Du Sol à L'assiette

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GreenAI
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Summary

- Products from neighboring farms or same area.
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- Problem: no pairing up

preharvest [17]

- organic site must be certified as organic/or strictly follow NOSB[6] protocols
- conventional production protocols should adhere to current crop management standards
- identical soil textures throughout the root growth profiles
- similar soil qualities (e.g., mineral, organic matter, cation exchange capacity)
- identical previous crops or field with a similar history for all plots; similar crop rotation/overwintering crop if utilized
- similar irrigation source, amount, and scheduling
- study sites should be as close as legally allowed by NOSB;[6] if conducted in a greenhouse, a suitable barrier to inhibit pesticide drift
- identical cultivars
- same aged plants (e.g., fruit trees)
- number of years or growing seasons must be identified
- repeat study by season if crop is commonly grown/harvested in different seasons (i.e., spring and autumn); establish appropriate replications with a statistician prior to conducting the study
- record and report production system's inputs (e.g., fertilizers and mineral amounts, herbicide/weed controls, insecticide controls)

harvest [17]

- same method of harvesting
- same size of fruit or vegetable
- same time of day
- same location on plant(s) or canopy
- same size and maturity of fruit or vegetable
- hold/transport identically

postharvest[26]

- wash/clean identically
- store for the same period of time, under identical atmospheres
- process under identical temperatures, humidities, and light (both intensity and quality) and time of day

Figure: Preharvest, Harvest, and Postharvest Factors To Be Paired in both Organically and Conventionally Grown Production Systems That Allow for a Comparable Produce Quality Study [Woese et al., 1997]

- In studies that paired common production variables and methodologies, organic crops:
  - + vitamin C, sugars, phenolics
    [Raigón et al., 2010, Soltoft et al., 2010, Juroszek et al., 2009, Pereira Lima et al., 2008, Marzouk and Kassem, 2011] dry matter [Riahi et al., 2009, Roussos and Gasparatos, 2009, Worthington, 1998].

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  - - nitrates [Raigón et al., 2010, Soltoft et al., 2010, Juroszek et al., 2009, Pereira Lima et al., 2008, Marzouk and Kassem, 2011], moisture, protein, yields [Riahi et al., 2009, Roussos and Gasparatos, 2009], chlorophylls, β-carotene and lycopene [Lester et al., 2007, del Amor et al., 2008, Rembialkowska, 2003]

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- Other studies (review of literature) :
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  - Vitamin C and nitrates clearly affected by fertilization method (latter possibly due to lower water content [Worthington, 1998]).

