Traditional orchard

For centuries, the countryside has been dominated by traditional orchards. Their existence has become commonplace for many people, though meanwhile they have been seriously endangered by means of abandoning and rededication of plots. Natural landscapes will be increasingly prone to irreversible changes.

These small but very valuable living environments need our protection. The diversity of fruit varieties, especially the conservation of old and rare varieties make traditional orchards highly valuable.

Apples, pears, cherries, nuts and many other fruits, available in summer and autumn, assure healthy nutrition and form the basis for many dishes.

Traditional orchards are multi-functional environments. Cut grass, weeds, and herbs deliver hay. Apiculturist (beekeepers) like to put their beehives on these meadows, as opposed to intensively cultivated fields, as they offer excellent keeping conditions. Last but not least, the trees deliver desired fruits.

Tourism

With an increasing trend of spending holidays at or near home, traditional orchards attain touristic value. They are more and more appreciated as recreational areas, including their culinary pleasures.

Biodiversity

Because of their multiplicity of habitats, traditional orchards offer a living environment for a lot of rare and threatened species, giving them a better chance of survival. In a typical traditional orchard you will find more than 5000 species of animals and plants. Its special value descends from this biodiversity and the co-existence of a variety of living environments in a relatively small area. Stonewalls and hedges, combined with rough pastures bordering forests and treetops offer natural habitats for birds, reptiles, and mammals.

Older trees, showing partial deadwood, offer shelter for tits, starlings, small owls, but also fat dormice, hazel dormice, bats and insects. Insects and fruits are nourishment to numerous other animals. Extensive use creates excellent pre-conditions for sustainable habitats of slow growers, such as alga, fungi, mosses and ferns.

Traditional orchards are simultaneously a habitat and living condition for flora and fauna, whether or not they are endangered.

Threats

In respect of their role as a food supplier, traditional orchards have suffered decreasing significance, from approximately the mid 20th century. Compared to intensive agriculture, traditional orchards appear less attractive. Following increased building activity, traditional orchards were often ousted by roads and homes.

Since 1965 roughly 50% of all traditional orchards have fallen prey to this development. Thus traditional orchards are among the most threatened cultivated areas in Europe, occupying a ranking position on the red list of endangered types of biotope in Europe.

Deficient care

Until some decades ago, land reclamation in order to get more farmland was the main threat for traditional orchards. Meanwhile, deficient care and the aging of the trees bare a much higher hazard, a fact true for nearly all traditional orchards, including those situated rather peripherally. Many dead trees were not replaced and those left were not taken care of sufficiently or not at all. This leads to most traditional orchards producing low crops and large portions of deadwood, and only few young trees, growing uncontrolled.

Resulting from deficient care, those orchards have become increasingly unattractive and thus they have increasingly fallen prey to the production of hay or biofuel. From a financial perspective, the cultivation of traditional orchards is largely unprofitable. Most of the owners do not have a personal relation to this aspect of land cultivation any more.

Fruit tree Diseases

Apart from lower harvest outcomes, the overall aging of fruit trees represents another significant problem: traditional orchards become more susceptible to disease.

In Central Europe, for example, a disease named Phytoplasmosis (pear decay) has been observed over the past few years. Decrepit trees have little or no prospects for the future, leading to a significant decline. Fire blight is another disease that has lead to the loss of many more trees, partly through the disease itself, partly resulting from preventive clearances.

Potentials

There are more than 3000 varieties of apples in Central Europe, only 60 of which offered in supermarkets (with some markets limited to only two or three).

The remaining 2940 varieties are still found in traditional orchards, so their genetic material is preserved and can be used for pollination. As most old varieties were cultivated before the introduction of pesticides and fertilisers, they tend to be stronger.

With regard to climate and use, those trees are exceptionally well adapted to their individual environment. The better their adaption to regional ecosystems, the healthier and more productive the traditional orchard will be, and no fertilisers or pesticides are needed.

Varieties suitable for traditional orchards - General requirements

Introduction

Presently, the people's appreciation of traditional fruit varieties is experiencing a revival. Older people experience a nostalgic sense of confidence, thinking of rugged fruit trees that didn't need any spray treatment. Others stress their better taste and extended shelf life in the cellar. Nevertheless, it must be said that also with old varieties there are pros and cons. When selecting a certain variety, local requirements and purpose have to be carefully taken into account. Its ecological eligibility within a specific region plays an important role. Because of their robust habit, in many cases old varieties are inappropriate for modern plantations. Nevertheless, with a selective approach, always with the target market in mind, their cultivation can be quite promising.

Old varieties are characterised by a great variety of nutrients. The balance between acids and sugary components widely determines their taste. High degrees of sugar or acidity can be invaluable processing determinants.

Apples, such as "Muskotály rennet" and "Baumann rennet", present high total sugar content.

Pectin as a single ingredient is important during fruit processing. At the same time it is generally known to be healthy. "Blenheim rennet" apples present exceptionally high pectin contents.

Biotic stress tolerance

Fig. 1: Fireblight

Among fruit varieties there are high variabilities in their tolerance to different diseases. Research may help in discovering tolerant varieties. Fire blight is a serious disease of pomaceous fruit species. According to Hungarian observations, some old apple varieties from the Carpathian basin - e.g. Szabadkai szercsika and Tordai piros kálvil – have shoot and flower tolerance to fire blight. Similarly, the fruit of the pear Pap körte has tolerance to fire blight. Apple scab is a common disease for apples. There are old varieties that are tolerant against this disease such as Batul, having resistance to more than one race of the scab fungus. Old varieties having tolerance to diseases can be good sources of resistance in breeding programmes.

Fig. 2: Venturia inaequalis

Abiotic stress tolerance

In every region there are traditional fruit varieties that resist ecological conditions and have outstanding ecological adaptability. In the Carpathian basin and Eastern Europe, the sour cherry Cigány is modest and resistant to cold winters.

It is easy to recognize such varieties as they are usually widely grown and propagated easily by vegetative methods.

Fig.3: Sunscald

Picture 4: Frozen cherry bud

Explanation of the terms: old, historical, and local varieties

There are different expressions concerning the traditional fruit varieties which are generally preferred in traditional orchards due to their suitability in extensive growing systems:

The expression “old variety” simply means that the variety was selected a very long time ago, which in most cases also means it was selected to be grown in extensive orchards, as in the past intensive orchards could not be found.

“Historical variety” refers to the fact that the given variety, even if it was grown in the past, has no high economical relevance nowadays; it may have also disappeared from the variety assortment, now being “only history”.

The expression “local variety” refers to those cultivars which are typical to a given region, which also means they are suitable to the proper ecological conditions, and that they have been grown in that region for a long time before the modern cosmopolitan varieties appeared, so they are old varieties as well. (Similar to landraces, but they fit the DUS requirements).

Requirements related to technology

Pest and disease resistance

- Most of the fruit species are threatened by several pests and diseases. The use of chemical pesticides can lower the damage of these organisms, but this solution is expensive, and may also have an unwanted impact on human health and the environment. The most modern attitude suggests the use of resistant varieties, which not only makes the production more economic, but also keeps the system more sustainable.
- As the pest and disease resistance highly correlates with the condition of the orchards, it is not only important to use the proper technological methods to keep the orchard in a good condition, but also to select the species and varieties most suitable for the proper region (maybe local varieties). The varieties which have adapted to the ecological conditions of the region where they are planted will be in a better condition (also see below) and will be more tolerant (or resistant) to pests and diseases.
- There is a lot of opportunity for mixing the different species and increasing biodiversity within the orchard. In Traditional orchards it is worth taking advantage of the beneficial species combinations. For example the combination of strawberry and peach can be beneficial, because the natural enemies of the oriental fruit moth can be accumulated on the strawberry.

- Eco-farmers often use the beneficial effects of the garlic or lavandula, as they often keeps the pests away from the cultivated fruit trees (Tóth in Radics, 2002).
- In mixed variety orchards the accumulation of pests and diseases is hindered because it is harder for them to adapt to the genetically more diverse resistance of the varieties. It is very important to use appropriate variety combinations because it also lowers the risk of the appearance of pests and diseases with new virulence factors. To avoid the emergence of new pathogen races or highly virulent pests is also the criteria of sustainable production and development (Barbara et al., 2008; Parisi et al., 2013).

Abiotic stress tolerance due to competing plant species, lack of water and nutrients

- In traditional orchards it is very important to use species and varieties with high abiotic stress tolerance. The biodiversity is often high in traditional orchards (see above) which also means increased competition for nutrients and water.
- Also the structure of these orchards and the limited use of fertilizers make it harder to replace the needed nutrients, as the modern watering systems are also rare in these orchards. So we have to avoid the use of species and varieties which have high water and nutrient needs.
- As we have limited opportunities to modify the quantity of available nutrients and water, it is preferred to choose (local) varieties specially adapted to the proper ecological (microclimatic etc.) conditions.
- Varieties with strong growing habit also tend to have better fitness and are thus preferred (Tóth and Szani, 2004; Tóth in Radics, 2002).

Bearing habit, fitotechnology

- The varieties with low fitotechnical needs are preferred. As the extensive T.O.-s are low input systems it is important to avoid the high costs of pruning. The varieties with natural spherical crown shape are preferred, as these varieties need less pruning in general.
- In some cases the bearing habit is also relevant. It may affect the pruning needs, and the yielding. In the case of apple and pear, the varieties which are yielding on the long fruiting shoots are preferred, because in extensive systems with these it is easier to achieve the ordinary yielding. In the case of peach and plum, it is better to choose varieties which are yielding on the short fruiting shoots, because these peach and plum varieties need less pruning (Tóth in Radics, 2002).

Postharvesting applications

- If the fruits were produced without chemical treatments, then the threat of post-harvest diseases is higher. If we are planning long term storage, we have to choose varieties with very good storability.

