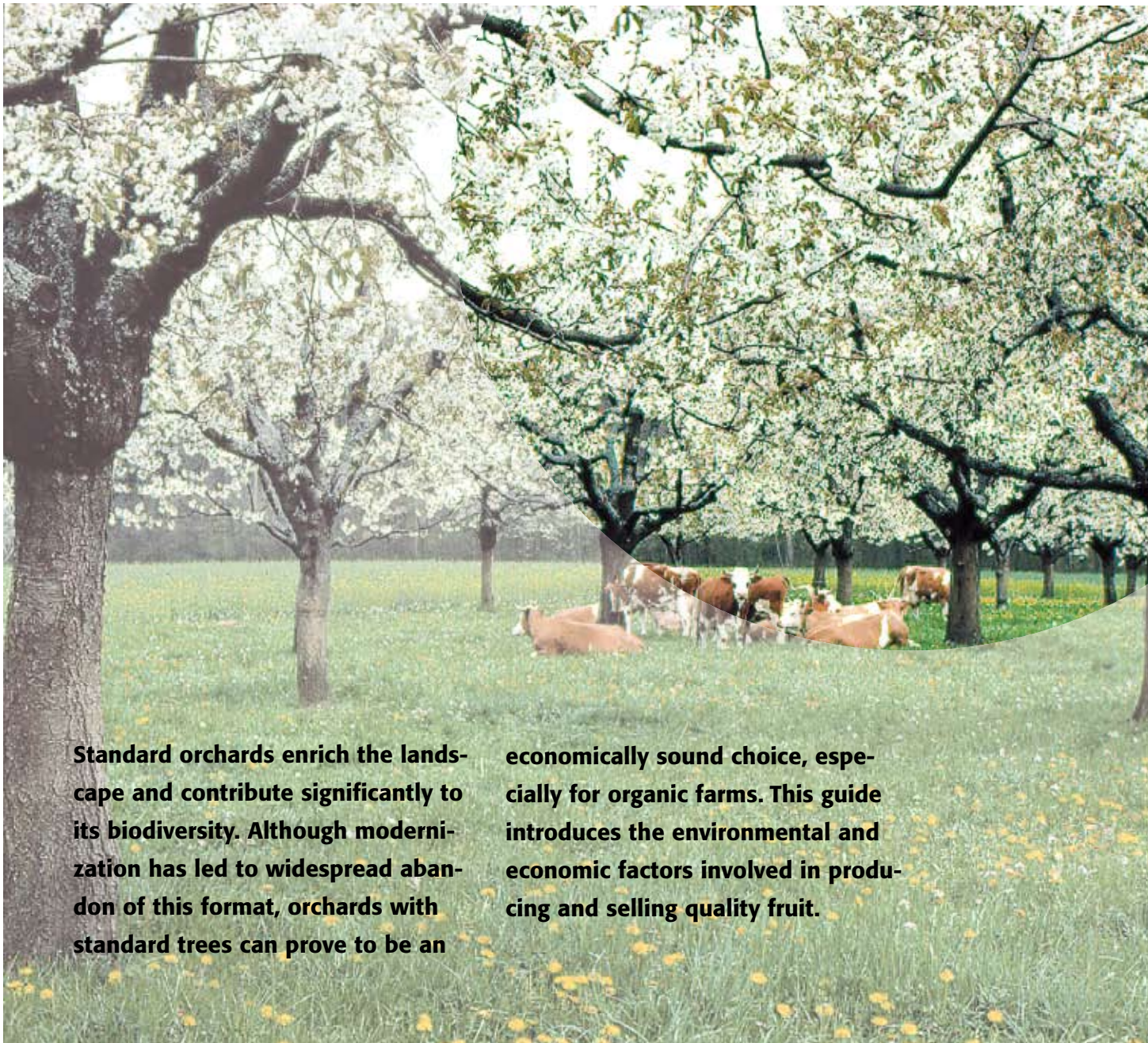


Organic Cultivation of Standard Orchards



Standard orchards enrich the landscape and contribute significantly to its biodiversity. Although modernization has led to widespread abandonment of this format, orchards with standard trees can prove to be an

economically sound choice, especially for organic farms. This guide introduces the environmental and economic factors involved in producing and selling quality fruit.

Good planning is the key to long-term success

Standard orchards are most appropriate when long-term goals are involved.

