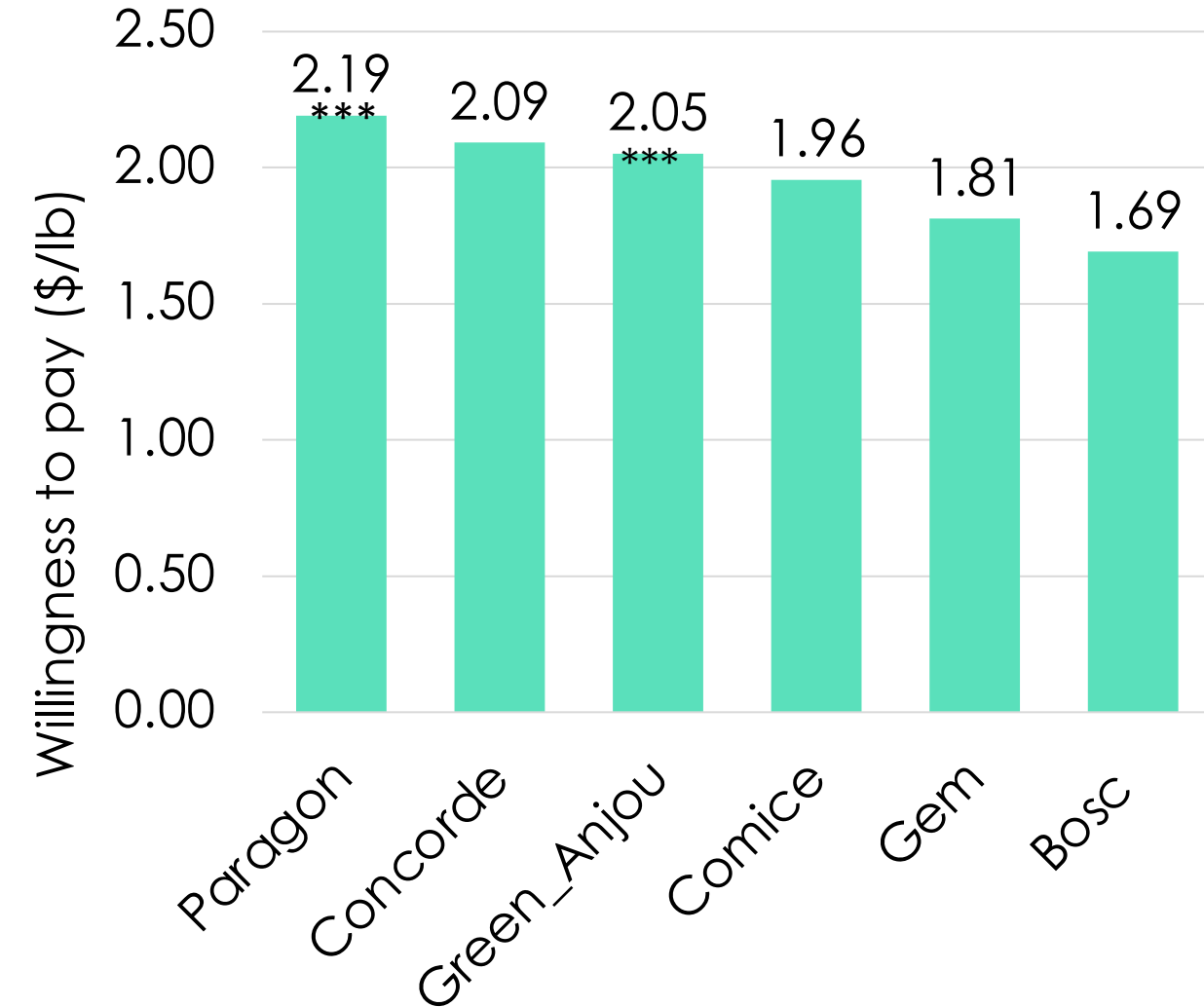|	Consume > once per month		Consume < once per month		Pairwise t-test comparison
	WTP Mean	WTP std error	WTP Mean	WTP std error	
Bartlett	2.14	0.068	1.99	0.080	2.11**
720	1.57	0.075	1.43	0.089	1.70*
642	1.67	0.073	1.52	0.087	1.81*
573	1.96	0.068	1.81	0.082	2.08**
417	1.59	0.075	1.44	0.089	1.71*
Seckel	1.93	0.068	1.78	0.081	2.10**

Single, double, and triple asterisks (*, **, ***) indicate statistical significance at the 10%, 5%, and 1% levels

Summer pears: WTP by key sociodemographics-**Use of social media to learn information about pears**

	Use social media		Does not use social media		Pairwise t-test comparison
	WTP Mean	WTP std error	WTP Mean	WTP std error	
Bartlett	2.18	0.068	1.96	0.075	3.65***
720	1.61	0.075	1.39	0.086	2.98***
642	1.70	0.073	1.48	0.084	3.16***
573	1.99	0.068	1.78	0.077	3.60***
417	1.63	0.075	1.41	0.085	2.99***
Seckel	1.97	0.068	1.75	0.077	3.63***