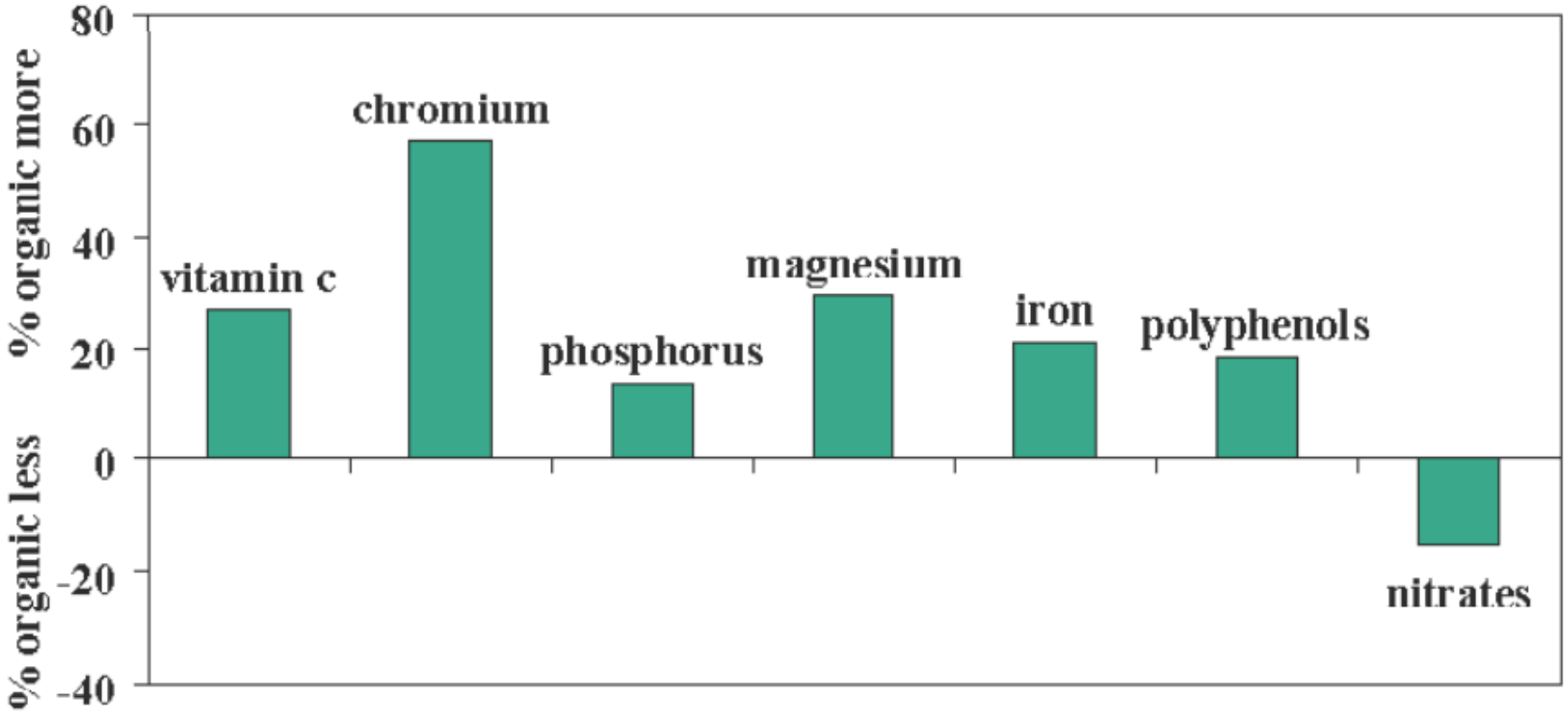

Figure: [Worthington, 1998] Review of the literature produced over the last 50 years comparing the nutritional quality of organic with conventional crops.

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- Slight advantage for organically grown produce
  [Tauscher et al., 2003]

Conclusion

CCL : No consistent / significant differences in taste and organoleptic quality between organic and conventional vegetables, but of studies reporting differences, organic produce is superior or preferred. [C.Theuer, 2001].

Also, "several researchers have concluded that maturity at harvest and storage methods generally have a **greater impact** on organoleptic quality **than** production systems. However, most research in this area has been conducted with conventional foods" " [C.Theuer, 2001].

No study on sensory analysis has been found, except on the impact of wheelings on carrot sensory quality [Taksdal, 1984]. The results are as follows:

- Wheelings modified the shape of carrots.
- Wheelings deteriorated the sensory quality of carrots in multiple aspects.

Project Progress

So far :

- 480 data.
- Divided into three different events: MSV/Bio, Bio/Conv, MSV/Conv.
- Involves 5 vegetables.

Triangle Test

Reminder: Two samples are the same, and one is different.

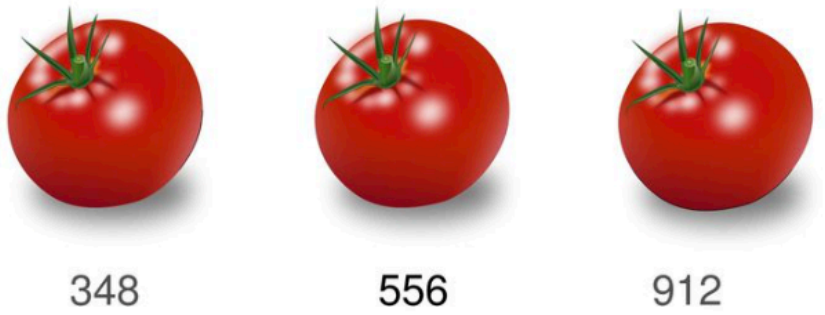

Figure: Triangle test

Triangle Test Analysis: Test-Based Approach

Objective determine whether a panel is able to differentiate between two products.

