No rose without a thorn: Adapting sensory methods for testing garden roses

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Vineland Research and Innovation Centre

- Independent, not-for-profit research institute in Niagara region of Canada
- Dedicated to driving a competitive horticulture industry through research, advancements in technologies and commercialization of new products
- Fruits, vegetables and ornamental plants

49th Parallel Collection

Canada's Hardy Rose Program

- Vineland breeding cold-hardy, disease resistant roses with consumer appeal
- Need to understand drivers of liking to inform breeding selections and rose releases

www.49throses.com

Rose challenges

- Highly diverse product set
- Highly variable products
- Temporal
  - Being in peak bloom is important for consumer acceptance
  - Different roses achieve peak bloom at different times
- Sensitive to environmental conditions, grown in a variable environment

Rose maintenance

- Commercial roses from one grower
- All roses in same style pots
- Kept in same growing conditions for 2 months prior to testing
- Grew 5 roses of each variety, brought 3 best ones for testing

Research Questions

1) Hedonic testing

- What is the best method of in-person hedonic testing considering that roses will reach peak bloom at different times?

2) Preference Mapping

- Can the same approaches used to build a preference map in food products, be directly applied to roses?

Consumer study design

Both years

- Garden plant purchasers
- Consumers from Greater Toronto Area
- 12 roses evaluated
  - 2 roses replicated between years

Year 1

- 199 participants
- 1 testing day per week for 3 weeks
  - Account for roses blooming at different times
- Liking scored on a 100pt scale

Year 2

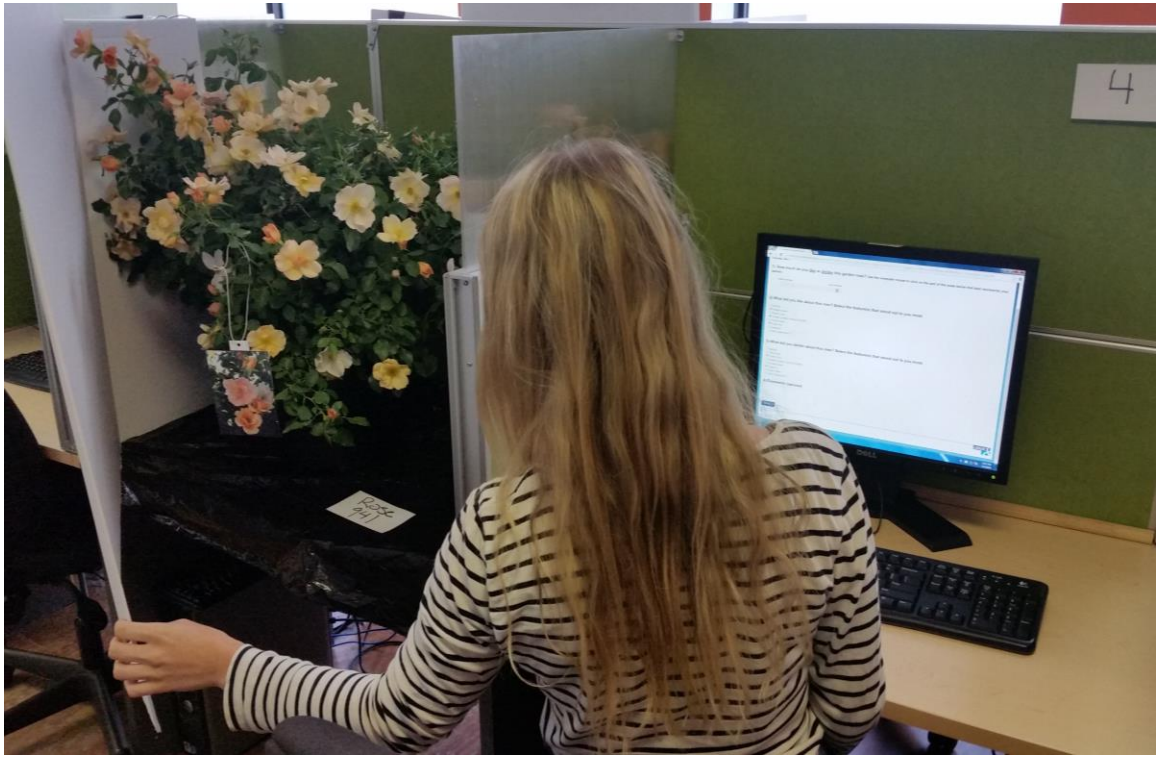
- 197 participant
- 3 consecutive testing days in one week
  - Account for roses at one time point that are in bloom
- Liking scored on 100pt scale and CATA for liking and disliking