Single, double, and triple asterisks (*, **, ***) indicate statistical significance at the 10%, 5%, and 1% levels

Willingness to pay – **Winter varieties**

Willingness to pay ($/lb) (left chart)

- Paragon: 2.19 ***
- Concorde: 2.09
- Green_Anjou: 2.05 ***
- Comice: 1.96
- Gem: 1.81
- Bosc: 1.69

Overall flavor

Liking score 1=dislike extremely, 9=like extremely

- Paragon: 7.46 ***
- Green Anjou: 6.99
- Concorde: 6.98 ***
- Comice: 6.80
- Gem: 6.24
- Bosc: 5.86

Overall appearance

Liking score 1=dislike extremely, 9=like extremely

- Paragon: 6.62
- Green Anjou: 7.21
- Concorde: 7.27
- Comice: 7.13
- Gem: 7.71 ***
- Bosc: 6.22

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Winter pears: Willingness to pay (WTP) by key sociodemographics-**Age**

	Age≥35 (n=70)		Age<35 (n=37)		Pairwise t-test comparison
	WTP Mean	WTP std error	WTP Mean	WTP std error	
Green_Anjou	1.96	0.070	2.18	0.074	-3.81***
Bosc	1.60	0.073	1.82	0.075	-3.53***
Gem	1.73	0.071	1.94	0.074	-3.74***
Comice	1.87	0.069	2.09	0.073	-3.90***
Paragon	2.11	0.069	2.32	0.075	-3.79***
Concorde	2.01	0.070	2.22	0.075	-3.77***

Single, double, and triple asterisks (*, **, ***) indicate statistical significance at the 10%, 5%, and 1% levels

Winter pears: WTP by key sociodemographics- Income

	Income < 60K/year		Income ≥ 60K/year		Pairwise t-test comparison
	WTP Mean	WTP std error	WTP Mean	WTP std error	
Green Anjou	2.03	0.075	2.07	0.071	-0.68
Bosc	1.67	0.077	1.71	0.073	-0.64
Gem	1.79	0.075	1.83	0.071	-0.67
Comice	1.93	0.074	1.97	0.070	-0.70
Paragon	2.17	0.074	2.21	0.071	-0.68
Concorde	2.07	0.074	2.11	0.072	-0.68

Single, double, and triple asterisks (*, **, ***) indicate statistical significance at the 10%, 5%, and 1% levels

Winter pears: WTP by key sociodemographics-frequency of consumption

	Consume > once per month		Consume < once per month		Pairwise t-test comparison
	WTP Mean	WTP std error	WTP Mean	WTP std error	
Green Anjou	2.09	0.068	1.94	0.081	2.03**
Bosc	1.73	0.071	1.58	0.084	1.91*
Gem	1.85	0.069	1.71	0.081	2.01**
Comice	1.99	0.067	1.85	0.080	2.08**
Paragon	2.23	0.069	2.08	0.081	2.01**
Concorde	2.13	0.069	1.98	0.080	2.00**

Single, double, and triple asterisks (*, **, ***) indicate statistical significance at the 10%, 5%, and 1% levels

Winter pears: WTP by key sociodemographics-**Use of social media to learn information about pears**

	Use social media		Does not use social media		Pairwise t-test comparison
	WTP Mean	WTP std error	WTP Mean	WTP std error	
Green Anjou	2.10	0.069	1.96	0.078	2.09**
Bosc	1.74	0.071	1.60	0.081	1.97*
Gem	1.86	0.070	1.72	0.079	2.07**
Comice	2.00	0.068	1.86	0.077	2.14**
Paragon	2.24	0.070	2.10	0.077	2.07**
Concorde	2.14	0.070	2.00	0.078	2.06**

Single, double, and triple asterisks (*, **, ***) indicate statistical significance at the 10%, 5%, and 1% levels

Economics-Takeaways

- Willingness to pay (WTP) is consistent with the liking scores for overall flavor.
  - **Summer varieties:** Bartlett, 573, and Seckel have higher scores than 642, 417, and 720.
  - **Winter varieties:** Paragon, Concorde, Green Anjou, and Comice have higher scores than Gem and Bosc.
- No salient differences in the liking scores between key sociodemographic groups (age, income, buy at farmers markets).

Economics-Takeaways

- Salient differences in the WTP values:

  - Younger individuals (<35) are willing to pay more for winter, not for summer pears.
  - Higher income individuals (≥ 60K/year) are willing to pay more for summer pears, not for winter.
  - Higher frequency of consumption (consume > than once per month) are willing to pay more for both summer and winter pears.
  - Use of social media to learn information about pears (yes use) are willing to pay more for both summer and winter pears.

Questions?