

CONSUMERS' ACCEPTANCE OF A LOCAL LANDRACE: THE CASE OF PURPLE CARROTS



Azucena Gracia^a, Cristina Mallor^b, Francesc Jurado^a

*Centro de Investigación y Tecnología Agroalimentaria de Aragón
(CITA) & Instituto Agroalimentario de Aragón-IA2.*

^aUnidad de Economía Agroalimentaria y de los Recursos Naturales

^bUnidad de Hortofruticultura



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Introduction

- This study has been carried out in a **multidisciplinary project** context about **agro-biodiversity**.



- With the aims:
 - To **identify and recover** several landraces of vegetables at risk of genetic erosion.
 - To **assess and valorize** the local product from these landraces.
- Such valorization passes not only from the farmers, but also from consumers.
- It is why we need to know firstly the consumers' acceptance

Introduction

- Among such landraces, we are interested in a local **purple carrot landrace** that was cultivated some years ago but it is no longer in production.
- This landrace comes from the **Maestrazgo county (Aragón)**.
- This landrace is now maintained in a Genebank (**Banco de Germoplasma de Hortícolas del CITA**).
- But it would be interesting to **restore again in cultivation** taking into account that there is an **increasing consumers' interest in colored vegetables**.



Objective

- The aim of this paper is:
 - To study **consumers' acceptance** of this local purple carrot landrace.



In particular:

- To assess **consumers' preferences** for carrots with different characteristics (**color, price, variety, and production system**).
- To estimate **consumers' willingness to pay (WTP)** for the local **purple carrots**.

Methodology

- Data was obtained from a survey conducted in Aragón to a total of 405 respondents in 2016.
- The questionnaire was administrated online to the responsible of the food purchase in the households stratified by gender, age, and province of residence by a specialized company in market surveys.
- The questionnaire was structured in three parts
 - consumption and purchase habits
 - the choice experiment task
 - questions on socio-demographic characteristics (i.e. age, family size, income and education level, residence province)



Methodology



- Before the final questionnaire was distributed, a **pilot survey** was conducted to a sample of respondents (N = **15**) to test for understanding and response time.
- The choice experiment was designed to calculate the main and two-way interaction effects.
- Previous to the choice experiment task, participants must read a **cheap talk script** (Cummings and Taylor, 1999) to **encourage** respondents to **reveal** their true preferences in order to **minimize possible hypothetical bias**.

Methodology: designed of the choice experiment

- **Half kilo of whole carrots**



Attributes and levels:

- **Price (Euro/box): 0.5 - 0.8 -1.1 - 1.4**
- **Colour: Orange - Purple**
- **Method of production: conventional - organic**
- **Variety: non-local - local**

Methodology: designed of the choice experiment

“Street and Burgess” Choice Design for main effects and **two-way interaction effects**

Each choice set have three alternatives:
Two designed alternatives + a non-buy option

Number of choice sets = 24
Number of blocks = 6
Each respondent faces 4 choice sets

A

B



Methodology: specification and estimation

$$U_{njt} = ASC + \beta_1 PRICE_{njt} + \beta_2 PURPLE_{njt} + \beta_3 LOCAL_{njt} + \beta_4 ORG_{njt} + \beta_5 LOCAL_{njt} PURPLE_{njt} + \beta_6 ORG_{njt} COL_{njt} + \varepsilon_{njt}$$

- n = number of respondents
- j = available choosing options (A, B or none)
- t = number of choice sets
- ASC= dummy: 0 for A and B options; and 1 otherwise (no-buy)
- PRICE = price levels in the choice options (negative impact in utility)
- PURPLE, LOCAL and ORG = Dummy: 1 if the attribute is present and 0 otherwise
- LOCAL*PURPLE and ORG*PURPLE = Interactions variable by multiplying VAR and COL and ORG and COL dummies variables
- ε_{njt} = an observed random term distributed following an extreme value type (Gumbel) distribution



An Error Component Random Parameter Logit model (ECRPL) was finally selected (NLOGIT 5.0 Software)

Results: socio-demographic characteristics of the sample

Characteristics	Sample (n=405)	Population
Gender: Female	51.36	50.93
Age (Average)	47.72	42.68
18–34	21.23	21.63
35–44	21.98	20.94
45–54	19.26	19.20
≥ 55	37.53	38.22
Education level		
Primary	23.21	17.00
Secondary	29.63	50.00
Higher	47.16	33.00
Household size (average)	2.87	2.53
Province of residence		
Huesca	14.32	17.00
Teruel	18.77	11.00
Zaragoza	80.25	72.00
Other	0.99	0.00

