

THE WORLD DRINKS CITRUS

Citrus components: Well-known, but still good for more

From sweet to sour, from bitter to ripe – the taste nuances of citrus fruits are more diverse than those of almost any other fruit. More than two thirds of all soft drinks contain citrus components. But citrus fruits – even though well established – may still offer an untapped potential.

Centuries of crossing this fruit genus, which originated in Asia, has bred the most varied fruits, such as limes, grapefruits, lemons and – probably the most popular citrus fruit – the orange. In the Middle Ages it was seafarers who spread the fruits from the Asian parts of the world, first to Portugal and Spain, because even in those days the fruits were known to prevent scurvy due to their high vitamin C content.

It was not until the 15th century, however, that the orange was introduced into Europe, from where, the latest findings reveal, the Portuguese took it to America, today the most important continent for the cultivation of citrus fruits.

Since then, the orange – alongside the grape – has been the most-grown fruit worldwide. No other taste has been able to find greater acceptance. This is not surprising, for the orange tastes refreshing, possesses a slightly acidic, yet at the same time sweetish, taste and is extremely juicy.

Whether in refreshing Aqua Plus beverages, carbonated soft drinks, colas, still drinks or fruit juices – citrus fruits are represented in all beverage categories. The DöhlerGroup provides its customers with tailor-made beverage concepts, in addition to a broad portfolio of citrus fractions, FTNF/FTNJ flavours, water phases and concentrated oils.



But how does the fruit get into the glass?

To retain the freshness and full taste of the fruit, immediate processing at source in the producing country is of paramount importance. Only the best fruits yield high-quality fruit-juice concentrates and the raw materials for outstanding flavours.

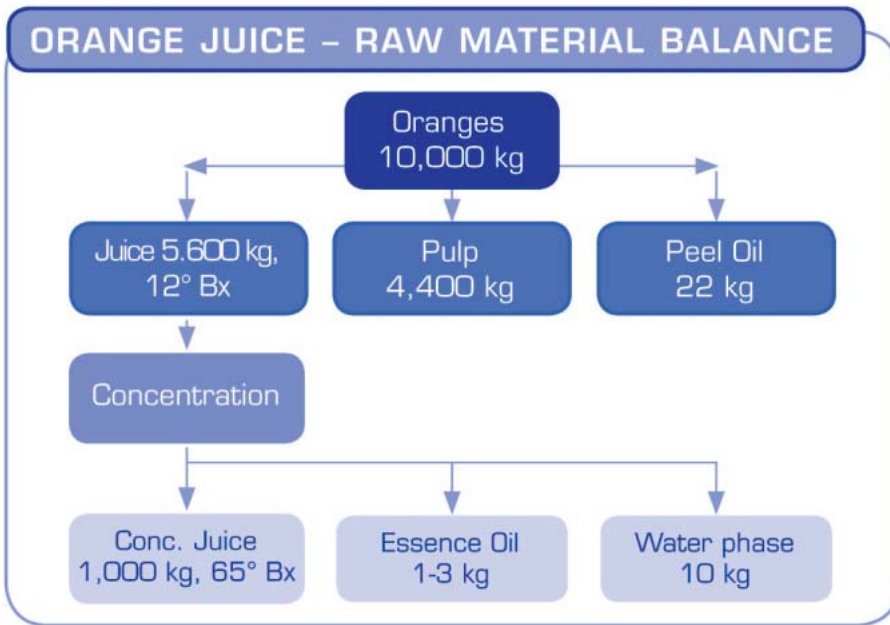
The basic ingredients for citrus flavours occur at two stages in the production of orange-juice concentrates. During juice ex-

traction the fruit is separated into three streams: pulp-containing juice, peel and peel oil/water emulsion. The latter comes from drops of essential oil that are squeezed out of the peel and washed off with a jet of water. The peel oil is extracted from the emulsion by means of centrifuges and then subjected to several weeks' storage at low temperatures to precipitate out hard-to-dissolve components (known as "waxes"). What remains at the end of this process is pure citrus peel oil (cold pressed oil).

The pulp-containing juice undergoes filtration and centrifugation before being fed into an evaporator for concentration. During the evaporation stage some 80 per cent of the water is extracted from the juice. Since the bulk of the juice flavour is removed along with the water at this stage, the water vapours have to be conducted through a unit which enables the flavour to be

Döhler Citrus Range:

- FTNF / FTNJ
- Citrus Fractions
- Water Phases
- Concentrated Oils



At the end of 2007, in the midst of the largest single citrus-growing region in the world – in Limeira, Brazil – the DöhlerGroup completed its high-tech production site, the Centre of Expertise for Citrus, on an area of more than 50,000 square metres. This innovation centre gives the entire DöhlerGroup access to high-quality citrus fraction flavour building blocks, concentrated citrus oils and other fruit by-products, enabling it to supply customers, manufacturers and brand owners throughout the world.