Presentation order

- Roses stayed in one place, participants moved between booths visiting roses
- Participants received an "itinerary", order of booths
- Itinerary: 12x 12 Sudoku puzzle
  - Each line of Sudoku puzzle was one participant's itinerary

Booth set-up

- 12 booths: 1 rose variety per booth
- 3 pots of the same rose
- Photo tag with flower close-up
- 3-digit code
- Roses behind "doors" in booth
- Computers in adjacent booth



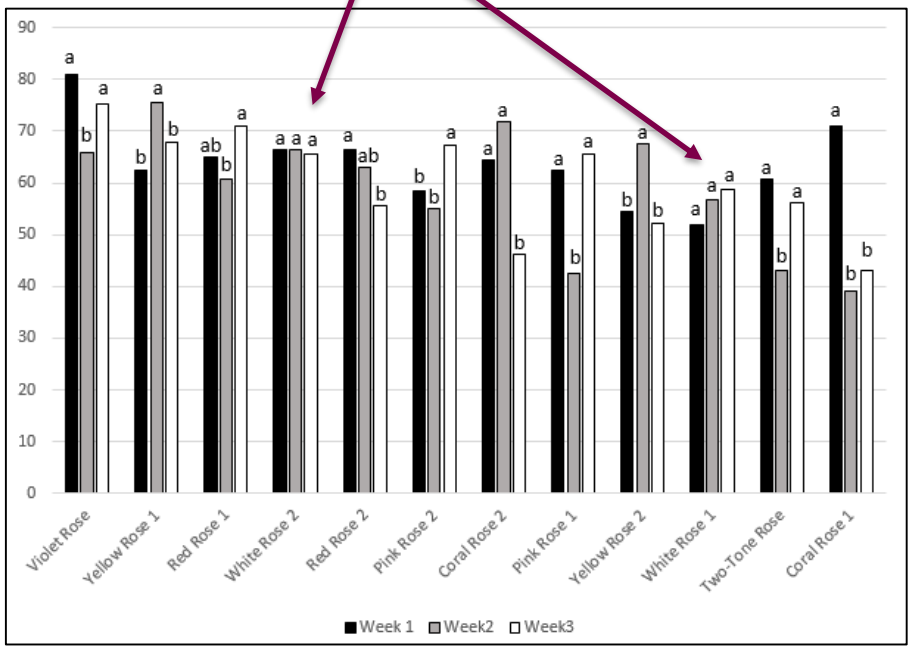
Best methods

2) What is the best method of in-person hedonic testing considering that roses will reach peak bloom at different times?

Year 1: Liking results

Significant differences in liking from week to week depending on bloom

Only 2 roses consistent across weeks



Comparison between years

Year 1 vs. Year 2

Look at average liking across 3 weeks or best week only?

Rose	Liking
Yellow Rose 1-Year 2	80.3[a]
Yellow Rose 1-Year 1 Best Week	75.5[ab]
Red Rose 1-Year 2	71.4[b]
Red Rose 1-Year 1 Best Week	70.9[bc]
Yellow Rose 1-Year 1 Overall	68.5[bc]
Red Rose 1-Year 1 Overall	66.1[c]

Best week comparison

Year 1 vs. Year 2

Comparison between years

- Year 2 and best week of year 1 not significantly different

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Yellow Rose 1-Year 2	80.3^{a}
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Overall comparison

Results: Year 1 vs. Year 2

Comparison between years

- Year 2 and best week of year 1 not significantly different
- Year 2 significantly different from overall year 1 result

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Summary

Year 1

3 days of testing
1 day/week

Pro

- Each rose has opportunity to be seen when in bloom
- No need to keep large rose inventory

Con

- Logistics more complicated: Need to setup/tear down 3 times
- Can only use data from best week for each rose

