Decoding the flavour of ‘Ilzer Rose‘ – an old apple variety from the south-east of Austria

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Introduction

Fig. 1: Example of a traditional meadow orchard
(Source: www.streuobstwiesen-niedersachsen.de)

Apple cultivation has a long tradition in southern parts of Austria (Styria). About 75% of the Austrian apples are cultivated and harvested within this region. In apple plantations, popular international apple varieties like Golden Delicious, Gala and Idared cover more than 60% of the fruits. On the contrary, about 25% of the Styrian apples are grown in so-called meadow orchards (Fig.1). One benefit of the traditional meadow orchards is the enormous number of apple varieties that have been domestic in this specific type of landscape for hundreds of years. Recent developments regarding for example apple price on the European market as well as the general consumers’ trend to prefer regional products have put old apple varieties back on the map.

The old apple variety ‘Ilzer Rose’ is one of these varieties which have been described especially from this region near the village Ilz since about 1900. The rather small, intense-red apples with white flesh possess a very pleasant, intense fruity and slightly rose-like flavour which makes it interesting for producers of high quality apple juices, ciders and other products thereof.

Materials and Methods

The formation of secondary flavour compounds is dependent on enzyme activity of the fruits, but also on the conditions used during fruit processing. To be able to focus on primary flavour compounds, apple enzymes were inactivated as far as possible by applying a procedure described in [1].

The volatiles of the flesh of the ‘Ilzer Rose’ were in the focus of the present study. For the flavour characterisation we used the following techniques:
Identification of the volatile and odour active compounds by using gas chromatography-mass spectrometry and gas chromatography-olfactometry after headspace SPME. In GC-olfactometry, the human noses of trained panellists were used as selective and sensitive detectors to identify the odour active compounds. Detection frequency was used to identify to most potent odourants of this apple variety.

(i) Sample preparation
- Inactivation of genuine enzymes
- HS-SPME (2 cm 50/30 µm DVB/Carboxen/PDMS)

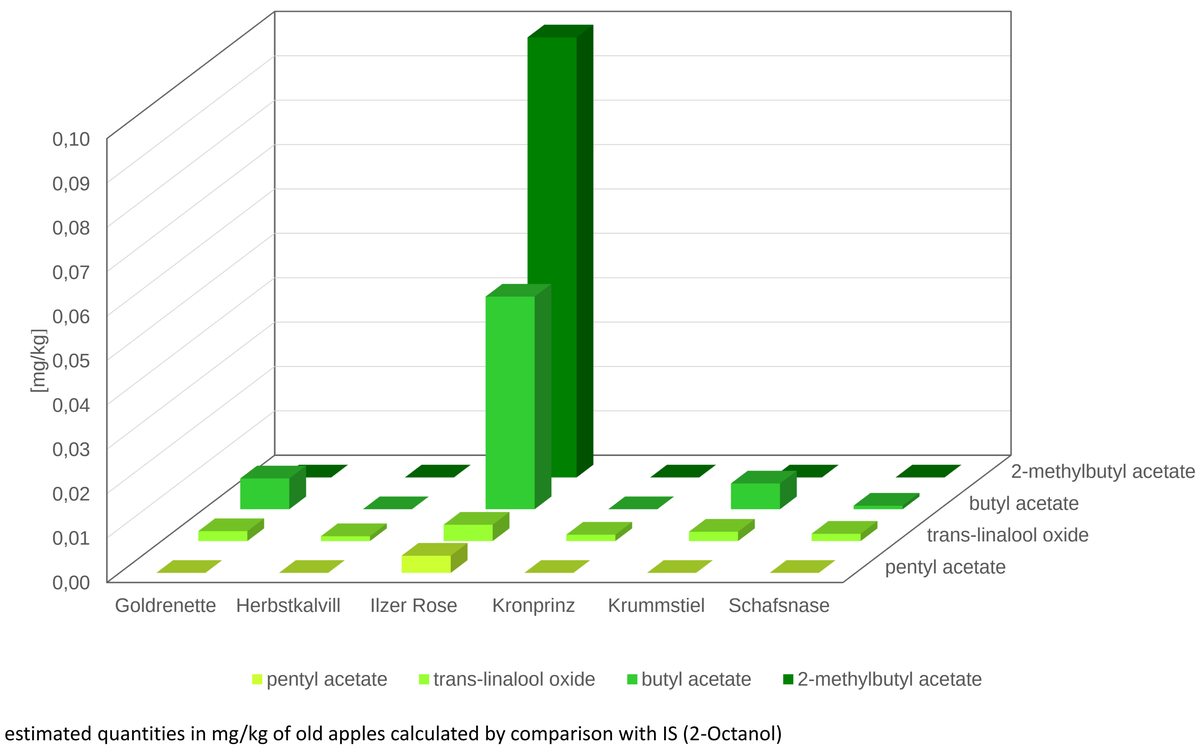
(ii) Analysis of the volatiles
(after Headspace Solid Phase Microextraction)
- Gas chromatography-mass spectrometry
- Gas chromatography-olfactometry (Detection Frequency)