The success of a standard orchard is dependent on the following factors:

- Marketing study for different varieties
- Response to market demands
- Combined operations
- Labor availability
- Establishing a budget

Important planning issues

Formulating goals:

- How suitable is the standard orchard for the farm? [Page 3](#)
- How significant is the orchard's fodder production?
- Is it preferable to produce fruits for the processing market or the fresh market? [Page 15](#)
- How important are biodiversity and landscaping?
- What are the farmer's interests and areas of expertise?



Labor budget:

- What additional labor is required and when? [Pages 16, 18-19](#)
- How can the labor be reduced? [Page 14](#)
- Are there possibilities for collaboration with other farms? [Page 14](#)



Evaluating the site:

- Are the climate, sun exposure and soil conditions favorable? [Page 6](#)
- Are the site and its topography appropriate for maintenance work and harvesting?
- Is efficient fodder production planned for the future?
- In what ways can the landscape be enriched and biodiversity be increased? [Pages 4-5](#)



Evaluating the economic outcome:

- What revenue can be expected? [Page 16](#)
- What investments must be made? [Page 16](#)
- What are the maintenance costs for the trees? [Page 16](#)

Marketing development:

- What are the medium and long-term distribution and sales possibilities? [Page 17](#)

The importance of standard orchards for farms

The establishment and maintenance of a standard orchard depends heavily on the farmer's interests, middle and long-term market conditions, labor and site production potential.

A comparison between intensive production with high-density orchards and extensive production with standard orchards illustrates the important role standard orchards can play for a farm.



For polyculture farms, which are common in organic agriculture, standard orchards offer significant advantages. However, they have drawbacks as well, which are especially relevant for producing fresh market fruit.

Evaluation of Standard Orchards

| | Standard Orchards | High-density Orchards |
|--|--|---|
| Production Goals | <ul style="list-style-type: none"> Producing fruit for the processing market or the fresh fruit market, as well as providing pasturelands | <ul style="list-style-type: none"> Producing fresh market fruit, not available for use as grasslands |
| Ecological Goals | <ul style="list-style-type: none"> Enriching the landscape Developing significant ecological diversity over the long-term Possibility of cultivating and preserving diverse varieties over the long-term | <ul style="list-style-type: none"> Lesser ecological value Creation of additional environmental compensation areas needed to promote the development of auxiliaries |
| Length of Use | <ul style="list-style-type: none"> 50 years or more Long development time (15–20 years) before optimal yields are reached, which suggests that varieties require a long period of time to adapt. | <ul style="list-style-type: none"> Medium (12–20 years) Full yields at the 4-year mark, thus possibility to change varieties quickly |
| Investments | <ul style="list-style-type: none"> Low to medium investment in equipment: (harvesting machine, hydraulic ladder, etc.) | <ul style="list-style-type: none"> High investments necessary (high tree density, special equipment, costs of maintenance set-up, anti-hail nets, irrigation, etc.) |
| Maintenance | <ul style="list-style-type: none"> Significant for producing fresh market fruit Rational methods available for producing processing market fruit | <ul style="list-style-type: none"> High |
| Direct Subsidies and Environmental Contributions in Switzerland | <ul style="list-style-type: none"> Subsidies for standard trees and additional subsidies for extensive grasslands cultivation | <ul style="list-style-type: none"> No per-tree contribution. Contributions for the environmental compensation spaces in the orchard. |
| Profitability | <ul style="list-style-type: none"> Environmental subsidies to compensate for the lack of revenue during orchard development and for upkeep of orchards currently in production Harvesting fodder, producing specialty products and other factors improve the profitability and the image of the farm. Significant alternate bearing | <ul style="list-style-type: none"> The following elements are required in order to guarantee the orchard's profitability, optimal productivity obtained in a short period of time, high fresh market fruit yields. Infrequent alternative bearing |
| Other Factors | <ul style="list-style-type: none"> Preventative safety measures for ladder use Adaptation of pesticide treatments to allow grasslands to be used Effective windbreak for large-scale farming and houses | |
| Requirements for the Farmer | <ul style="list-style-type: none"> Basic arboriculture knowledge can be adequate. | <ul style="list-style-type: none"> Special arboriculture knowledge required. |
| Risks | <ul style="list-style-type: none"> Medium to high | <ul style="list-style-type: none"> High |

Standard orchards aid in the preservation of a unique habitat

Standard orchards are among the richest habitats in Central Europe. No other modern-day habitat is comparable.