Year 2

3 consecutive days of testing

Pro

- Testing logistics are simpler: Consecutive testing days
- Ability to use all consumer data

Con

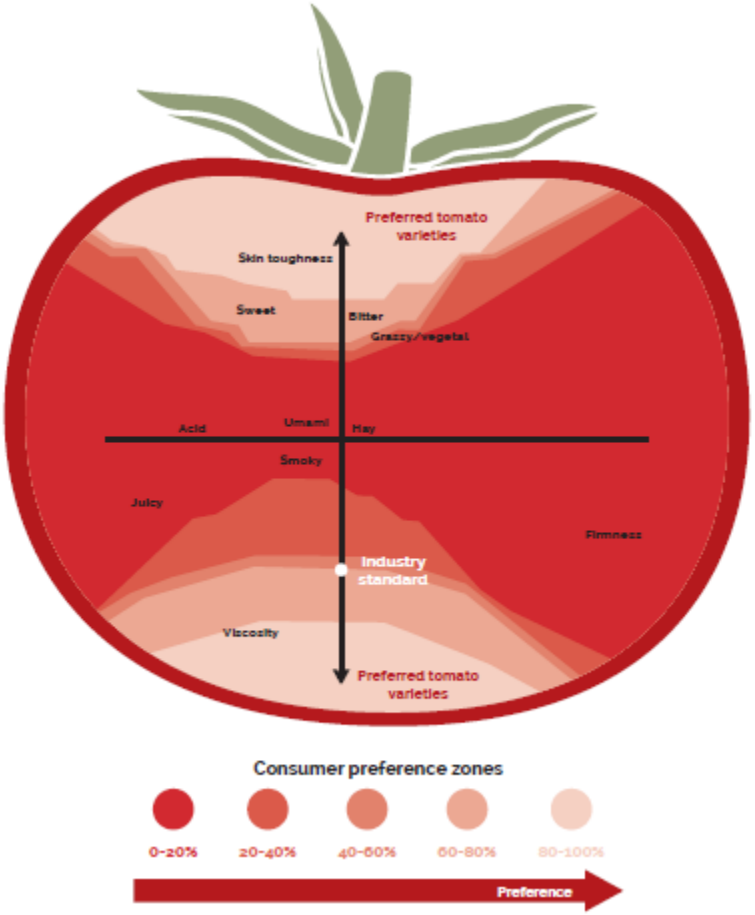
- Need to maintain a large pool of roses until testing is complete
- Risk that roses of interest may not be in full bloom during testing

Preference Mapping

- 3) Can the same approaches used to build a preference map in food products be directly applied to roses?

The plan

- Create an external preference map for landscape roses
  - Predict liking of new varieties coming out of breeding program
  - Benchmark against competitors
  - Product positioning
- Successful in edible crops
  - Sweet potatoes
  - Apples
  - Tomatoes



The lexicon

Visit poster 62 for the full story

12 training sessions

↓

95 terms generated

↓

32 terms into four categories

↓

25 terms defined

↓

Evaluation protocols defined

whole plant and foliage
plant height (short – tall)
upright growth habit (spreading – upright)
density of plant (low – high)
flower coverage (low – high)
new growth – bud (few – many)
new growth – young shoots (few – many)
bud elongation (round – elongated)
thorn length (short – long)
thorn coverage (low – high)
leaf size (small – large)
colour of foliage – lightness (dark – light)
leaf shine (dull – shiny)

flower
flower size (small – large)
abundance of petals (few – many)
height of flower (flat – tall)
petal curling (low – reflexed)
petal edge scalloping (round – scalloped)

main flower colour
hue (violet – yellow; red (midpoint))
lightness (dark – light)
saturation (dull – bright/vivid)
is there a secondary colour? (Y/N)
- yes→ contrast of secondary colour
- yes→ blending of secondary colour
- no→ monotone evenness