Requirements related to marketing and rural development

Marketing

- Nowadays with the environmentally friendly attitude, responsible and conscious consuming has become the centre of attention.
- Demand for chemical free, healthy fruits produced in organic production is increasing. As a consequence, special interest turns towards traditional fruit production systems that lack classic spraying with chemicals. Consumers require home-made, assuredly healthy fruits.

Consumer demands

- Traders of organic fruits coming from traditional orchards base their business on consumers who prefer great selection and service rather than price and convenience.
- As the production of traditional orchards is generally lower than of the classic orchards, their profit can only be assured by higher prices. However, many people are willing to pay more if they know that the product serves their health. Usually these consumers are loyal and buy eco products regularly (Bonti and Yridoe, 2006).
- In traditional fruit orchards it is worth choosing varieties which are produced in smaller amounts or not at all in modern orchards. This way the assortment is higher on markets concerning the appearance, taste, and nutritional value of fruits compared to supermarkets.
- For those who consume eco fruits, there are three main reasons for preferring fruits of traditional orchards: their personal health, high quality of the product, and environment protection (Pearson and Henry, 2010).
- Generally, for an average consumer, quality means appearance, thus perfect true to type fruits lacking any surface discrepancies are required. However, regarding ecofruits, consumers are much more tolerant to minor flaws as the primary value is not the attractiveness (Bonti and Yridoe, 2006).
- Thus, ecofruit fans would vote on the biological value of the fruits that is responsible and essential for health. An organic fruit lacks any chemical residues but is rich in valuable antioxidants and fibres, and their regular consumption keeps them healthy (Tóth in Radics, 2002).

Rural development

The role of traditional orchards in preserving biodiversity:

- As a consequence of modern fruit growing systems the number of grown varieties is decreasing. The old fruit orchards around the houses, trees on pastures, and fruit rows along the roadsides are eliminated.
- By planting traditional varieties the biodiversity of the fruit species as well as the related flora can be preserved. Growing these varieties in a traditional way means a lower load on the environment. (Tóth, 2005; Rodics, 2008)

The role of traditional orchards in preserving cultural heritage

- The varieties of a region may refer to its traditional growing systems
- Old varieties can be regarded as natural treasures and they are as much a part of our cultural heritage as any human creation
- Old varieties may play an important role in the special myths of the inhabitants and folklore, linked to traditional dishes, beliefs, symbols of the folk and other customs and traditions (Szani, 2011)

The role of traditional orchards in landscape formation

- Beside the culinary value of fruits, a traditional orchard can be a place for leisure. Working in the open air, activities in and with nature is relaxing. Fruit varieties have their special ornamental value (flowers, fruits, autumn colour of leaves, etc.)
- Fruit trees around the villages determine the landscape view: lonely trees in the landscape, trees at churchyards, fruit trees at crossroads, tree alleys along roads, trees around agricultural lands. Like trees at churchyards and cemeteries, old orchards define the unique landscape of the village and can be places for tourism (Tóth in Radics, 2002; Tóth, 2005; Holler, 2007; Timon, 2002; Kabai, 2001; Eplényi, 2012,)

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Information sheet Diversity of species in traditional orchard

Apple

Origin and distribution of the species

The apple is member of the subfamily Maloidae of the Rosaceae family. The domesticated apple (Malus x domestica Borkh.) originates from central Asia and is believed to be a hybrid of several wild apple species. Malus siiversii, a wild apple species from Kazakhstan is the closest ancestor, however the concrete origin and ancestry of apple is not yet known.

The domestication process of apple took place in central Asia, but the apple was brought to Europe by the Romans in ancient times, and nowadays, due to its great adaptability to ecological conditions, it can be found in every country of the temperate zone (Harris et al., 2002).

Estimated number of known varieties

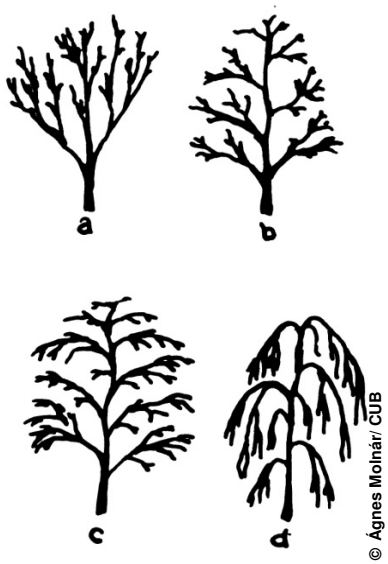
With the improvement of technology and the discovery of grafting and thus vegetative propagation, more and more varieties were born. Nowadays the new varieties are released through breeding programs assisted with the most modern technology (e.g. molecular markers), and the number of existing varieties is exceeding the number of 10000.

Trees: growing habit, size, stem features, age

In practice the root system is given by the rootstock which has significant effect on the scion variety. The rootstock influences the growing habit and the fruiting time, however the branching and fruiting type of the scion variety has to be considered in the case of pruning and designing the shape of the canopy.

There are four types of **branching type** based on the UPOV system:

a. Upright
b. Spreading
c. Dropping
d. Weeping



However three types of natural branching type can also be distinguished based on which part of the tree has the strongest branching:

a. Basitone
b. Mesotone
c. Acrotone

The fruiting type of the varieties are categorised as follows:

a. Spur
b.'King of the Pippins'-type
c. Standard ('Golden Delicious'-type)
d. Tip bearer (e.g. 'Granny Smith')

The location of fruiting buds determines the proper way of pruning, thus the characteristics listed above are in a close relationship with orchard management and care.

Leaves:
size, petiole, shape, margin

The petiole, shape, and margin of a cultivar can be used for the characterisation but it is more typical to identify cultivars based on fruits.

Flowers:
colour, size, calyx, corolla, stamina, gynoeceum; (numbers, colour, size); Flowering time/period

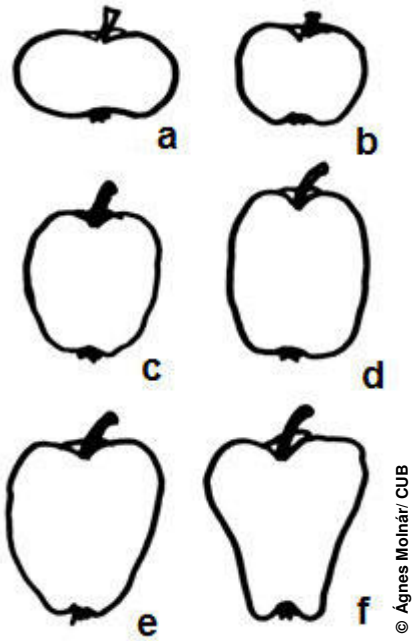
The colour, size, or the number of flowers are interesting traits, especially for ornamental cultivars, but the flowering time/period has more potential. The flowering period, intensity, and regularity are needed to be known for the choosing of pollinators which determines the amount of fruit set and thus the yield. The flowers colour at pre-balloon stage of a cultivar is also needed to be known for making the right estimation in regard to full bloom period.

Fruit:
fruit type; other features according to features in description of varieties, ripening time Apple fruits constitute so-called false fruits: they are formed from the ovary and other parts of a flower, mainly from a floral receptacle.

Size of apple fruits differs from 80-230 g in general, however some varieties have extremely large (e.g. 'Sekaiki': above 400 g) or very small fruits (e. g. 'Gyógyi csíkos': under 50 g) but these have no economic potential and are only grown in hobby gardens for curiosity.

There are 3 base type of fruit shapes; oblate, round, and oblong, however there are many other existing shapes (e.g. conical, ellipsoid etc.) which are considered extreme:

a. Oblate
b. Round
c. Moderately oblong
d. Oblong
e. Conical
f. Narrow-conical

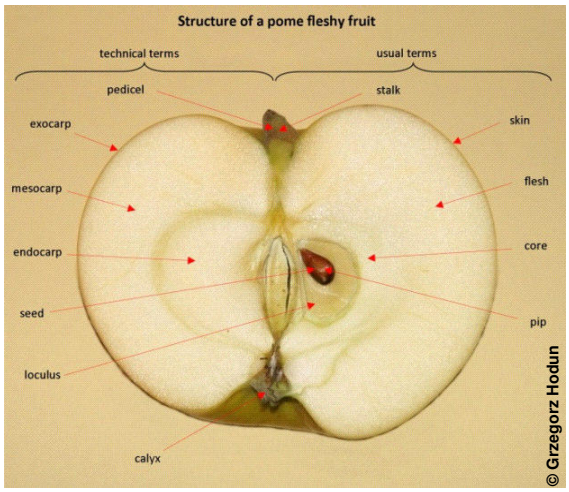


The round shape (or close to round, moderately oblong, oblate) is the most widespread, as it is the most suitable for postharvest manipulation.

Related to the shape, strong crowning at the apex, the aperture of the eye (which can be closed, or partly or fully open), or the deep stem pit can be useful characteristics as well for distinguish apple cultivars.

The stalk length has great economic potential. It is considered short/long, if it is shorter/longer than the stem pit. The short stalk results in fruit drop, while the long and thin stalk can make the harvest difficult.

The position and shape of the core can help to identify cultivars. An opened core can result in fungal diseases so it should be avoided.



The color of the apple skin is differentiated as ground colour and over colour, while the pattern and amount of the over color is also an important attribute.

The ground colour has a range from yellow to green or even red, while the over color has also a very wild range from orange to red until even purple or brown. Apple skin can be russeted, a trait which should not be mixed with the over colour, however the russet coverage is also an important trait. The skin can be also naturally waxy, which can modify the colour until it is wiped off. Not only the skin but also the flesh colour (before browning) has to be considered and it is important to take into account with the maturity of the fruits, as the colours change during ripening.