Each building block matters – for a perfect taste

Thanks to modern technology, the individual flavour fractions can be selected out and re-combined on the building-block principle. This permits the precise conversion of only the finest taste nuances and a tailor-made flavour, depending on the product and consumer preferences. From oranges alone, the DöhlerGroup has developed such a three-digit portfolio of different flavours. Tailor-made products that are successful on the market, however, demand knowledge

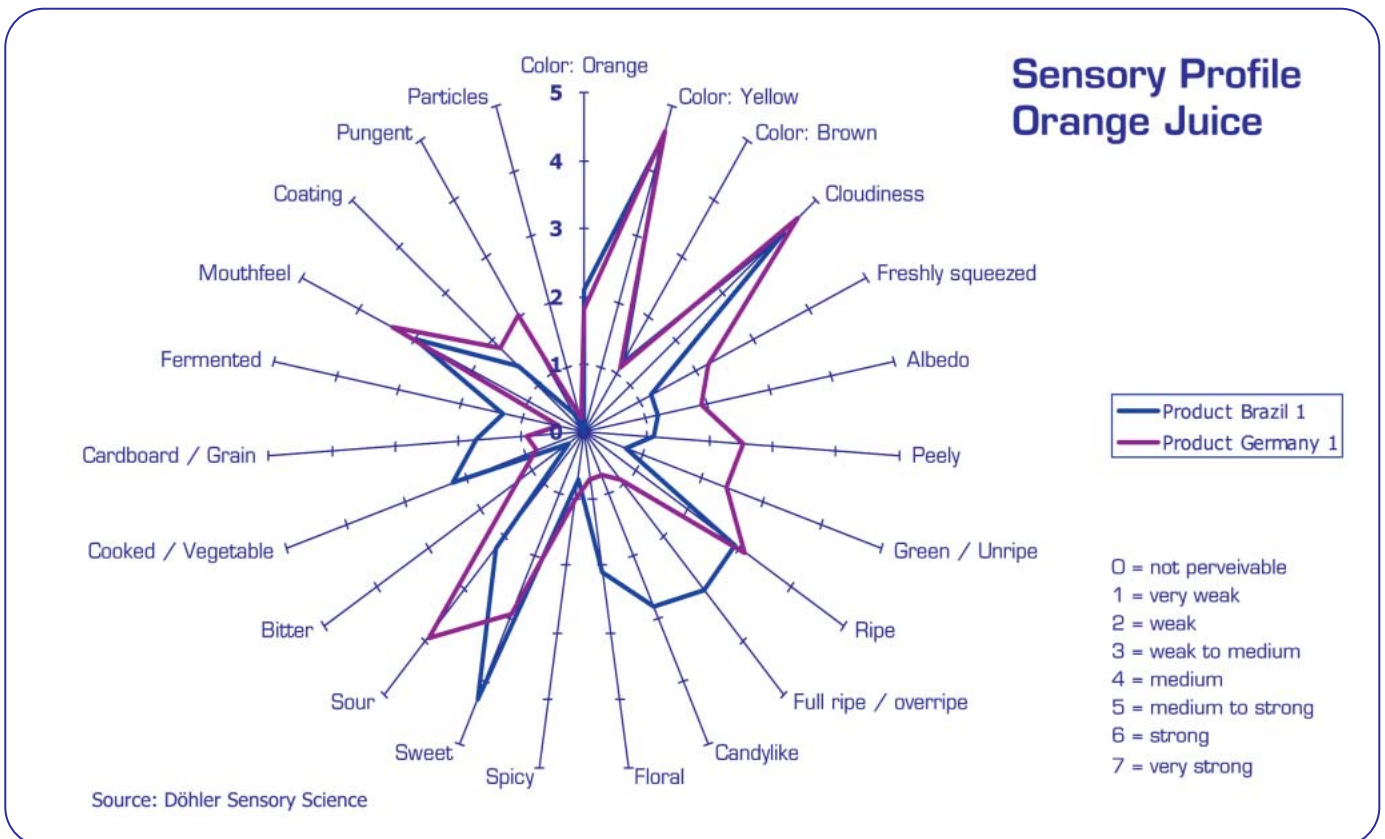
Raw material balance of the processing of oranges.

recovered. At this point the juice flavour occurs in the form of a water-soluble “water phase” and a water-insoluble “oil phase”.