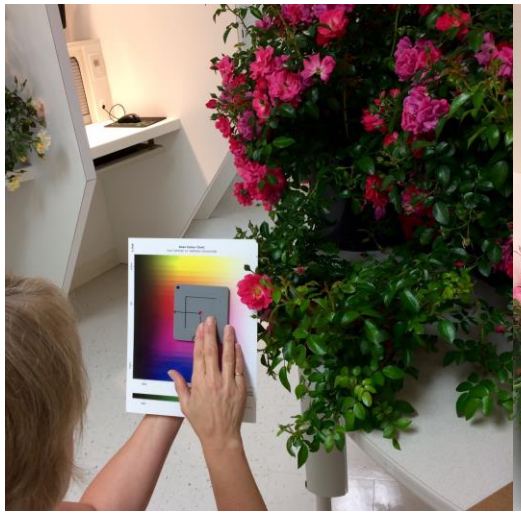
is the centre visible? (Y/N)
- yes→ size of the centre
- yes→ contrast of the centre

aroma
overall aroma (low – high)
rose water (low – high)
grassy/vegetal(low – high)
lemony (low – high)
red berry (low – high)
spice (low – high)
hay (low – high)

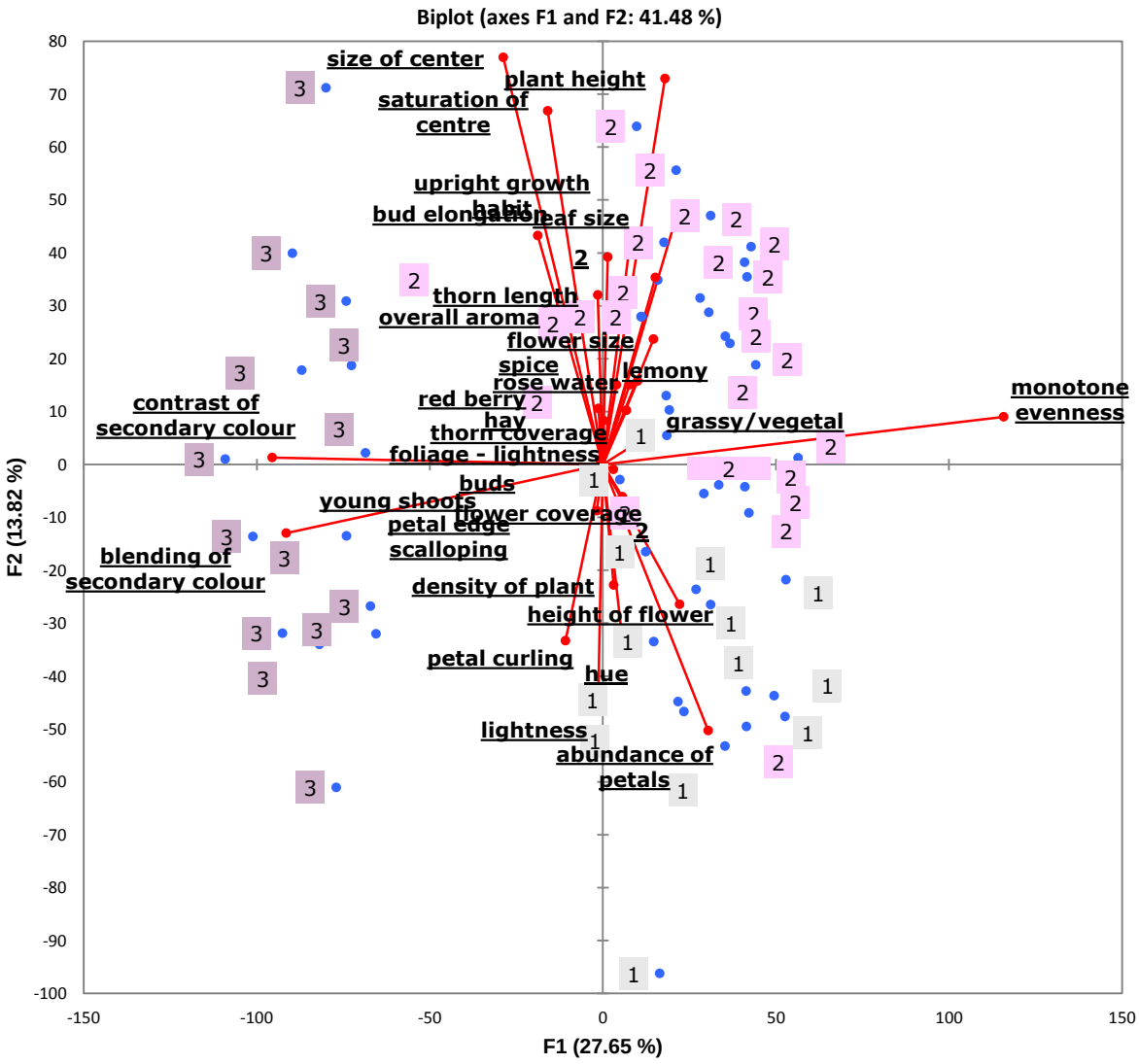
Sensory lexicon represented attributes deemed important by commercial rose growers (experts)