A valuable element of the environment

A unique habitat

Orchards are among the habitats that have been created by human beings. However, they have some of the same characteristics as natural habitats or those cultivated using traditional methods. In the past, natural landscapes like floodplains consisted partially of semi-open spaces with isolated trees. Forests were not just dense and dark, as significant natural events such as storms, floods or wildfires led to the creation of semi-open spaces. With human intervention, these spaces became pasture-woodlands with isolated trees and standard orchards. Several decades ago, the contrast between forests and grasslands was less pronounced than it is today.



Standard orchards are especially valuable if they contain isolated large trees and if the orchard floor is extensively developed.

Animal species living in orchards need semi-open spaces and cannot just adapt to fields or dense forests.

An essential habitat for many species

Standard orchards are highly valuable habitats for many species of animals, both common and endangered. In Switzerland more than one thousand species of insects, spiders and myriapods and forty different species of birds have been identified in standard orchards. Although it is true that relatively few orchards are

home to endangered species such as the Little Owl, the Eurasian Hoopoe, the Wryneck and the Woodchat Shrike, the number of bird species is far greater in standard orchards than in open fields. Many bird species in orchards feed on both airborne and crawling insects. The ground cover is their most important source of food, while the trees offer nest-building sites. The Green Woodpecker and Great Spotted Woodpecker even nest in tree trunks. They start with holes created by broken branches and peck at them to form a larger opening. In Switzerland these sites are then re-used by secondary cavity nesting birds such as Tits, and Redstarts as well as rarer species such as Little Owls or Wrynecks and also tree bats. In addition, Short-toed Tree Creepers hide their nests behind protruding pieces of bark, and the European Serin, the Goldfinch and the endangered Woodchat Shrike build nests in the tree branches, well camouflaged by the leaves.

The trees also provide an essential habitat for insects, spiders and myriapods. Most of the more than 300 species in Switzerland of these feed on plants that are primarily part of the orchard floor. Another two hundred species feed on the nectar and on plants growing under the trees, and the rest are predators or parasites. They aid in regulating the population of destructive insects by eating them or using them as parasitic hosts when they appear on fruit trees or in the surrounding fields.

Significance for agriculture

The contributions standard orchards can offer a farm include beside the production of good quality fruit, development of auxiliary lands, wind-protection for crops, shade for pasture animals, increased diversification and beauty for surrounding landscapes, and preservation of traditional fruit varieties.

The more varieties of fruit trees there are available, the greater the changes of finding optimum characteristics for natural selection, a concept that can easily be overlooked in modern agriculture.



The Little Owl (above) and the Wryneck (left) are among the most endangered species in Switzerland. However, the Tit (right) can be found in many orchards.

Creation of optimum conditions for plants and animals

Keep maintenance to a minimum

Where standard orchards are concerned, the principles of environmental soundness and economics are often contradictory. For example, second growth or dying trees have no financial value, yet are highly valuable for birds and insects. Moderate upkeep allows both environmental and economic concerns to be satisfied. Moderately intensive upkeep keeps birds and insect habitats intact, while the reduced labor costs for maintenance compensate for the decreased yields. In addition, the total work volume is reduced.

The larger the orchard, the better

The larger the orchard, the more essential habitat it can offer for animals. In terms of birds, an orchard with twenty trees offers nesting sites for some species, including goldfinches. A 100-tree orchard provides a habitat for specialized species and with 300 trees or more, a complete range of species can be found.

Optimum distance between trees

The ideal orchard is neither too dense, nor too sparse. When an area is planted extensively with standard trees, the maximum density is 70 trees per hectare, and most of today's orchards are less dense. However, when the distance between trees is greater than 50 meters, the orchard is too dispersed and is less beneficial.



Mowing grasslands at different heights creates an excellent habitat for orchard wildlife.

Optimum distribution according to tree age

The distribution of different varieties and ages of trees in an orchard increases its environmental contribution. Each standard orchard must include a few old trees and at least one-fifth new trees in order to preserve essential habitats. Dead wood is an essential habitat for innumerable species of insects. Thus, dead branches should not be systematically removed. Isolated dead trees can be a valuable asset, and generally are not a problem as they do not create shade and the lower branches can be removed. Piles of branches left on the ground enrich the habitat, and decomposing knots and tree hollows are important areas for bird and insect reproduction. Natural cavities often occur where large branches have been cut or broken, but



Standard orchards clearly illustrate the agriculture industry's efforts in the areas of environmental stewardship and preservation.

should be avoided in young or producing trees. In addition, proper distribution of special birdhouses, for example 15 to 30 per hectare for tits, helps create nesting spaces for orchard birds. Additional information on specialized nests (for Wrynecks, Little Owls or owls), in Switzerland can be obtained from SVS-Bird-Life.