H_0: A tester cannot differentiate between the two products.
$\mathbb{P}(\text{picking the right sample}) = 1/3$.

- X: random variable representing the number of correct answers.
- n: total number of answers.
- $X \rightsquigarrow \mathrm{B}(p = \frac{1}{3}, n)$.
- x: observed number of correct answers.

If $\mathbb{P}(X \geqslant x) < 5\%$, H_0 is rejected.

Triangle Test Analysis: Estimation-Based Approach

Objective: estimate the number of correct answers *not* due to chance.

Max likelihood: $\mathbb{P}(X = x \mid Y = y)$, where Y represents the number of correct answers due to chance.

Example : $n = 5$ testers, $X = 2$ correct answers.

- $Y = 0$: the 5 tasters answer randomly.

  Probability of observing 2 correct responses: $\mathrm{B}(k = 2; n = 5, p = \frac{1}{3})$ that is $\mathbb{P}(X = 2 \mid Y = 0) = 0.329$.

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- $Y = 1$: 1 correct answer is not due to chance. This answer can be dropped.

  Probability of observing $1/4$ correct answer: $\mathrm{B}(k = 1; n = 4, p = \frac{1}{3})$ that is $\mathbb{P}(X = 2 \mid Y = 1) = 0.395$.

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Objective: estimate the number of correct answers *not* due to chance.

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Example : $n = 5$ testers, $X = 2$ correct answers.

- $Y = 0$: the 5 tasters answer randomly.

  Probability of observing 2 correct responses: $\mathrm{B}(k = 2; n = 5, p = \frac{1}{3})$ that is $\mathbb{P}(X = 2 \mid Y = 0) = 0.329$.
- $Y = 1$: 1 correct answer is not due to chance. This answer can be dropped.

  Probability of observing $1/4$ correct answer: $\mathrm{B}(k = 1; n = 4, p = \frac{1}{3})$ that is $\mathbb{P}(X = 2 \mid Y = 1) = 0.395$.
- $Y = 2$: all correct answers are not due to chance.

  Probability of observing $0/3$ correct answer: $\mathrm{B}(k = 0; n = 3, p = \frac{1}{3})$ that is $\mathbb{P}(X = 2 \mid Y = 2) = 0.296$

These two approaches can sometimes provide contradictory results.
Example :

Table: Data from 2 events

Test	MSV/conv	MSV/bio
Sample size	85	54
Correct answers	35	22
p-value triangle test	**0.08**	**0.156**
Est. correct answers not due to chance	**10**	**7**
Preferences 1	23	12
Preferences 2	12	10
p-value preference	0.044	0.416
Est. preferences	10 / 0	4.5 / 2.5

Hedonic Test I

Compute p-value for preference?