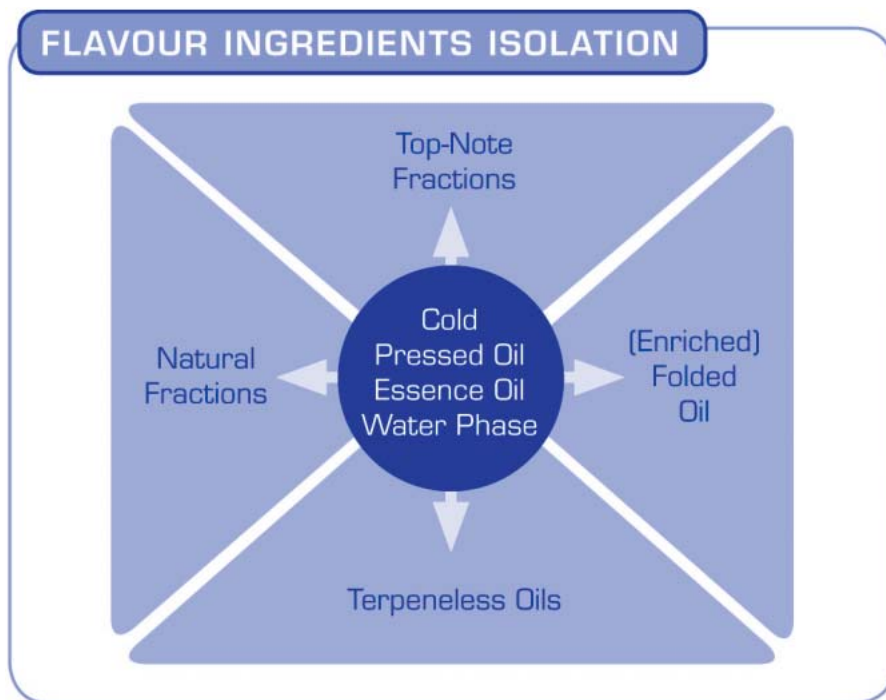
The following figures illustrate how valuable the respective quantities are: 10,000 kilograms of oranges produce some 5,600 kilograms of juice, from which around 1,000 kilograms of juice concentrate, 22 kilograms of peel oil, 10 kilograms

of water phase, and 1 to 3 kilograms of oil phase can be extracted.

Peel oil, oil phase and water phase can then be fractionated into their components by a variety of physical processes which create the citrus fractions that are of major importance for flavourists. They are used to develop natural flavours for attaining different taste nuances.



Comparison of the sensory profiles of a Brazilian and a German orange juice.



Classification of citrus flavour components.

of consumers' taste preferences, which can differ widely from country to country. The DöhlerGroup has a professional sensory science team capable of selecting out the finest taste nuances on the basis of internal and external consumer panels. In addition, the 17 application centres and production locations around the globe provide the DöhlerGroup with the knowledge of country-specific taste preferences, and this can be translated into a suitable flavour on the spot.

In a recent study conducted by Döhler Sensory & Consumer Science, 23 orange juices from 11 countries were sensorily profiled by a skilled panel of experts. To do so, the panel first developed the language needed to define 23 category-specific descriptors, which were then used to characterise and distinguish the samples. The results showed that the biggest differences between the products were recorded in the characteristics peely, fully ripe and bitter. With regard to country-specific effects, it was striking that the products from Brazil were perceived as being significantly sweeter and riper than the others, while the juices of the Spanish market tended to be characterised as peely, sour and green.

For the German market it was found that there the various preferences of consumers are

covered by markedly different products. Thus clearly ripe, sweet products share the market with more peely-sour ones.

The trend to natural products is becoming ever more evident globally. All the greater is the importance being assumed by the DöhlerGroup's role in developing flavours which form the perfect mirror image of nature. Elaborate analysis techniques permit the finest naturally occurring taste profiles to be recreated on the basis of natural fractions.

Product safety and stability

Ultimately, the taste stability of a flavour in the end product is one of the key factors for a long shelf life. This requires above all the knowledge of how flavours behave under the influence of light, temperature and pressure, as well as in the respective product and the particular packaging.

Thanks to numerous research methods under real-life conditions, the DöhlerGroup is able to develop a flavour that is guaranteed to remain stable and provide superlative enjoyment over a long period. (hed)

For further information:
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