Improving habitats by extensive soil cover cultivation

The more the soil cover is extensively cultivated, the better. However, some of the soil cover must be sparse enough that birds and mammals can capture the wildlife living in the grasses. The most effective strategy is to have extensive little-fertilized, high grasslands and cut only small areas. In Switzerland late-season cutting is not necessary in this case, as almost no ground nesting birds live in orchards. Extensive pasturing is

a comparable solution, as it also produces a pattern of high and low grasses. However, care must be taken that the trees are not damaged, and the number of grazing animals must be low enough that at least 20 % of the meadow is left ungrazed.

Forming a network with other ecologically important habitats

Additional habitats such as gardens or fallow strips of land located in orchards or nearby low hedges or other environmental compensation spaces increase the value of standard orchards. Care must also be taken that standard orchards do not interfere with other important habitats such as wetlands, forest edges or drystone walls by shading them.

Environmental protection and orchard production are not mutually exclusive. Based on the production techniques used, both excellent fruit quality and a biologically diverse orchard can be obtained.

Evaluating a site for a new orchard

The development of a hardy standard orchard for long-term production requires proper set up conditions, including consideration of general soil and climate requirements and those related to the species and varieties, as well as easy access for maintenance and harvesting. To achieve optimum development for the young trees, improving the soil is essential.

The trees' climatic and soil requirements must be taken into account.

Climate

Climate requirements vary widely for different species and varieties of fruit. However, general site requirements can be defined for fruit tree species.

Favorable sites:

- Well ventilated
- Flat or with a slight southern or south-western orientation

Unfavorable sites:

- Shady and humid or with standing water
- Very dry or lacking wind protection
- Steep (workplace safety, mechanization)
- Risk of frost (hollows or bases of hills)

In order to ensure that fruit ripens properly at elevations over 600 meters, special care must be taken when choosing the varieties and the site due to the rigorous climate and short growing period.



Mechanization must be considered when creating an orchard. Orchards located on slopes increase the risk of harvesting accidents and complicate the mechanization process.

Soil

Unlike specialized crops, standard trees do not have exigent soil requirements. However, soils that are firmly packed or frequently waterlogged are not appropriate.

A soil profile (approximately 1 meter deep with at least 60 cm of subsoil) or a spade test, combined with a chemical analysis of the upper and lower layers of soil provides valuable information on the soil's composition, structure and biological activity. This helps determine whether the soil is adequate for the creation of a standard orchard.

Characteristics of soil appropriate for standard tree orchards:

- At least 60 cm deep
- Good structure and constant and sufficient water supply
- Medium humus levels and high biological activity
- pH(H₂O) between 5.5 and 7.5. If the pH is lower, liming is recommended before planting

Soil requirements for specific varieties:

- Due to their deep roots, pear trees tolerate both drier and wetter climates better than apple trees.
- In limestone-rich soils, pear trees often suffer from iron deficiency.
- Plum trees also tolerate dense wet soils in which apple trees cannot grow.
- Cherry trees also grow on shallow dense soils that are not appropriate for apple trees.

Methods of improving soils:

- To compensate for slight structure problems and improve biological activity, incorporate green fertilizer such as a mix of clover and grasses or oil radishes) before planting.
- Break up dense soil with deep subsoiling, inserting the plough 5–10 cm below the hard-packed area. Then, plant alfalfa or oil radish to maintain soil structure.
- Improve damp areas by creating drainage.
- Add ripe compost or decomposed dung on soils poor in humus or on plots that have been worked to encourage biological activity. The quantity can be established based on the soil analysis results.

Influence of standard orchards on fodder production

Reduced yields

Shade reduces fodder quality and yields. If the trees are spaced far enough apart, the canopy is well ventilated and the grasslands are cultivated, it is possible to obtain quality fodder.

Extensive cultivation of grass under the trees generally does not interfere with maintenance. In cherry orchards, high grass is an important prevention method as it impedes the development of cherry fruit flies.