The ripening time of apples has ranges from August to October. Based on ripening time cultivars are classified into 3 categories:

1. Summer apples
2. Autumn apples
3. Winter apples

It has to be noted that those which ripen later can be stored better in general, but winter apples typically need storage before eating.

Pear

General

The pear belongs to the rose family (Rosaceae) and comprises of 15-30(-76) species. Pear varieties cultivated in European traditional orchards mainly belong to the species “European pear” (Pyrus communis), “wild European pear” (P. pyraster), “snow pear” (P. nivalis) and crossbreedings between them. In practical orcharding, cultivars (varieties) are mostly described without regard to the species they belong to. Therefore, the following description refers to all of them.

Origin and distribution of species

Pears in general are native to regions with a coastal or mild temperate climate from Western Europe and North Africa eastwards across Asia. The European or common pear is native to Central and Eastern Europe and southeast Asia, the snow pear to a region from South-east Europe to Western Asia. Varieties derived from the European pear are grown worldwide.

Estimated number of known varieties

The current number of pear cultivars is about 5.000 worldwide, including all (East Asian) Pyrus species. The number of cultivars of the European pear is estimated to be more than 1.500. The golden age of breeding pears started in around 1750, when many new varieties arose. One of the historic centres of breeding pear varieties was France with about 1.000 known varieties in the 19th century.

Trees: growing habit, size, stem features, age

Pear trees are medium sized, up to 20 m tall and form strong trunks with broad to narrow crowns. The bark of older trees is broken into stripes with traverse cracks dividing them into cube-like smaller units. The trees can reach an age of more than 200 years.

Leaves: size, petiole, shape, margin

Leaves of pear trees are alternately arranged, shaped broadly oval to broadly lanceolate, 4-9 cm long, 3-5 cm broad, with a glossy dark green upper side and a duller green lower side. The leaves of cultivars from the snow pear are covered by dense silvery hairs especially while young, resembling sage leaves, becoming less dense on the upper side later. The leaf margin is entire to minutely crenate-serrate, sometimes hairy. Petiole 1-5 cm long.

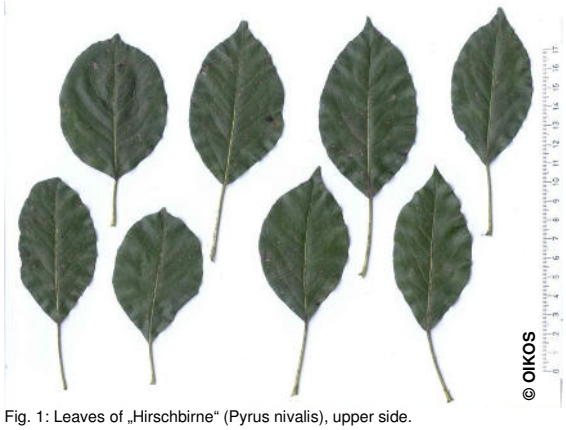


Fig. 1: Leaves of „Hirschbirne“ (Pyrus nivalis), upper side.

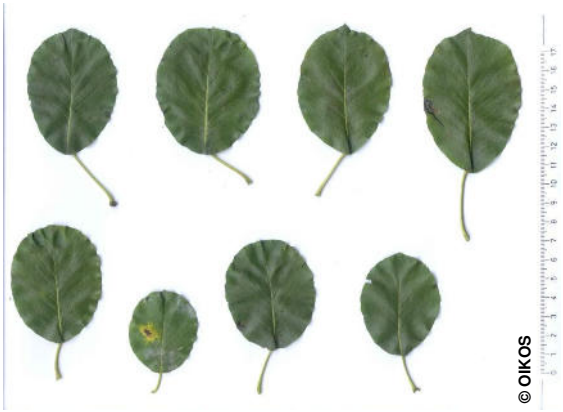


Fig. 2: Leaves of „Hirschbirne“ (Pyrus nivalis), lower side.

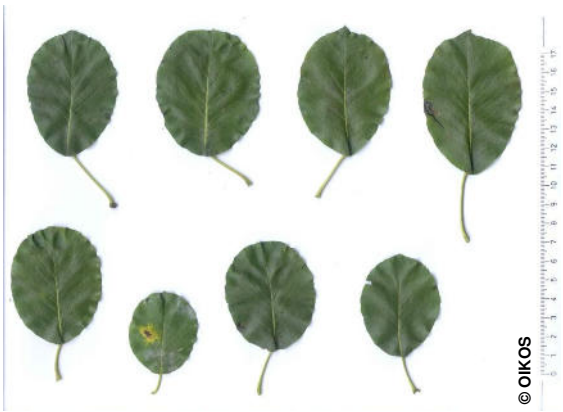


Fig. 3: Leaves of „Speckbirne“ (Pyrus communis), upper side.

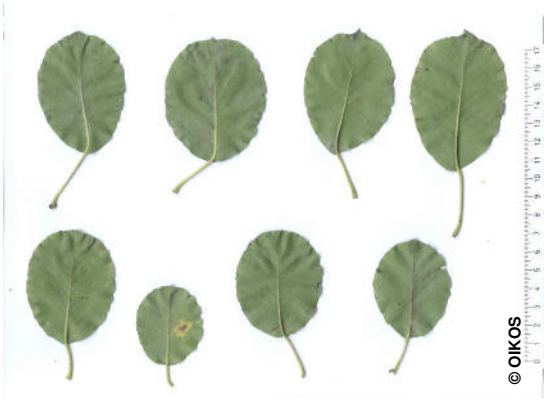


Fig. 4: Leaves of „Speckbirne“ (Pyrus communis), lower side.

Flowers: colour, size, calyx, corolla, stamina, gynoecium; (numbers, colour, size); Flowering time/period

The flowers of pear cultivars are 2–4 cm in diameter, have five sepals, five white, sometimes pink tinted petals, up to 20 stamens (> 20 in case of the snow pear) with purplish red anthers and 5 carpels.

Flowers arising in umbels or umbel-like clusters of 5-8 blossoms.

Fig. 5: Flowers of „Hirschbirne“, a cultivar oft he snow pear (Pyrus nivalis).

Fig. 6: Leaves of a pear seedling (Pyrus communis).

Fruit: fruit type; other features according to features in description of varieties, ripening time

The pear fruit is a pome, which in some cultivars is up to 18 cm long and 8 cm broad. The size of wild forms and some primitive cultivars ranges between 1 and 4 cm. The fruit stem (pedicel) is 1-5 cm long. The shape varies from globose to bergamot-shaped and the classic pyriform shape of the European pear with an elongated basal part and a bulbous end. The flesh of pear fruits contains stone cells which are absent in apples.

Seeds are flattened, oval to irregular drop-shaped, red to dark brown or black when ripe, 7-12 mm long, 3-7 mm broad, with a small protuberance on the broad side in some varieties. The place of attachment of a seed is visible as a small scar, the hilum.

The fruit is mainly composed of the upper part of the flower stalk, which is dilated. The true fruit is enclosed within its flesh and consists of five carpels forming the "core". At the upper end of the fruit, the calyx (remnants of the sepals) are preserved. In European temperate climate the ripening time of the fruits is between July and November, depending on the variety.

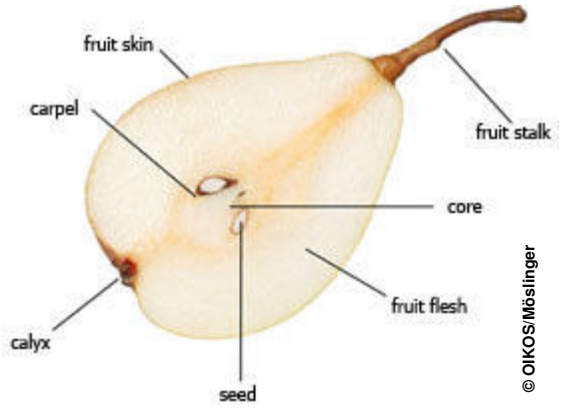


Fig. 7: Longitudinal section through a pear („Gute Luise").

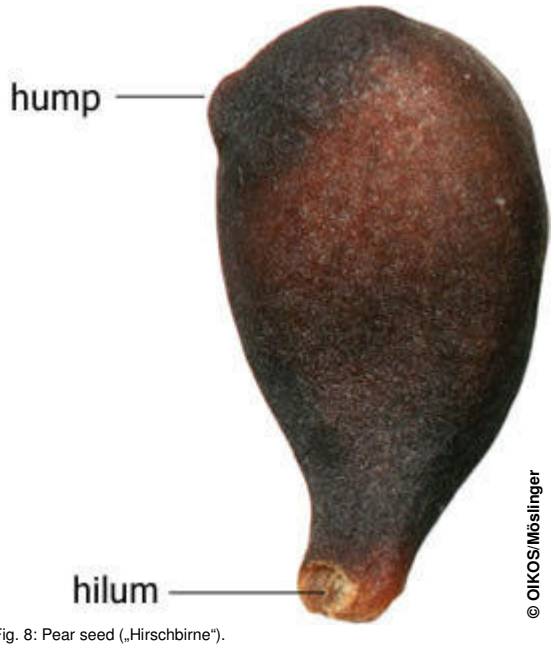


Fig. 8: Pear seed („Hirschbirne").

Plum

General

The plum tree belongs to the rose family (Rosaceae). All plum cultivars from European traditional orchards belong to the species European plum (Prunus domestica), including several subspecies and botanical varieties, differing in some points especially in shape, size and some internal features of the fruits. Common subspecies are:

- Plum in a narrower sense (Prunus domestica ssp. domestica)
- Damson (P. domestica ssp. insititia)
- Greengage (P. domestica ssp. italica var. claudiana)
- Mirabelle plum (P. domestica ssp. syriaca)

Origin and distribution of species

The European plum in a broad sense is native to Southern Europe, Turkey and the Caucasus, cultivated in Europe, western Asia and North Africa. The Plum was brought to Central Europe probably several times. It was cultivated in Greece at least beginning 500 BC and in the Roman Empire beginning 200 BC. Findings prove the occurrence in the west of Germany as early as 4000 BC. Cultivating plums in larger scale in Central Europe was promoted by the Romans much later.

