

Life ZERO RESIDUES:

Influence of the ripening degree on the odour composition of Early Bigi cherries: study of their aroma potential as ingredient for the juice industry

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Introduction

Among pre-harvest parameters, the **ripening state is a major factor determining the final aroma quality of the harvested fruit.** Little works have addressed the analysis of aromatic compounds in cherry cultivars, which means that **the number and nature of the odorants responsible for their aroma is not fully understood yet.** Studies carried out on **cherry cultivars cultivated in Spain have mainly focused on the physico-chemical and sensory characterization** of the fruits, **but not on their aroma**

Objetives

1. Monitoring how the odour of cherries is influenced by the ripening stage, in order to check the eventual aromatic potential of cherries discarded for the fresh fruit market which are destined to juices

2. Early Bigi cultivar as a case study due to the commercial importance in Aragon

Materials and Methods

The volatile compounds of Early bigi cherries from three ripening states were extracted by SPME and analyzed by gas-chromatography-olfactometry. Juice from cherries of the low and high ripening degrees was elaborated by pre-centrifugation before clarification and fining and submitted to descriptive sensory analysis by a panel of trained tasters.



Results

Rt	Aroma Descriptor	Compound	Low	Medium	High	
7.34	Sweet-fruity	Ethyl propanoate	41	nd	nd	•
8.08	Cream	2,3-butanedione	33	nd	nd	
9.07	Grass	ni	27	nd	nd	
9.32	Synthetic	ni	43	51	94	•
10.06	Strawberrry	Ethyl butyrate	24	nd	nd	
11.15	Pineapple	Ethyl isovalerate	41	nd	nd	
11.47	Grass	Hexanal	64	100	94	
12.30	Synthetic	2-methylpropanol	41	43	27	
13.52	Grass	Z-3-hexenal	30	47	91	•
14.07	Grass	Z-3-hexenol	75	61	58	
16.43	Grass	E-2-hexenal	30	85	67	
17.32	Fish	Z-4-heptenal	33	33	30	
19.28	Mushroom	1-octen-3-ona	nd	75	85	•
21.52	Geranium	Z-1,5-octadien-3-one	27	82	91	
23.21	Grass	ni	nd	33	67	
26.17	Bitter almond	Benzaldehyde	32	37	41	
28.08	Cucumber	E-2,Z-6-nonadienal	nd	nd	25	
31.15	Grass	ni	nd	nd	25	
	Rt 7.34 8.08 9.07 9.32 10.06 11.15 11.47 12.30 13.52 14.07 16.43 17.32 19.28 21.52 23.21 26.17 28.08 31.15	Rt Aroma Descriptor 7.34 Sweet-fruity 8.08 Cream 9.07 Grass 9.08 Synthetic 10.06 Strawberrry 11.15 Pineapple 11.47 Grass 12.30 Synthetic 13.52 Grass 14.07 Grass 16.43 Grass 17.32 Fish 19.28 Mushroom 21.52 Geranium 23.21 Grass 26.17 Bitter almond 28.08 Cucumber 31.15 Grass	RtAroma DescriptorCompound7.34Sweet-fruityEthyl propanoate8.08Cream2,3-butanedione9.07Grassni9.32Syntheticni10.06StrawberrryEthyl butyrate11.15PineappleEthyl isovalerate11.47GrassHexanal12.30Synthetic2-methylpropanol13.52GrassZ-3-hexenal14.07GrassEt-2-hexenal17.32FishZ-4-heptenal19.28Mushroom1-octen-3-ona21.52GeraniumZ-1,5-octadien-3-one23.21Grassni26.17Bitter almondBenzaldehyde28.08CucumberE-2,Z-6-nonadienal31.15Grassni	RtAroma DescriptorCompoundLow7.34Sweet-fruityEthyl propanoate418.08Cream2,3-butanedione339.07Grassni279.32Syntheticni4310.06StrawberrryEthyl butyrate2411.15PineappleEthyl isovalerate4111.47GrassHexanal6412.30Synthetic2-methylpropanol4113.52GrassZ-3-hexenal3014.07GrassZ-3-hexenol7516.43GrassE-2-hexenal3317.32FishZ-4-heptenal3319.28Mushroom1-octen-3-onand21.52GeraniumZ-1,5-octadien-3-one2723.21Grassnind26.17Bitter almondBenzaldehyde3228.08CucumberE-2,Z-6-nonadienalnd31.15Grassnind	RtAroma DescriptorCompoundLowMedium7.34Sweet-fruityEthyl propanoate41nd8.08Cream2,3-butanedione33nd9.07Grassni27nd9.32Syntheticni435110.06StrawberrryEthyl butyrate24nd11.15PineappleEthyl isovalerate41nd11.47GrassHexanal6410012.30Synthetic2-methylpropanol414313.52GrassZ-3-hexenal304714.07GrassE-2-hexenal308517.32FishZ-4-heptenal333319.28Mushroom1-octen-3-onand7521.52GeraniumZ-1,5-octadien-3-one278223.21Grassnind3326.17Bitter almondBenzaldehyde323731.15Grassnindnd	RtAroma DescriptorCompoundLowMediumHigh7.34Sweet-fruityEthyl propanoate41ndnd8.08Cream2,3-butanedione33ndnd9.07Grassni27ndnd9.32Syntheticni43519410.06StrawberrryEthyl butyrate24ndnd11.15PineappleEthyl isovalerate41ndnd11.47GrassHexanal641009412.30Synthetic2-methylpropanol41432713.52GrassZ-3-hexenal30479114.07GrassZ-3-hexenal30479114.07GrassZ-4-heptenal33333019.28Mushroom1-octen-3-onand758521.52GeraniumZ-1,5-octadien-3-one2782.09123.21Grassnind33374128.08CucumberE-2,Z-6-nonadienalndnd2531.15Grassnind2531.1531.1531.1510.1525

Cherry volatile profile is **deeply influenced by the maturity degree**, in terms of both the number and the chemical nature of odour volatiles.

- As a general rule, **low ripening degrees imply the presence of low volatile compounds (mainly ethyl esters)** whose concentration decreases as maturity stage advances.
- Sensory data evidences the correlation between the "green/grass" note and the perception of the "characteristic cherry aroma".
- Aldehydes exhibiting "green-like" odours (hexanal, Z-3hexenal and E-2-hexenal) are much clearly perceived in the high rippen cherries. This could e explained by the complex balance established among the molecules implied in the aroma

Conclusions

- The olfactometric profile of Early Bigi cherry is mainly conformed by chemical compounds from the aldehydes family evoking "green" and "grass" odours.
- The different volatile profiles present in the juice are clearly expressed on the sensory properties of the juice. The olfactometric monitoring allows, therefore, estimating the aromatic potential of the fruit and its sensory implication.
- Knowledge of the specific aromatic potential of cherries discarded to be commercialized as a fresh product is valuable information for manufacturers. Correlation studies between GC-O and sensory data can be a useful technique to predict the aroma properties of novel juice formulations prior to be launched to the market.



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