Descriptive analysis

- 14 sessions, 12 trained panellist
- Lexicon of 32 attributes
- 53 rose cultivars (12 selected for hedonics)
- Panelist circulated room in randomized order
  - Whole plant, flower shape, colour
  - 3 rose plants/booth
  - Labelled 3 digit codes
- Aroma evaluated by smelling cut flowers in cup under red light



Sensory profile



Group 1

- Abundance of petals
- High foliage density
- Yellow hues
- High lightness

Group 2

- Purple hues, white blends
- Upright growth
- Monotone colour
- Overall aroma
- High saturation

Group 3

- High colour contrast
- Secondary colour

Consumer liking

Year 2 consumer study

Roses	Mean liking
Yellow rose	80.3 a
Pink rose 1	71.7 b
Red rose	71.4 b
Pink rose 2	69.2 b
Coral rose	68.4 bc
Violet rose	61.7 cd
While rose 1	58.2 de
White rose 2	51.6 ef
Pink rose 3	51.3 ef
Pink rose 4	48.9 f
Pink rose 5	48.8 f
White rose 3	48.0 f

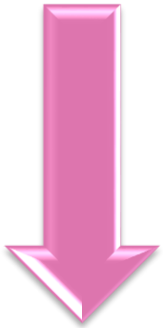
- Roses were found to differ for liking
- Could not predict consumer preference from through external preference mapping
  - Not significant (p= 0.245)
- Did see an impact of bloom coverage on liking
- CATA to define likely

Drivers of liking

Looking at the **flowers**, what did you like/dislike?

- Nothing
- flower colour
- flower size
- flower shape
- number of petals
- fragrance

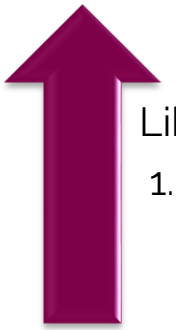
Like
1. Everything



Dislike
1. Size
2. Shape
3. Colour
4. Fullness

Looking at the **plant as a whole**, what did you like/dislike ?

- Nothing
- height
- density
- flower coverage
- presence of buds
- bud shape
- thorn coverage
- thorn length
- leaf size



Like
1. Everything

Dislike
1. Flower coverage
2. Density
3. Height

Consumers were more decisive about what they did not like.
What they dislike about a rose can overpower its positive attributes.

Challenges: Why didn't it work?

Preference mapping

- Did not find any sensory attributes from profiling that correspond to liking
  - Flower coverage and colour were important for consumer liking but did not contribute to the sensory space (low KMO in PCA)

- Flavour over-rules expertise?
  - Edible: Experts and consumers can agree on attributes they experience in-mouth such as taste, aromas, textures to describe a product
  - Non-edible: Experts and consumers may have different frame of reference
    - Consumer is evaluating amount of flower coverage and colour
    - Expert is evaluating petal number, plant architecture and foliage

- Lexicon audience
  - There is a discrepancy between how consumer and trained panel evaluated the rose plants
  - Need to define who is driving the lexicon development: consumer or expert
  - Visit Poster 62 for more challenges related to lexicon development

Key takeaways

1. The best method for hedonic testing of highly variable, temporal products depends on project objectives & budget
   - Overall testing highly variable temporal products remains a challenge.

2. While many approaches are similar in food & non-food, preference mapping of roses had some additional challenges
   - Need to ensure the lexicon describes the product from a consumer perspective to predict liking
   - Consumers more descriptive at defining what they do not like
     — Roses need to be evaluated a peak bloom time

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Thank you

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