Estimated number of known varieties

The number of plum cultivars worldwide is estimated to be about 2.000 at the beginning of the 20th century, including plums in a narrower sense, greengages and mirabelle plums.

Trees: growing habit, size, stem features, age

Plum

The trees are small to medium sized, up to 12 m tall, forming thin to medium sized trunks (diameter usually not exceeding 40 cm) with broad to narrow crowns; young twigs are hairless to slightly hairy, the branches have spines; the trees are rather short-lived, reaching ages of up to 80 years.

Damson

Trees are small sized, up to 7 m tall and form thin to medium sized trunks with broad to narrow crowns; young twigs are hairy during the first two years, the branches have spines; the trees are rather short-lived.

Greengage

Trees are small to medium sized, up to 8 m tall, forming thin to medium sized trunks (diameter usually not exceeding 40 cm) with slim crowns, branches growing erectly, without spines, young twigs are hairy during the first two years; trees are rather short-lived.

Mirabelle plum

Trees are small to medium sized, up to 7 m tall, with broad crowns, branches without spines, twigs are hairy during the first year; trees are rather short-lived.

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Leaves: size, petiole, shape, margin

Leaves of plum trees are alternately arranged, shaped elliptically to obovate, dull green.

Plum
Leaves 4-10 cm long, 2-5 cm broad, hairy when young, leaf margin crenate-serrate, petiole with two glands at the upper end.

Damson
Leaves 5-8 cm long, 3,5-4,5 cm broad, dull green, hairy at least when young, leaf margin bluntly toothed, petiole without glands.

Greengage
Leaves 5-8 cm long, 3-5 cm broad, dull green, leaf margin crenate-serrate, petiole with glands.

Mirabelle plum
Leaves 4-7 cm long, 2-5 cm broad, dull green, leaf margin crenate-serrate, petiole with glands.

Flowers: colour, size, calyx, corolla, stamina, gynoeceum; (numbers, colour, size); Flowering time/period

In general, the flowers of plum cultivars are 1,5-2,5 cm in diameter, have five sepals, five white (damson, greengage) to greenish-white (plum, mirabelle plum) petals, about 20 stamens and one single carpel. Flowers blossom from April to May in clusters of 2-3.

Fig. 9: Flowers of a plum in narrower sense (unknown cultivar).

Fig. 10: Flowers of a plum in narrower sense („Stanley“).

Fig. 11: Flowers of Mirabelle plum („Mirabelle de Nancy“).

Fruit: fruit type; other features according to features in description of varieties, ripening time

The plum fruit in general is a drupe which contains a single stone. The skin is smooth, usually more or less covered by a dusty white to dark blue layer consisting of wax which is easy to wipe off. In European temperate climate the ripening time of the fruits is between July and October, depending on the cultivar.

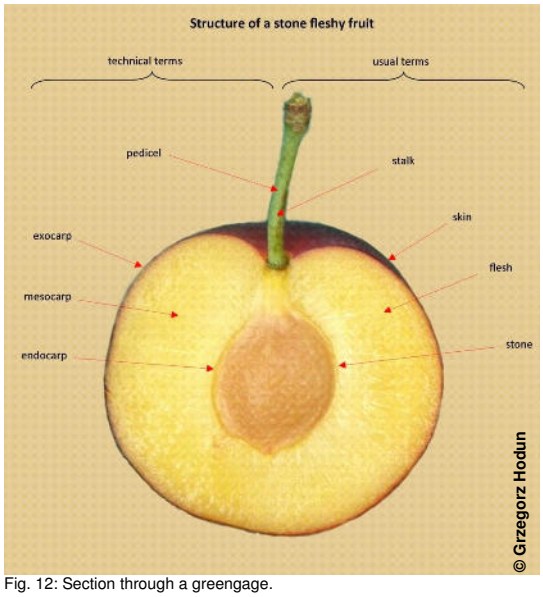

Fig. 12: Section through a greengage.

Plum

Fruit shape varies from globose to irregular elliptical-ovate, 3-7,5 cm long and 2-4 cm broad, with a groove along one side. Fruit stem (pedicel) 1,5-2 cm long. Skin smooth, bluish red to blackish blue. Stone brown, flat, oval to lanceolate, broad side asymmetric, upper end pointed, surface smooth to mostly rough; 20-75 mm long, 12-50 mm broad; easy to separate from the yellow-green, smooth textured flesh.

In European temperate climate the ripening time of the fruits is between July and September, depending on the cultivar.

Fig. 13: Plum fruits („Stanley").

Fig. 14: Plum fruits („Besztercei Szilva").

Fig. 15: Plum fruits („Vörös Szilva").

Damson

Fruit shape is globose, 1.7-2.8 cm in diameter, with an indistinct groove along one side; fruit stem (pedicel) at least as long as the fruit, sometimes slightly hairy; fruit skin smooth, yellow, red, violet, blue or black; flesh usually juicy with blood red juice. English cultivars differ from

continental ones in their typical flavour and shape (pear-shaped).

Stone oval to lanceolate, ends rounded to pointed, brown, surface smooth to mostly rough; 13-19 mm long, 8-12 mm broad; not easy to separate from the flesh.

Greengage

Fruit round-oval, diameter 2-5 cm, with a groove along one side. Fruit stem mostly not exceeding one third of the length of the fruit, hairy. Skin reddish purple to greenish yellow, with an intense scent.

Stone broadly oval to globose, 14-17 mm long, 11-14 mm broad, ends rounded, surface smooth to rough; not easy to separate from the yellow-green to golden yellow flesh.

Fig. 16: Greengage fruits („Graf Althanns Reneklode“, syn. „Count Althanns Gage”).

Fig. 17: Greengage fruits („Sermina“).

Fig. 18: Greengage fruits („Reineclaude d'Oullins“).

Mirabelle plum

Fruit globose to slightly oval, diameter 2-3 cm, with a slight groove along one side. Fruit stem inserted into petiole groove. Skin light brownish yellow, sometimes red spotted or green.

Stone broadly oval, 12-14 mm long, 9-11 mm broad, surface wrinkled, light yellowish brown; easy to separate from the yellow-green to golden yellow flesh.

Fig. 19: Mirabelle plum fruits („Mirabelle de Nancy“).

Sweet cherry (Prunus avium)

Origin and distribution

Sweet cherry originates from Asia Minor, the region of Caucasus and Iran. Europe can be regarded as a secondary gene center of the species. The first diploid cherry species evolved in Central Asia and the descendants of them are sweet cherry, sour cherry and steppe cherry (mongolian cherry, dwarf cherry).

Sweet cherries are relatively diverse and broadly distributed around the world, being found in Asia, Europe, and North America. The sweet cherry is grown almost everywhere in the temperate zone. In Europe it is cultivated from the mild regions of Norvegia to the mediterranean regions of Italy.

Tree: Tree habit, vegetative and generative features

There are considerable differences among varieties in their vigour and tree habit. The trees of most varieties have strong vigour (e.g. Schneiders Späte Knorpelkirsche), some types have weak vigour (e.g. Carmen) or compact habit (e.g. Compact Stella).

Young trees show strong apical dominance. The habit of the tree can be upright (e.g. Van), spreading, or drooping (e.g. Jaboulay).

Sweet cherry mostly bears fruits on short shoots that are called „spurs". They usually stand in clusters at the base of long shoots. The flower buds are located all around the spurs. At the top of the shoots we can find a leaf bud.

The sweet cherry flowers are 12-18 mm in diameter, with five pure white petals, and yellow stamens. They are bisexual, and pollinated by bees and other insects. Some cultivars are self-fertile, but most of them requires pollinators. Flowers join in clusters of 3-10 flowers each.

The leaves are obovate, 18 cm long and 8-9 cm broad, finely downy beneath. The margin is serrate; the petiole is green or reddish and 4-6 cm long bearing two to five small red nectaries.

Fruit, ripening time

The fruits of sweet cherry are rounded, flat round, kidney shaped, or heart shaped. The size of the fruit is appr. 26-30 cm in diameter and can be described as small (3-5g), medium (5-7g), large (7-9 g), and very large (9-12 g). Fruit skin colour varies from yellow to dark red, black. There are bicolor or blushed cherries that have yellow ground colour with red over colour (e.g. Bigarreau Napoleon).

On the quality of the fruit flesh there are crispy and soft sweet cherries. The fruit flesh and juice colour may vary from light red to mahogany, among which some of them have tinctorial juice.

An important feature of the cherries is the length of the stem. It can be short (e.g. Van) or long (e.g. Jaboulay). A short pedicle makes the hand harvest difficult.

The ripening time of the sweet cherry can comprise of a 2-3 month long period from the earliest to the latest cultivars. In Western Europe the ripening time starts at around end May and lasts until mid July.

Sweet cherry is not a postripening fruit; it is harvested at full ripeness. Fresh consumption and export requires handpicked cherries. Fruits from machine harvest can be used for processing.

Fig. 20 Fruits of a typical red coboured cherry variety „Schneiders Späte Knorpelkirsche“

Fig. 21 Fruits of a blushed sweet cherry variety „Vega“

Fig. 22 Fruits of a black coloured sweet cherry variety „Szomolyai fekete“ with tinktorial juice

Sour cherry (Prunus cerasus)

Origin and distribution

Sour cherry originates from southeastern Europe and the Western Asia region surrounded by the Caucasus mountain and Adriatic Sea (De Candolle 1886). However, the Carpathian Basin and a part of Western Europe are regarded as secondary gene centres of this species. The sour cherry can be found in eurasian continental climates. A great variability of sour cherry can be observed in Eastern Europe.