Pasturing restrictions

An orchard should not be pastured unless the tree trunks are protected from being rubbed by grazing animals. For health reasons, the excrement should be decomposing before harvest occurs. Pasturing should only take place on dry soil to avoid compacting the ground and limit root damage. Orchards located in wet areas should only be used as pasturelands for lighter animals such as sheep or young cattle. The bumpy soil that results from heavy animals treading on wet soil can make it very difficult for harvesting equipment to operate properly.

Careful use of natural fertilizer

Care must be taken not to spray the tree trunks with liquid manure, as this can lead to the development of bark or root diseases.

Choosing appropriate plants

What species and varieties should be cultivated?

Criteria for selecting species:

- Which crops the climate and soil can support?
- Low harvesting costs: for example, shaking cherry trees for fruit to be used for preserves or distilling
- Development opportunities: production contracts, market trends, diversifying product offering, new products, etc.

Criteria for selecting tree fruit varieties:

- Climate and soil (traditional local varieties)
- Disease and pest resistance: Local diseases and pests, such as cherry fruit flies, Raspberry Ringspot Virus and Coryneum Blight.
- Adequate pollination for blossoms: especially important for isolated orchard or those with few varieties
- Minimal special pruning and training requirements
- Staggered harvesting periods.
- Consistent yields
- Specific goals such as the preservation of rare varieties
- Intended uses: for example, for producing fruit juices: high sugar content, good flavor and acidity, well suited for pressing and high juice yields
- Farm development goals: direct sales of table fruit, cider and brandy production, industrial processing, and self-sufficiency

Plant requirements

Organically grown plants

The Swiss government's organic agriculture ruling (known as Obio) and agricultural seals stipulate conditions for the use of organically grown young trees.

Consider plant quality criteria:

- At a height of 1 meter, trunk circumference should be at least 7 cm.
- Lower offshoots at least 1.7 m. to qualify for direct subsidies, first scaffold branches must be at least 1.2 m off the ground for stone fruit trees and 1.6 m for pome fruit trees. If the orchard will be used for pasturing horses or cattle or will be mechanically harvested, the scaffold branches should be at least 2 meters from the ground.
- At least three scaffold branches of the same thickness (without competing branches) with secondary lateral offshoots.
- Dense, healthy root system with rootlets. Generally potted standard trees are not adequate as they have too many rootlets.

Use appropriate grafting stock

To obtain hearty homogenous trees, grafting stock should be used. Standard trees are generally grafted onto cuttings or seedlings. When grafting slow-growing or local varieties, it can be advantageous to choose hardy varieties so that a trunk forms quickly. Topworking is thus used, which results in heartier trees and earlier fruit-bearing.

Order plants in advance to have any

Some varieties must be ordered rather early, meaning in the fall, when the largest selection is available. Large orders or requests for rare varieties must be submitted three to four years before planting. In addition to a reduction in costs, the customer will receive higher quality trees and can request specific attributes such as a particular trunk height.

Planting appropriate varieties reduces the required maintenance and significantly contributes to successful growth. Selecting the right mix of different varieties is also a key factor.

Careful tree replacement

When fruit trees have been cultivated over a long period of time, cryptogamic diseases (replant diseases complex) and nematodes may develop and stunt the growth of the replacement trees by attacking their roots. Soils in orchards that have been cultivated for long periods of time show signs of exhaustion that appear in the form of nutrient deficiencies.

How to remedy these problems:

- Trim roots properly (dig up the main roots and cut them, use a rotary hoe if necessary)
- Let the soil rest for a ten-year period, or start a rotation of species.
- Conduct soil analysis.
- Enrich soil with compost or green fertilizer.
- Shift the location of the new trees from the old planting sites to avoid the apparition of honey fun-



The better the soil is cleaned from the tree roots, the fewer problems are likely to arise for the next planting.

Proper distances between trees and a planned arrangement make maintenance easier

If different species and/or varieties of fruit trees will be planted in the orchard, the trees should be grouped according to species, variety and harvest time.

Leaving ample space between the trees improves ventilation and sun exposure and lowers the risk of disease. It also increases the number of fruit-bearing branches and improves the harvest quality. The proper distance between trees is established based on the variety and the diameter of the canopy. Usage of the grasslands, either for harvesting fodder or for pastures, should also be taken into consideration. Fairly large distances between trees and a regular arrangement facilitate mechanization and ensure that an adequate amount of light reaches the grasslands.