Results

Descriptive analysis of the enzyme-inactivated sliced ‘Ilzer Rose’ apples showed a distinct flowery/floral flavour with pronounced crispiness and fruitiness. GC-MS analysis of the volatile compounds revealed significantly higher concentrations of four volatiles compounds (butyl acetate, 2-methylbutyl acetate, trans linalool oxide and pentyl acetate), which are only present in very low amounts in other old apple varieties (Fig.2).
Results from GC-O (Fig. 3) demonstrate a certain contribution of these compounds to the ‘Ilzer Rose’ flavour, but do not explain the distinct flowery/floral odour. Further investigations are necessary to identify the volatile compounds that contribute to the typical ‘Ilzer Rose’ flavour.

However, these results serve as a good basis to disclose the secret of ‘Ilzer Rose’ flavour!

GC-MS Analysis



estimated quantities in mg/kg of old apples calculated by comparison with IS (2-Octanol)

Fig. 2: Concentrations of the four compounds of interest in ‚Ilzer Rose‘ comparison to other old apple varietes

GC-Olfactometry

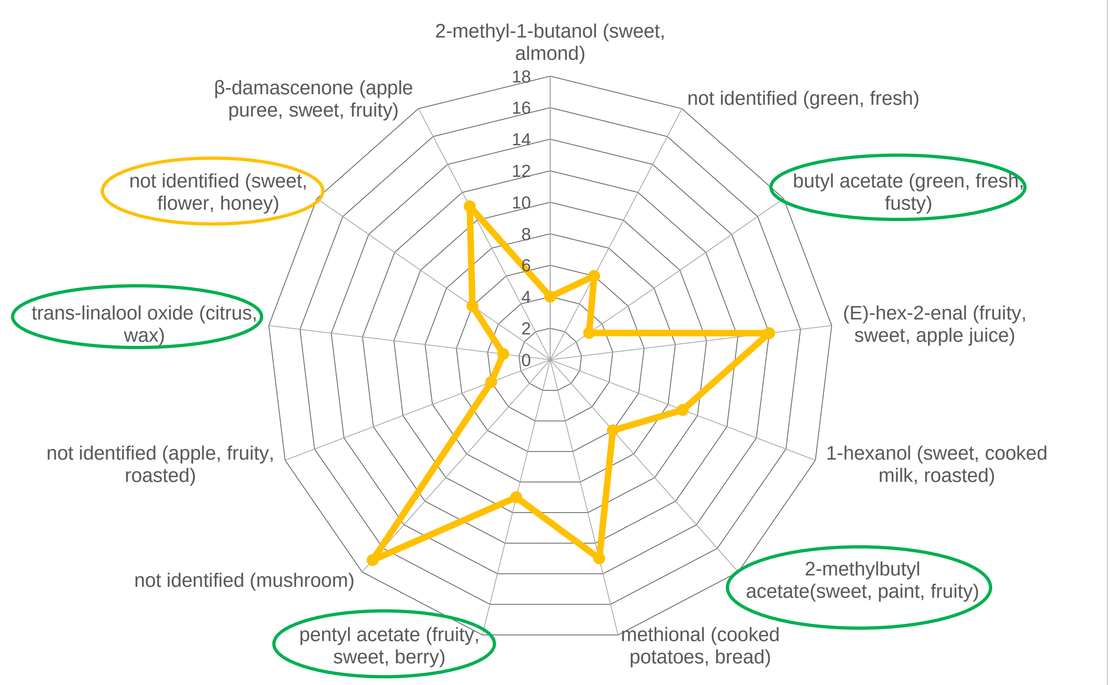


Fig. 3: Odour active compounds in ‘Ilzer Rose’ identified after GC-O (Detection Frequency)

Reference:
1. M.L. Corollaro, I. Endrizzi, A. Bertolini et al. (2013) Postharvest Biology and Technology, 77, 111-120.