Sour cherry (*Prunus cerasus* L.) is a tetraploid species and is regarded as a natural hybrid between ground cherry (*P. fruticosa*) and sweet cherry (*P. avium*) . Several botanical subcategories (convarietas, provarietas) exist among sour cherries that refer to different types (e.g. morello, marasca, etc.). Additionally, as natural crossing often occurs among cherry species, intermediate types are common such as the so-called Duke cherries.

Cultivars of sour cherries are grown in Western Europe and Michigan state, USA mainly for industrial purposes. However, fruits are eaten fresh in Eastern European countries.

Tree: Tree habit, vegetative and generative features

Trees of sour cherries are often drooping or spreading. Only some of them have upright tree habit. The buds can either be vegetative and flower buds. Flower buds are mostly located on long, one year old shoots. From flower buds 2-5 flowers swell in clusters („cyme"). Each flower has five white petals. The margin of the leaves are serrated.

Fruit, ripening time

Sour cherry fruits are basically rounded with some alterations (e.g. flat round, elongate). The fruits can be small (3-4 g, e.g. 'Stevnsbaer', 'Köröser') up to large (6-8 g, e.g. 'Heimanns Rubin').

Two types of sour cherry fruits are known: the amarellas have vermilion skin colour, light fruit flesh and colourless juice (e.g. 'Montmorency'), whereas morellos have red or mahogany skin colour, dark red fruit flesh and coloured juice (e.g. 'Köröser').

The stem length is important when considering harvesting methods. It can be short (e.g. ‘Heimanns Rubin’) up to long (e.g. ‘Köröser’).

In Western Europe the ripening time of most sour cherry varieties is in July. Most varieties are self-compatible, but some of them require pollinators.

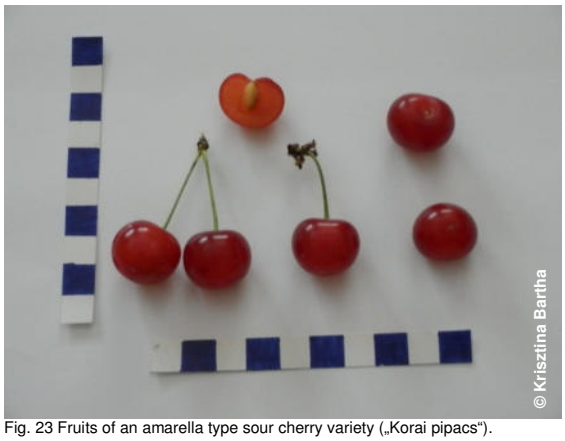

Fig. 23 Fruits of an amarella type sour cherry variety („Korai pipacs“).

Fig. 24 Fruits of a morello type sour cherry variety („Csengődi“).

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Characteristics of apple varieties

Introduction

Botanically, apple varieties are considered culture apples (*Malus domestica* Borkh.). Thus, vegetative Organs (roots, shoot, leafs), as well as fruits, are basically of the same structure. Though, in general terms, various characteristics may differ in their individual development. Those characteristics employed to distinguish between different varieties are known as “descriptors”. Their extent is considered characteristic for the individual variety.

Descriptors

Descriptors (distinguishing properties) were generally developed for shoots, blossom, leaf and fruit. As simply observable differences are primarily found on fruits, a procedure enhancing practicability (it is the fruit that is used and retailed), the distinction between different varieties is in the majority of cases completed, solely referring to the fruit.

Retailers and also those receiving samples via mail usually don’t have the tree itself for reference. In pomological descriptions, in many cases, growth of the tree, denseness of the branch system and their angular characteristics are also referred to, though in a rather simplified manner. Added is information regarding time of ripeness and shelf-life. Very detailed descriptions also embrace leaf- and blossom properties.

The evaluation of descriptors has to be completed with reference to a general fruit pattern of 10 to 20 well developed and ripe fruits in order to be representative.

It is important to note, that it cannot be distinguished between different apple varieties, solely looking at only one descriptor. Depending on experience, smaller or larger group of descriptors is necessary.

Main characteristics, descriptors for apples refer to, are illustrated in chart 1.

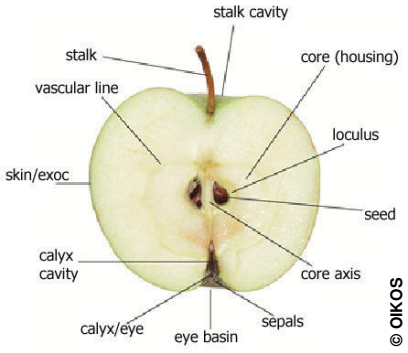

Fig. 1: structure of an apple (longitudinal basis) symbolically for the “Sauergrauech” variety.

In the following, the most important descriptors for characterising fruit are explained. Apart from those, there are numerous others, sometimes referred to in the text and occasionally used in pomological examinations.

Outer Appearance

Size of fruit

The size of apple varieties in most cases is somewhere between 5 cm and 12 cm. Within defined limits a certain variability is considered typical for the variety, always dependent on outer influences, such as local factors (soil, climate, weather conditions) and the tree’s general state of health.

Normally, size is referred to in different size classes, based on graphic schemes. (See Bernkopf, 1999):

- very small (width ≤ 4,2 cm)
- small (width 4,2-5,7 cm)
- medium sized (width 5,7-7,2 cm)
- large (width 7,2-9 cm)
- very large (width 9-10,5 cm

Other scales (Szalatnay 2006) are more precise, open to the bottom and the top. Also centimetre measures are common (dispersion rate between maximum height and maximum width).

Shape of fruit

The shape of the fruit is described, viewing it from the side. Fixed schemes of verbal descriptions are used. One scheme (Bernkopf 2011) comprises the following shapes:

- spherical-bulky (e.g. „Parkers Pepping“, chart 3)
- spherical-flat (e.g. “Champagnerrenette”, chart 13)
- flat-round
- short, stubby conical
- long, stubby conical
- upside down bell-shaped
- barrely
- cylindrical
- conical
- egg-shaped

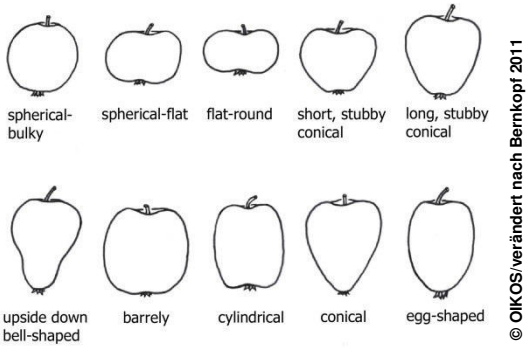

Abb. 2: Fruit forms of old apple varieties. Bernkopf (2011), changed..

Added the information, whether a fruit is symmetrically built. (Two equal halfs). The exact length-width-ratio is scientifically determined by means of examination of large fruit patterns.

Fig. 3: „Parkers Pepping“: fruit spherical bulky to spherical flat. Yellowish-green basic colour, covered up to approx. ¼ with red (not seen on pictured sample) Between /4 and whole covered with “russetting”, stained.

Fruit Silhouette: Edges, Blossom, Seams

Apples can present longitudinal ribs of different strengths, notable top-down or by means of a cross-section. Ribs can terminate in bumps, surrounding the blossom. Those bumps may also be found independent of ribs. Sometimes slightly raised longitudal seams are observed.

Fig. 4: „Roter Herbstkalvill“: Silhouette showing clearly notable ribs with bumps around the blossom.

Fig. 5: „Danziger Kantapfe“l: Note the fruit's slightly raised longitudinal seams..

Eye basin: depth and width

Depth and width of the eye basin are described verbally (Szalatnay 2006):

Depth: lacking – flat – medium – deep

Width: small – medium – wide

In case of lacking eye basin, the basin may be described as “resting on top”..

Pistil cavities: Depth and width

See eye basin!

Skin: texture

The fruit's skin is differently textured, in accordance to the apple variety. This can be determined optically and/or haptically. The skin's textures, which could be distinguished in even smaller implements, are:

- coarse
- smooth
- lardy
- frosted/scented (with a wipeable, bone-coloured waxy surface, as found in the “Ilzer Rosenapfel”, Chart 6)

Fig. 6:“ Ilzer Rosenapfel“: Fruit is spherical flat or flat round, basic colour is greenish yellow, ½ - ¾ of surface of flamed or stany red, sometimes with shades of rosy pink, skin with more or less bone-coloured removable waxy surface. Pistil cavity stained with russetting.

Basic colour

The basic colour is the fruit skin's primary colour. It may be green, yellow or even light orange with everything in between, e.g.

- whitish-green (e.g. Weißer Klarapfel, chart 7)
- green
- green-yellow (e.g. Grüner Stettiner, chart 10)
- whitish-yellow
- yellow (e.g. Ananasrenette, chart 15)
- yellow-orange (e.g. Wintergoldparmäne, chart 11)
- orange

The basic colour may be covered by one colour (see there).

Fig. 7: „Weißer Klarapfel": fruit spherical flat, basic colour whitish green, no covering tone, pistil cavity with radial ribs of russetting.

Covering Tones: Colour, Percentage, Intensity, Characteristics

Covering tones cover the basic colour in parts or fully and may also be lacking completely in accordance to the variety. Covering tones are orange or red and also purple red and brownish-red, in some cases even extremely dark, almost black, red tones. Everything in between is possible. Apart from the tone itself, its percentage of the overall cover is distinctive for each variety.

