

Importance and use of apple juice

In Germany an average of eleven to twelve litres of apple juice per person are drunk every year, making apple juice the “star” among the juices. Orange juice, at about ten litres, takes second place; all in all, the Germans drink about 40 litres of fruit juices and fruit nectars per year. If the fruit juice drinks are included, total consumption is higher still.

Fruit juice is 100 percent juice, without any further additives, with the single exception of the multi-vitamin juices, which are enriched with vitamin mixtures. Orange and apple juice again form the basis for the multi-vitamin juices. The taste is obtained by adding extracts of exotic fruits such as papaya, pineapple, maracuja or mango.

Fruit nectar is made of fruit juice or fruit pulp, water and sugar. Unlike juice, it needs only a minimum fruit content of 50%. Fruit juice drinks have a fruit content ranging between 6 and 30 percent, and also include water, fruit aromas, sugar and, in some cases, food acids. Food acids are organic acids and are used to give the desired sourness to food and drinks. Examples of food acids are malic or citric acid. Ready-made mixtures of apple juice and mineral water (Apfelschorle) count as fruit juice drinks although they have a fruit content of 50 to 60 percent.

Raw material apple

Fruit for processing to juice comes mostly from old standard fruit trees. Unlike standard (i.e. high-growing) fruit trees, which are found mainly in irregular meadowland cultivation, the low-growing, bush-like cultivars used nowadays mainly for table fruits make up only a small share of the fruit juice harvest. The low-growing trees make maintenance and harvesting easier and reduce the numbers of working accidents. The cultivation of standard fruit trees is thus hardly economical any more in Central Europe, with the result that low-growing cultivars are becoming more and more frequent. In addition, several hundred thousand tonnes of juice concentrates (see “Juice production”) are imported from almost all parts of the world.

Juice production

After the fruits have undergone a quality inspection, they are first washed for hygienic reasons. “Hard” fruits such as apples must be crushed to a pulp before pressing, the result of this being what is known as the pomace. Oranges, on the other hand, are only cut in half. Various processes are used for pulping. For home-made juice this can be done by hand, though it is rather time-consuming. About 1.3 to 1.5 kilograms of fresh are required for one litre of juice. For professional purposes, of course, machines are used. In one type of machine, the fruit is flung by a rotor against the milling chamber wall, which is fitted with toothed cutters. Other machines fling the fruit through knife-like sieve holes on the inner sides of the milling chamber.

The machine usually used for home-made juice is a fruit or must press. The juice which comes out of this is cloudy apple must, which if not treated will start to ferment in a very few days. To prevent this alcoholic fermentation, it is important to heat the must to at least 75 °C and fill it hot into pre-warmed

containers, which have to be tightly sealed without any delay. If preserved in this way, the must can be kept for one year.

Industrial processing involves a number of extra work stages. Pulping is often followed by the addition of enzymes, which break down the cell walls of the fruit and thus increase the amount of juice extracted. The enzymes known as pectinases have already been used for many years. Gene technology methods have been devised for the production of certain types of pectinase. The pomace is finally pressed out in large presses. The solid matter left over from the pomace can be used as animal feed (cattle cake).

If it is intended to clarify the apple juice, which is still cloudy, the juice is first centrifuged - during which process the larger particles settle to the bottom - and then filtered. This production step can also be supported by enzymes which break down the turbid particles before filtering starts, thus preventing the filters from blocking too quickly.

To enable the juice to keep longer, it is pasteurised. For this purpose it is heated to 75 C or more for about half a minute. If the juice is then filled straight into bottles, it becomes what is known as direct juice. Bottling, labelling and packaging are performed automatically.

Many apple juices are produced from concentrate, which is imported in large quantities (see "Raw material apple"). Water and aroma substances are extracted from the juice under vacuum. The concentrate, which takes up only about one sixth of the volume of the original juice, and the aroma substances are filled into separate containers and stored deep frozen; this makes them suitable for transport. The lower weight and smaller volume help to save a great deal of transportation energy. When the juice is bottled in Germany, the aroma substances are added again, together with water to replace the amount originally extracted.

Links

<http://www.ebay.com>: On this site you can buy fruit presses (sold by auction, prize displayed in US\$). The prizes are very different and approx. between 10 and 200 US\$.

www.fruchtsaft.de, the website of the German fruit juice industry (in English and German, aimed at a German public). Plenty of details are available on apple, orange and grape juice, including a vivid demonstration of juice production, the substance content, and infos on health value.

The website <http://www.idlconsulting.com/fruitjuicepr.html> shows the production processes for juice from various types of fruits and berries. In English and German.

The website <http://www.norfolk-county.com/bigapple/cider.htm> shows the production of fresh apple juice in large pictures.