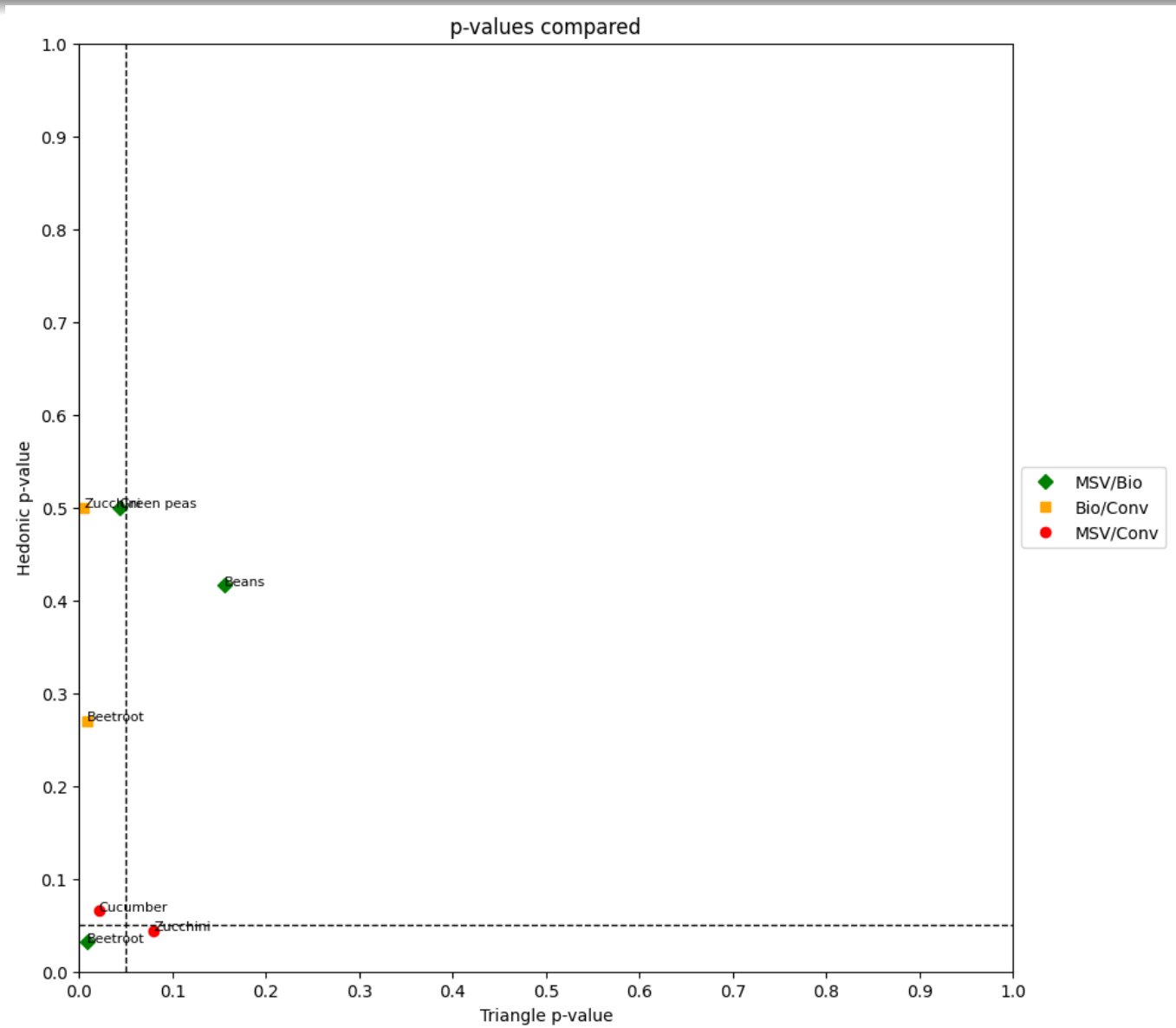
If an individual is unable to differentiate (even if they believe otherwise) between products A and B, they attribute their preference to chance, meaning with a probability of $1/2$ for each product.