It is described in thirds or quarters. The covering tone doesn't always appear clear and equally distributed. It may be slight, medium or even very well covering and is described in these manifestations:

- Extensive cover (e.g. "Roter von Simonffi", Chart 8)
- striped
- marbled tarnish (e.g. „Schöner von Boskoop", chart 9)
- blurred (e.g. „Grüner Stettiner", chart 10)
- amed (e.g. „Wintergoldparmäne", chart 11)

Sometimes transient changes, somewhere between the described manifestations can be observed (e.g. Ilzer Rosenapfel, chart 6) and also sharply delineated transitions are possible.

Fig. 8: „Roter von Simonffi": Fruit flat to spherical flat, basic colour yellow, fully covered in dark red, skin sticky and greasy

Fig. 9: „Schöner von Boskoop“: Fruit spherical, basic colour yellow, covering tone 3/4 marbled red, extensive or spotty russetting cover.

Fig. 10: „Grüner Stettiner“: fruit flat spherical, basic colour yellowish green, covering tone, faded brownish red.

Fig. 11: „Wintergoldparmäne“: fruit spherical to flat spherical, basic colour yellow, covering tone ¾ to 1/1 flamed or striped red, coarse skin, pistil cavity with radial ribs or full cover of russetting.

Russetting: Distribution Colour, Intensity und Characteristics

The fruit’s skin can be covered by a distinct surface of light brown to dark brown russetting (thin surface of cork fibres, chart 12). On covered areas, it is no longer possible to determine the original basic colour nor covering tones. The percentage of russetting is referred to in thirds or quarters of the entire surface. Russetting may be limited to distinct fractions of the skin (e.g. pistil cavity or eye basin) but also be evenly spread across. Possible employments are:

- Fully covered (e.g. „Graue Herbstrenette“, chart 12)
- stained (e.g. “Parkers Pepping”, chart 3)
- reticular
- actinomorphic (e.g. „Weißer Klarapfel“, chart 7, „Champagnerrenette“, chart13)
- zoned

The latter more often observed in the pistil cavity than in the eye basin

Fig. 12: „Graue Herbstrenette“: fruit spherical flat, basic colour yellowish green, cover tone 0 – 1/3 red, russetting cover entirely or stained ¾-1/1.

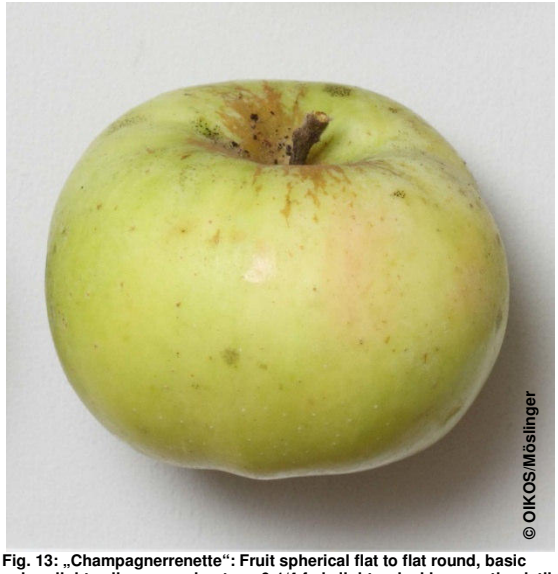

Fig. 13: „Champagnerrenette“: Fruit spherical flat to flat round, basic colour light yellow, covering tone 0-1/4 fady light red, skin smooth, pistil cavity with radial ribs of russetting.

Freckles on skin: Colour, Size, Shape, Adjacent

Independent of russetting, the skin may present freckles or lenticels (chart 15). Their shape varies between round, triangular and star-shaped.

The freckles are distributed in accordance to the individual variety and of different size and colour between light grey and dark brown. They may also present adjacent, coloured white, green or in orange- and red tones. (The skin next to the freckle is toned, e.g. “Steirischer Maschanzker”, chart 14.

Fig. 14: „Steirischer Maschanzker“: Fruit spherical bulky or flat spherical, basic colour bright yellow, 0-1/2 stainy red, smooth skin, freckles, in some cases presenting red adjacent. Pistil cavity covered or showing actinomorphically russetting.

Stem: Length, Thickness

The stem’s length is verbally described in length-stages, with no common standard. For orientation, one may refer to the following scale (Szalatnay 2006):

- Very short (<15 mm)
- short (15-19 mm)
- intermediate (20-24 mm)
- long (25-29 mm)
- very long (≥30 mm)

Fig. 15: „Ananasrenette“: Fruit spherical bulky, basic colour yellow, covering tone n.a., freckles with green adjacent, short stem.

Calyx: Size, aperture

The calyx' size is verbally described as small, intermediate or large. The opening (aperture) of the calyx' leafs though, is of higher significance. Depending on its characteristic, it may cover the calyx to different degrees. (Bernkopf 1999, Szalatnay 2006):

- covered
- semi-covered
- open

Interior Criteria

Axis (vertical core axis)

Depending on the individual variety, the vertical axis of the fruit may either be hollow or filled with fibres. This is notable via longitudinal view, as well as via cross-section (Chart 1).

Core housing: Shape

The core housing's shape can be identified by means of a longitudinal cut. It can be determined among the following characteristic forms (Bernkopf 1999):

- spindle-shaped
- spherical
- onion-shaped
- heart-shaped

More detailed descriptions also refer to the individual cubicles (Bernkopf 2011). They may be open, semi-open or closed towards the axis.

Seeds: Development

Seeds may, in accordance to the variety, be developed to different degrees:

- mostly „deaf“ (not developed)
- partly developed
- fully developed

Pulp: Colour

The pulp's colour is also considered typical of the variety:

- white (e.g. „Sauergrauech“, chart 1)
- greenish white
- yellowish white
- yellow
- red

Red stains are observed throughout the entire pulp, but may also radiantly stain in from the skin. Apart from colour, mechanical resistance, texture, the pulp's juiciness, can be evaluated as indicators, typical of a variety.

Organoleptic Profil

Type of Flavour: Sugar-Acidity-Ratio

The sugar-acidity-ratio determines the fruit's exploitability. As it is very dependent on the individual variety, certain varieties are likely to be assigned to a certain utilisation. The type of:

- very sour
- sour
- balanced
- sweet
- very sweet

The sugar-acidity-ratio represents a rather general tasting characteristic. Trained tasters will also evaluate sweetness and acidity separately.

Astringency

Astringency describes the fruit's content of bitter tasting tannins or their intensity observed in the tasting. It is verbally described as:

- lacking
- week
- intermediate
- strong
- very strong

Wort

The aromas („wort") of apple varieties are manifold. Some apples are known to present extensive raspberry- (chart 16), banana- (chart 17), cinnamon-, pepper-, or winy notes. They are commonly named by means of their aromas. Also the wort's intensity is described:

- without wort
- weakly worted
- intermediately worted
- strongly worted

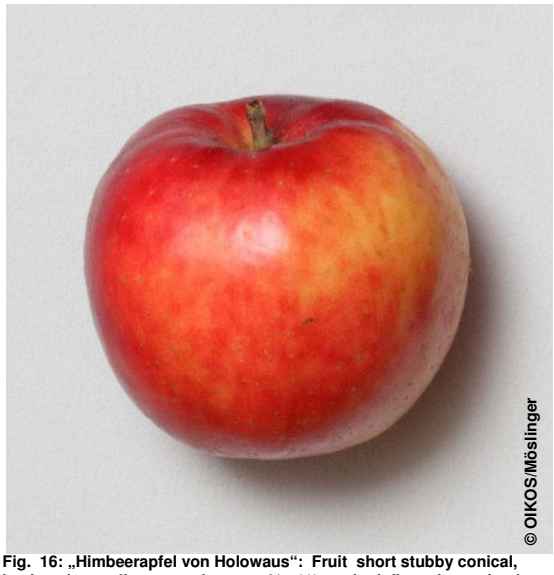

Fig. 16: „Himbeerapfel von Holowaus": Fruit short stubby conical, basic colour yellow, covering tone ¾ - 1/1 washed, flamed or striped scarlet red. Greasy skin.

Fig. 17: „Lavanttaler Bananenapfe"l: Fruit barrel-shaped, basic colour yellow, covering tone ½-3/4 striped faded or marbled red.

Phenology

Time of harvest

The time of harvest describes the time gap, in which fruit shall best be harvested for further storage (autumn- and winter varieties) or their processing (early varieties). Normally this time gap is given in thirds of months (e.g. early October, mid-September or late September) but can also comprise longer periods.

Time of eating ripeness

Eating ripeness is given for those varieties, which may also be used as dessert fruit. With early varieties, it starts with the harvest time; for storage apples it starts, as soon as they are post-ripened and at the same time describes their shelf-life.

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Typical old Austrian varieties

Ilzer Rosenapfel

Name (Synonymes): Ilzer Rosenapfel
(Ilzer Weinler, Weinler)

Origin
Ilz (Styria, Austria), Assumed time of origin unknown, the oldest tree still existent.

Time of ripeness:
Harvesting Mid October, eating ripeness November through March

Output, alternation:
First harvest starts rather late but once going very high, strong alternation

Fruit properties:
Intermediately sized fruits, 50 – 55 mm high, 55 – 65 mm wide, spherical, stubby conical, with conical shape slightly aiming towards calyx. Smooth relief without bulges or ribs, sometimes heterogeneous growth. Smooth skin, basic colour golden yellow, covering tone (2/3 – 3/3 dark red, faded, sometimes striped or entire fruit dark pink, frosted, sometimes presenting reticular patterns of russetting and warts. Pistil cavity tight and deep, sometimes radially striped with russetting. Thin, short woody stem. Intermediately deep and wide, sometimes wrinkled eye basin with russetting stains. Medium sized eye, semi-open.