Results: Model estimations

Parameters	WTPs (€/box)		Total WTPs (€/box)		
	Estimation	T- ratio	Estimation	T- ratio	Estimatio
Mean					
ASC	- 5.8161***	- 9.65	---	---	
PRICE	- 2.8341***	- 7.50	---	---	
PURPLE	-1.4589***	-4.03	-0.51**	-3.41	
LOCAL	0.6451**	1.99	0.23**	2.31	
ORG	0.8209***	3.61	0.29***	3.53	
LOCAL*PURPLE	1.3558**	2.41	0.48**	2.07	0.20
ORG*PURPLE	0.0089	0.03	0.00	0.03	-0.22
Standard Deviation					
PURPLE	3.2681***	8.62			
LOCAL	1.5059***	4.83			
ORG	1.6231***	4.32			
LOCAL*PURPLE	2.3993***	3.94			
ORG*PURPLE	1.2331*	1.93			
σ^2	3.1177***	8.52			
Log L	- 1163.27				
χ^2	1232.96***				
# of observations	1620				

Results: socio-demographic characteristics of the sample

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≥ 55	37.53	38.22
Education level		
Primary	23.21	17.00
Secondary	29.63	50.00
Higher	47.16	33.00
Income level ³		
≤ 1500 €/month	21.16	N/A
1501–3500 €/month	43.33	N/A
> 3500 €/month	35.51	N/A
Household size (average)	2.87	2.53
Province of residence		
Huesca	14.32	17.00
Teruel	18.77	11.00
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Other	0.99	0.00

Results

- ASC was **negative and significant**: consumers obtain higher utility from choosing any alternative than from the non-buy option.
- The **price** variable (PRICE) was **negative** and statistically **significant**.
- The estimated parameters and WTP for the main effect of the **PURPLE** variable was **negative** and statistically **significant**.
- Then, consumers' **utility for the purple carrots was lower than for the orange ones** and consumers' **valuation for purple carrots was negative**.



Results

- The estimated parameters and WTP for the main effects of the **LOCAL** and **ORG** variables were **positive** and statistically significant.
- Then, **consumers positively value the local variety and the organic production method.**
- The **interaction** between the **ORG** and **PURPLE** variables was **not statistically significant.**
- However the **interaction** between the **LOCAL** and **PURPLE** variables was **positive** and statistically **significant.**



Results



- Consumers' utility for purple carrots produced from the local landrace is higher than the sum of the utilities derived by either the purple or the local landrace carrots.
- The purple colour is negatively value by consumers but if the carrots are purple because they are produced from the local landrace, consumers' valuation would be positive.
- Thus, **both attributes, color and local variety** can be considered **complements**.
- Finally, **consumers' preferences are indeed heterogeneous** because the standard deviations of estimated parameters were statistically different from zero.

Economic results



	WTPs (€/box)	Total WTPs (€/box)
Mean		
PURPLE	-0.51**	
LOCAL	0.23**	
ORG	0.29***	
LOCAL*PURPLE	0.48**	0.20
ORG*PURPLE	0.00	-0.22

- On average, 0.23 and 0.29 is the price premium that consumers were **willing to pay** to purchase a package of carrots produced from the **local landrace** or **organically produced**, respectively.
- Then, the **most value attribute**, *ceteris paribus*, is the **organic** but closely followed by the local landrace.
- On contrary, -0.51 represented the discount for consumers to purchase a package of purple carrots, meaning that **consumers prefer the orange carrots**.

Economic results



	WTPs (€/box)	Total WTPs (€/box)
Mean		
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LOCAL*PURPLE	0.48**	0.20
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Taking also into account the WTPs for the interactions:

- If the purple carrots are produced from the local landrace, consumers would positively value these purple carrots (0.20 €/package).
- On contrary, purple carrots organically produced would still be negatively value (-0.22 €/package).

Discussion and further research

- Local origin of the carrots was positively value by consumers.
- The purple carrots were less value than the orange one.
- However, the interaction between the local landrace and the purple color was positive.
- These three results indicate that consumers prefer the traditional orange color of the carrots but the **purple carrots would only be accepted if the carrots are locally produced from the traditional landrace.**
- Further research: to explain consumers heterogeneity.



Implications of our results



- Results clearly indicate that the purple carrot could be an interesting product for growers, but only if the consumers are appropriately informed about its local origin.
- These results encourage continuing with the carrot research project through a breeding and selection program to obtain homogeneous material.
- The breeding program should guarantee the quality of the product reaching the consumer, but also the profitability for the growers.
- Once we have selected the material, seeds will be transfer to local growers along with the recommended strategy to commercialize the carrots for consumers' acceptance.

Implications of our results

The results also confirm the importance of involving a multidisciplinary group that allows take decisions along all the value chain for designing a recovery strategy, taking into account both grower and consumer preferences.



Thank you for your attention.



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