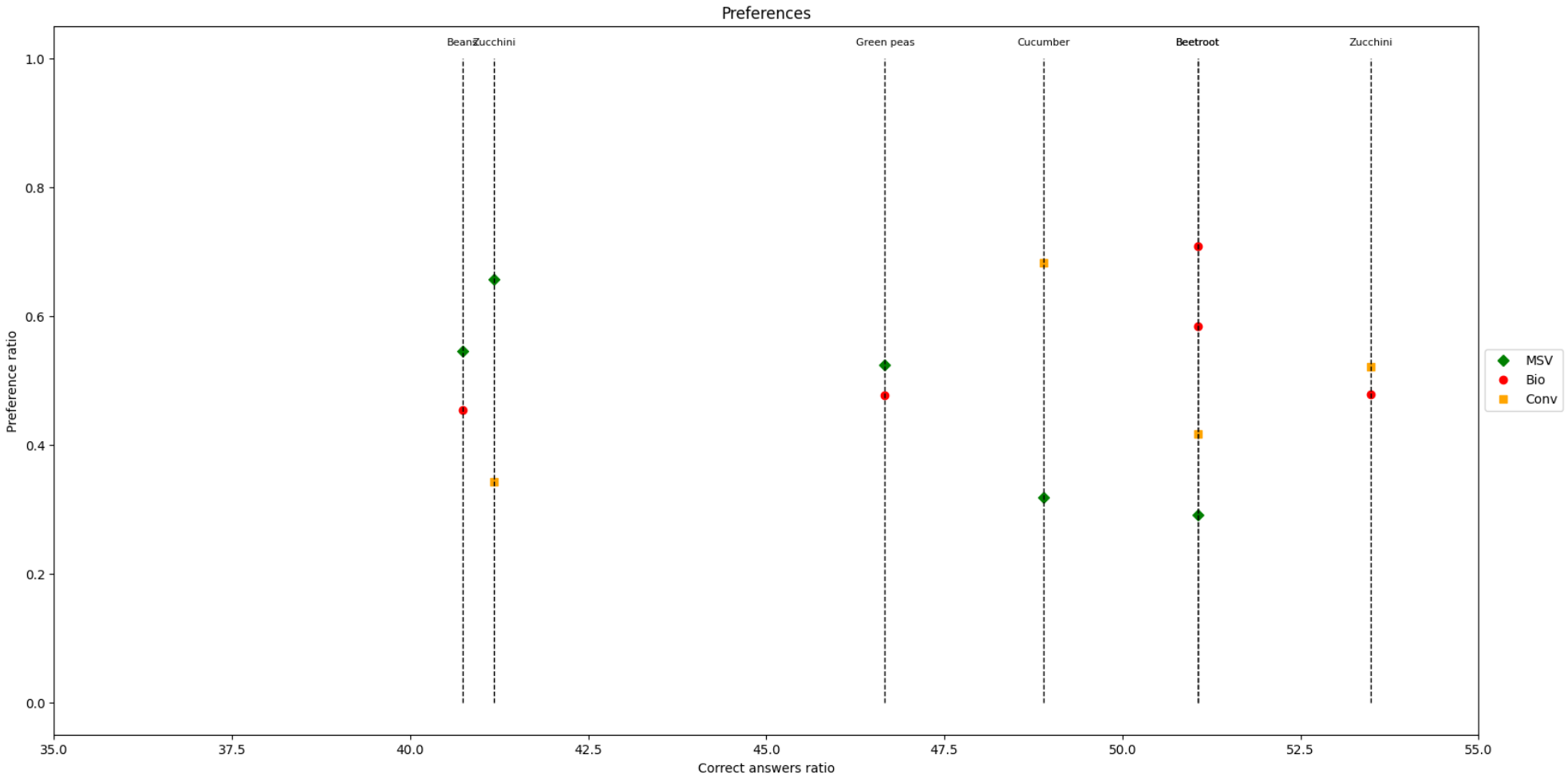
Hedonic Test II

Objective: determine the preferences of testers who were able to distinguish between the two products.

Subtract from the number of preferences for products A and B the portion attributable to chance. Therefore, the corrected number of preferences for A is:

$$Rc_A = R_A - \frac{1}{2} \times Y \tag{1}$$


p-values compared
Hedonic p-value
Triangle p-value
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
Zucchini
Green peas
Beans
Beetroot
Cucumber
Zucchini
Beetroot
MSV/Bio
Bio/Conv
MSV/Conv


Preferences
Beans
Zucchini
Green peas
Cucumber
Beetroot
Zucchini
1.0
0.8
0.6
0.4
0.2
0.0
Preference ratio
35.0
37.5
40.0
42.5
45.0
47.5
50.0
52.5
55.0
Correct answers ratio
MSV
Bio
Conv

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