Growth, branching:
Strong growth, high globular treetop, tree training best done tall-stemmed.

Habitat preferences:
No special requirements towards soil; resistance towards winter frosts, also blossoms, very well. Thus adequate for higher altitudes.

Vulnerability for disease and pests: Leafs aren't very vulnerable to disease.

Fruit's shelf life:
Until March

Utilisation:
Manifold as dessert and general-purpose household apple (kitchen, juice, cider)

Fig. 18: „Ilzer Rosenapfel" presenting characteristic red covering tones, striped or washed out.

Steirischer Maschanzker

Name (Synonyms): Steirischer Maschanzker
(Steirischer Wintermaschanzker, Steirischer Winterborsdorfer, Eisapfel)

Origin:
Austria, probably Styria, around 1800

Time of Ripeness:
Harvesting End October, Eating ripeness December through June

Output, Alternation:
First harvest very late (approx. 12th – 15th year of plantation), from then on very good and evenly distributed with some likeliness for alternation.

Fruit Properties:
Fruit small or medium sized, on average 50 – 55 mm high, 55 – 65 mm wide, spherical bulky or spherical flat, smooth Relief, very seldom with flat bumps, smooth skin, basic colour yellow, covering tone 0-1/3 light red, washed out, fine crimson freckles may appear, russetting figures and warts possible. Pistil cavity tight, deep, in parts radial sections of russetting. Short, thick or medium thick stem, woody; intermediately deep eye basin, wide, in parts wrinkly with moderately bumpy edge. Calyx intermediately sized, open or semi-open

Growth, Branching:
Growth stronger in early periods, slowly declining, growing rather small, wide tree tops with a lot of whisk and fruit wood. Best form of tree training: semi- or high stem.

Habitat Preferences:
Demand for good strong soils, also grows on light sand and limestone soils; inadequate for heavy clay soils; prefers open spaces in winegrowing climates or even cold fruit growing climates, also grows at higher elevations; Blossom and frost resistance intermediate.

Vulnerability for disease and pests:
In inappropriate (low, damp) climates prone to scab

Fruit's shelf life:
excellent, until June

Utilisation:
Manifold as dessert and general-purpose household apple (exceptionally well for ciders and Distilling "Edelbrand")

Fig. 19: „Steirischer Maschanzker" still well known as regional variety, with a formerly good market.

Wintergoldparmäne

Name (Synonyms): Wintergoldparmäne (Goldparmäne, „Goldrenette“)

Origin:
Most likely France, originating from pre 1700

Time of Ripeness:
Harvesting Mid September through Mid October, Eating ripeness October through January

Output, Alternation:
Output starting in early stages, intermediately to high, alternating

Fruit properties:
Fruits mid-sized, 55 - 60 mm high, 55 - 70 mm wide, spherical high, short stubby conical, smooth relief, occasionally unitary flat ribs, smooth skin, basic colour golden yellow, covering tone ½ - ¾ red-orange or red, mainly washed, covered with flamed tones, intermediate finely textured russetting cover; pistil cavity intermediately deep, tight with radiant russetting, stem intermediately long, intermediately thick, woody; wide eye basin, wide, intermediately deep, bowl-shaped, wrinkly, mid-sized calyx, open, pulp shines whitish light yellow, in later stages mellow, watery-juicy, more or less rich sweetness, well balanced acidity with pleasant wort.

Growth, Branching:
Intermediately strong, tree top spherical high, pyramid-shaped

Habitat Preferences:
Demands nutritious soils; blossom not very vulnerable to frosts, low demand for temperature, thus also adequate for mid-ranges

Vulnerability for disease and pests: Prone to scab, mildew disease, fruit tree cancer, as well as apple aphids.

Fruit's shelf life:
Until March, inappropriate for cooling

Utilisation:
Manifold as dessert and general-purpose household apple (kitchen, juice, cider)

Fig. 20: „Wintergoldpamäne.“

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Advantages of old varieties

Introduction

Man has selected fruit varieties from nature since antiquity or selected specific varieties for breeding from a great pool of known varieties. Thus, especially old varieties offer a wide basis of genetic material and offer exceptional diversity in every respect. As opposed to this, modern varieties for commercial fruit farming normally root on a small pool of varieties, which have furthermore been crossed with one another, having lead to a tremendously small genetic selection, indicating low variability. Following this, there are numerous advantages in favour of old varieties, enhancing culture, usability and other, more general benefits.

- Manifold attractive appearance
- Balanced and diverse flavours
- Widely spread processing options for specific produce
- Widely spread location suitability
- Ease in care and high life expectancy.
- High resistance and tolerance towards desease
- Rare varieties and regional identification
- Important genetic reservoir
- Aesthetic addition to the landscape, ecological factor

Appearance

Fruit of old varieties are due to their genetic diversity highly variable in their appearance. While modern varieties are mainly medium-or large sized (approx. 7-10 cm), old varieties cover sizes from small (approx. 5 cm in diameter) to very large (approx. 12 cm diameter).

Also their colouring is quite dissimilar, reaching from clear green or yellow to striped or blushed red, full red to dark red or violet.

(chart 1). Apart from their main utilisation, fruit fulfil manifold decorative functions, not only the tree itself in the garden, but also in Buffets, Fruit baskets or on Christmas trees. Fruit exhibitions, presenting old varieties are considered especially attractive. (chart 2)

Fig. 1: Old apple varieties are clearly determined by size, shape and colour: Ananasrenette (top left.), Grüner Stettiner (top right), Wintergoldparmäne (bottom left) und Roter von Simonffi (bottom right.).

Fig. 2: View on an exhibiton of old varieties

Taste

Apart from some commercial or cider varieties, with exceptionally high acidity or tannin contents (chart 3), in general old varieties present an extensive range of flavours and aroma, which modern varieties often lack of, as those were bred or selected in accordance with a very narrow view on certain properties

Thus there are manifold flavours from sweet to rather sour flavours and occasionally bitter notes and everything in between, so that every consumer will be able to select his personal favourite.

Especially aromas („wort“) can be extremely diverse. Surprisingly to some, apples are known with a distinct raspberry- banana- cinnamon- pepper or even winy note. (chart 4) Those are no longer retailed, so customers are increasingly trained to enjoy harmonised, converge flavours.

Fig. 3: „Speckbirne“ ist an extremely juicy, pear variety, rich in tannins , not fit for human consumption but extremely good for the production of ciders.

Fig. 4: „Himbeerapfel von Holowaus“ (left.), „Pfefferapfel“ (centre) and „Lavanttaler Bananenapfel“ (right) were named after their flavours (raspberry, pepper, bananna)

Processing and Products

While modern fruit cultivation primarily aims to breed new dessert fruit, whereas other options of consumption are a mere product of chance, old varieties were distinctively selected for specific properties.

Due to their balanced composition (sugar- acid- and tannin contents) most old varieties can be processed sorted, unmixed and pure. This leading to a more distinctive and characteristic produce, easier marketed than those with uniform characteristics.

Dessert Fruit (fresh market)

Old varieties of dessert fruit are readily available for long seasons fresh and ready for consumption. (fully ripened) (chart 6)
This period lasting from about July („Weißer Klarapfel“, chart 5) through November („Steirischer Maschanzker“, chart 7). Furthermore, varieties are picked which present exceptional shelf lifes or even require storage in order to present full maturity. No artificial storage conditions, as found in modern fruit storage facilities are required. It is only important to store perfectly healthy fruit. This ensures supply throughout May or even June.
For storing newer varieties this long, even under controlled storage conditions, it is inevitable to harvest well before full ripeness. Under these conditions their flavour potential (Aroma) cannot fully develop.

Fig. 5: „Weiße Klarapfel“ gains ripeness already in July, but only stores 2 or three weeks.

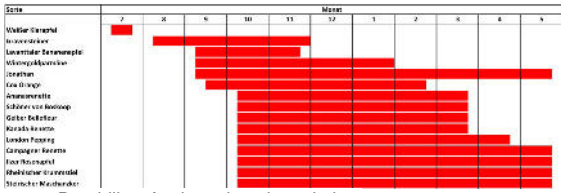

Fig. 3. Durability of selected apple varieties.

Fig. 7 „Steirische Maschanzker“ ripens from October onwards and may be stored in the cellar until the end of May.

Fruit for Pressing (Juice, Cider)

In the earlier days, fruit rich in acids and tannins were selected for pressing. These contents not only ensure an extended shelf life, but also offer more ease in processing in the cellar. Tannins ensure self-clearing without additives after fermentation and thus provides the desired degree of clarity. Higher acid contents ensure a more balanced and refreshing sugar-acidity ratio with higher sugar contents at the same time. In many cases, manufacturers purchase old varieties from traditional orchards, in order to achieve more balanced flavours.

process fruit (Cooking/Jams/Jelly/Distilling/ Smoke drying)

An example of an old variety with a wide selection of options for processing, requiring in-depth knowledge of the fruit's properties and characteristics, e.g. degrees of ripeness, is the "Hirschbirne" (chart 8). This variety is grown in East-Styria, Lower Austria and the province of Burgenland for at least 200 years and is nowadays constituent ingredient of many traditional specialties under the name „Pöllauer Hirschbirne", well known beyond its origin. In fact a cider pear, it can be eaten as a fully ripened or overripe fruit (when it presents little tannins). Juice and cider, even sparkling wine (chart 10) are exceptionally made from fruit in early states of ripeness (high in tannins). Furthermore these pears are found in Schnaps, as dried fruit (chart 9), in jam and jelly, as well as in pastries (Tiramisu, …), where the degree of ripeness is less important.

Fig. 8: „Hirschbirne" offers an exceptional wide range of different possibilities.

Fig. 9: Smokedried „Hirschbirnen", due to their balanced flavour are often used as ingredient in pastries.

Location Suitability

Modern fruit varieties were mainly selected for mild climates, adequate for fruit trees. Thus, they increasingly fail in rapidly changing severe climates (Draught, shady slopes, high altitudes, cooler climates in general). With many old varieties, this is not the case. Due to the diversity of their properties (high frost resistance of their wood, blossoming period, …) there are always appropriate varieties for certain local requirements and preconditions. This is of importance to hobbyists, as well as to mixed agricultural businesses in low mountain ranges. Until the extended diminishment of varieties in the 1950s and 1960s, there were, e.g. in Styria, particular public cultivar recommendations for regional plantations in accordance with local climatic conditions with commercial fruit growing significantly larger, those days. Even for different soils (light or heavy, warm or cold) there are particularly suitable varieties available. At a supraregional level, traditional fruit varieties differ significantly. Some Scandinavian varieties for instance, could only and very exceptionally spread into more southern regions.

Fig. 11: The Styrian" Country Standard Assortment" , proposes appropriate fruit varieties, sorted by fruit growing regions.

Care and life expectancy

Old varieties in traditional orchards, in comparison to new varieties, demand less care. They are well adapted to poor quality soil and thus, apart from their basic demand of nutritients, no intensive fertilisation, lowering workload and expenditure.

As they almost completely develop typical fruit on vigorously growing surfaces, effort for pruning gets lesser with increasing age. After the initial pruning over the first couple of years, it only needs occasional thinning every couple of years. As high growing trees have a high life expectancy (100 years and more), the total effort for cutting and pruning, and also the total effort for renewing traditional orchards is significantly lower than in intensively grown plantations.

Disease tolerance and -Resistance

Fruit trees are exposed to different diseases and pests, which may harm leafs, fruit, branches, tree trunk or roots, doing harm to the fruit quality and harvest.

These may be viruses (e.g. fruit tree cancer), bacteria (e.g. fire blight), fungi (e.g. scab, soot spot disease, downy mildew disease) and different insects (e.g. aphids, geometer moth, tortricids, weevils, as well as spiders (e.g. mites).

Many of the recently commercially grown high quantity varieties due to their genetically narrow selection (see introduction) are exceptionally prone to disease.

Prevention or control measures are thus inevitable in modern commercial fruit growing and connected to large expenditure and workload, as well as negative effects on the environment and the consumer.

Many old varieties are robust or sometimes resistant to one or more disease.

This may result from a general intolerance between host and parasite, advanced defence mechanisms or mechanical barriers.

The skin of some old pomacious fruit presents an extensive rust surface (corc fibres) which is

unwelcome for modern varieties, but also helps to protect the fruit from fungi, such as scab and especially disease Schizothrium pomi and apple sooty blotch disease (chart 14) “(Schöner von Boskoop”, “Graue Herbstrenette”, “Parkers Pepping” (chart 12), (chart 13)

Thus good, though not perfect results, without any pesticides are likely by means of selecting adequately located varieties, planted in appropriate distance and utilisation of proper pruning.

Accordingly, the result are healthy fruits, free of contaminants, as a food produced sustainably.

Fig. 4: „Schöner von Boskoop“ (left) and „Parkers Pepping“ (right) are largely rust-covered apple varieties.

Fig. 5: „Graue Herbstrenette“ apples are usually fully rust covered.

Fig. 14: Strongly affected by Schizothirium pomi disease (fine dots) and apple sooty blotch disease (grey or black stains) fruit with smooth skin, enhanced by damp climates and dense foliage.

Rarities and regional Identification

Many old varieties are considered rarities, as they are almost uniquely found in a rather limited area.

The reason fort his is to be found in the fact, that they have well adapted to this region and can develop ideally solely there. The population identifies themselves more with those than with those known at a supraregional or global level.

Fruit and their produce can be easier marketed as rarities with special properties and regional reference (flavour, method of manufacture, …), e.g. under a protected designation of origin, as done with the “Pöllauer Hirschbirne”.

Valuable Gene Reservoir

Old varieties are a valuable gene reservoir for breeding, as apart from individual flavour and growth properties, they carry genetic resistance towards diseases (see disease tolerance/resistance).

This is of great importance for modern fruit growing, as the pest pressure constantly grows, demanding an increased, broader application of pesticides.

Fig. 6: „Champagnerrenette“ fruit are free of scub, even under severe climates

At the same time, consumers request fruit free of such residues. E.g. the old apple variety “Champagnerrenette” (chart 15), completely resistant to scub and thus of fundamental importance for all resistance breeding.

Landscape and ecological factor

Old varieties are, if grafted on adequate surfaces, good tree trunk builders with an overall strong growth. Thus they are highly qualified for nursing high-trunk varieties. They support constituent landscapes and serve a function in ecologically valuable traditional orchards at the same time. (chart 16)

Semi-open landscapes, determined by traditional orchards are not only of tourist value (varied, well structured landscapes with trees, generating shade…). Due to their extensive use, they also provide habitats for manifold organisms: Flowering plants in their scrub and on the trees themselves braids and plaits, mosses, fungi, birds, insects, beetles, ants, spiders etc.

Fig.7. Traditional orchard asset with old varieties, enhancing the landscape’s beauty inviting to linger and taste.

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Apple Tasting

Introduction

In practice, fruit tastings are carried out for the purpose of market research and refer to new dessert fruit, produced by means of intensive commercial fruit farming. This market normally serves the typical consumer's demand for sweet apples (See Höller & Guerra 2009), eventually yielding into variety breeding.

In pomology, important characteristics for describing and determining cultivars, are confirmed by means of tasting. Those are considered descriptors for certain varieties. (Compare expert text "characteristics of Apple varieties".)

Following the fact that selection did never follow a certain flavour pattern, and sometimes even considered less- or unimportant, e.g. in commercial or cider fruit, old varieties, as opposed to new ones, present a wider variety of different flavours. Apart from different degrees of sweet and sour, new intensive bitter notes can be observed.

It has to be taken into account, that taste sensations may be rather subjective and (if not observed by a professionally trained taster) may be found hard to approve. For tasting, all fruit should be readily available in perfectly ripened condition, in order to obtain comparable results. (Compare comments referring to ripeness in paragraph on tasting properties).

Tasting properties

Tasting properties may be described according the application and also be summed up in peer groups. For example, sweetness, acidity, sugar-acidity-ratio, wort and astringent can be summarised as "Taste". This may be helpful, working with non-specialists. Apart from flavour- or haptical indicators, the appearance is assessed.

Appearance

In respect of appearance, the attractiveness of the fruit is estimated with a reference to the overall ranking.

- Very appealing
- appealing
- fairly appealing
- less appealing
- unappealing

Skin thickness

Skin thickness is a distinctive indicator and relevant for dessert fruit. Following Szalatnay (2006), thickness is determined in three stages:

- thin
- intermediate
- thick

structural strenght of pulp

Following Szalatnay (2006), the structural strength of the pulp is determined in five stages:

- very soft
- soft
- intermediate
- hard
- very hard

Objective measurement is carried out under lab conditions and measured in kg/cm².

Pulp texture

Following Szalatnay (2006), pulp texture is subjectively evaluated in eight stages:

- fine
- intermediate
- coarse
- floury
- mushy
- gluey
- brittle
- crisp

Bernkopf (1999, 2011) solely evaluates the pulp structure:

- very fine-celled
- fine-celled
- slightly fine-celled
- coarse-celled

pulp juiciness

According to Szalatnay (2006), pulp juiciness is evaluated in three stages:

- very dry
- dry
- intermediate
- juicy
- very juicy

Flavour Profile: Sugar-Acidity-Ratio

The sugar-acidity ratio determines on the fruit's exploitability. Being distinctive to each variety, certain varieties may be assigned a certain use from the start. The type of flavour is verbally determined (Szalatnay 2006):

- very sour
- sour
- balanced
- sweet
- very sweet

The sugar-acidity-ratio shows general taste characteristics. Experienced tasters will evaluate sweetness and acidity separately, following similar procedures:

- absent
- very minor
- minor
- minor to little
- intermediate
- intermediate or extensive
- extensive
- extensive to very extensive
- very extensive

Sweetness (sugar contents) and acidity can also be objectively identified in laboratories, by eans of measuring pressed juices. They are referred to in °Oechsle or in g/l.

Flavor – kind of taste

Flavourings („wort“) of apple varieties are tremendously diverse, though normally not named. Only if the wort reminds of certain, well known flavours, these are referred to. Some apple varieties are referred to as presenting distinct raspberry-, banana-, cinnamon- pepper- or winy notes. Thus, normally only the wort intensity is described; e.g. Bernkopf (1999), following this scheme:

- no wort
- weak wort
- intermediate wort
- strong wort

Szalatnay (2006) also describes bitter notes:

- tedious
- delicate and aromatic
- aromatic
- scented
- bitter
- wrong flavour

Distinctive bitterness is normally evaluated separately (see astringency).

Astringency

Astringency describes the fruit's content of bitter tasting tannic substances or their intensity in the overall flavour. Szalatnay (2006) verbally describes:

- absent
- weak
- intermediate
- strong
- very strong

Ripeness

Evaluating the degree of ripeness can help to interpret the tasting results. „Staatliche Lehr- und Versuchsanstalt für Wein- und Obstbau Weinsberg“ (State-owned institute and research station for wine- and fruit growing“) describes three stages:

- unripe
- slightly ripe
- ripe
- fully ripe
- overripe

„Ripe” describes fully developed apples at their peak of ripeness. Starch has been transformed into sugar to a very high extent, the flavour is fully developed in accordance to the variety, complete absence of grassy notes. Overripe fruits the ageing process is already in progress. This is notable by means of wrinkly skin, specks and age-related browning. (see Taub 2003).

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