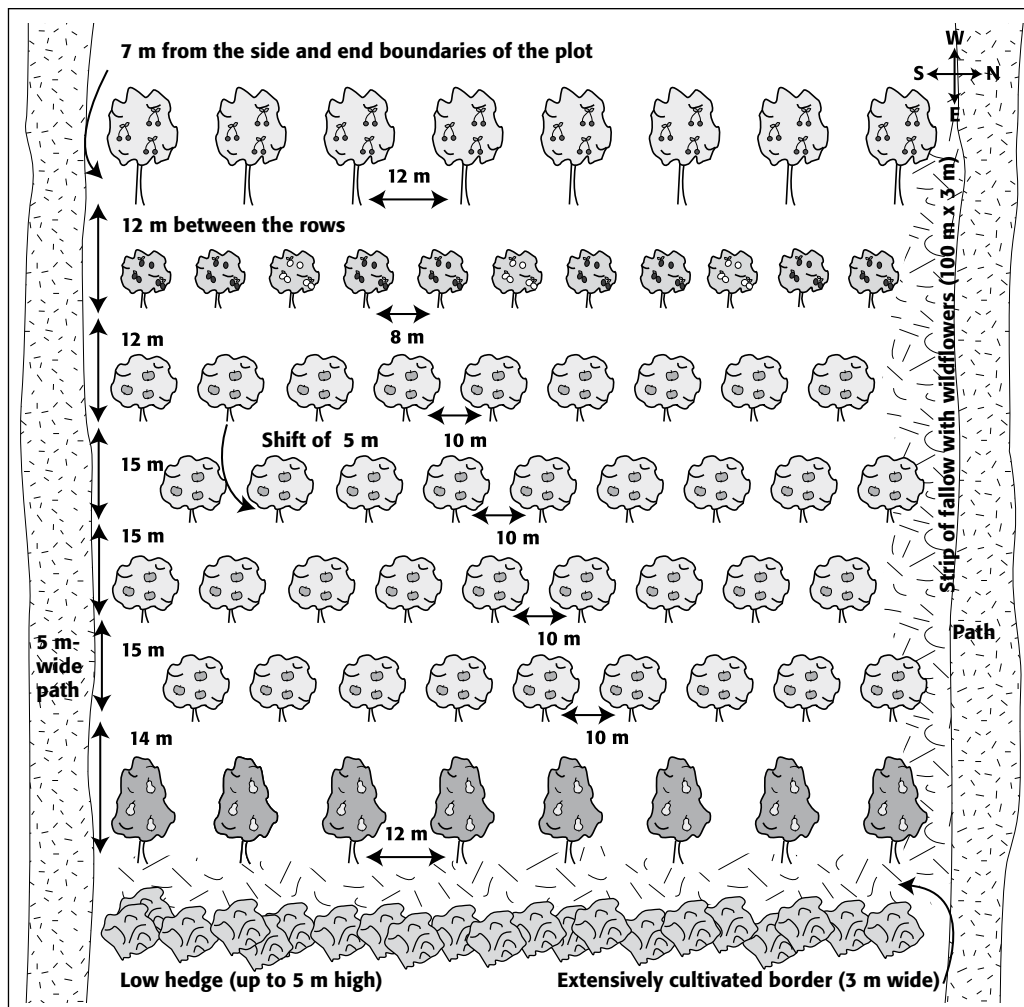
Trees planted too close to paths or roads can impede road traffic and lead to a smaller harvest. The risk of accidents increases further when ladders are used. For these reasons, trees should never be planted less than seven meters from roads or land boundaries. There should be at least 3–5 meters between the edges of the canopy and hedges so that harvesting machines can operate properly. Legal requirements for minimum distances between orchard trees and neighboring plots of land, roads, and pipelines are listed in the cantonal regulations.



Carefully chosen distances and a regular geometric arrangement allow the meadowlands to be easily cultivated.

Planting more than 70 trees per hectare is not recommended. Orchards with more than 100 cherry or walnut trees or more than 300 other fruit trees per hectare are considered intensive cultivation. In Switzerland they do not qualify for standard orchard subsidies.

Example of a standard orchard including different species, varieties and distances on a 1-hectare plot







Optimum planting distances:

Distance between rows (in m)

| Species | Distance between rows (in m) |
|---------------------------|------------------------------|
| Apple | 12–15 |
| Pear | 12–15 |
| Cherry | 12–15 |
| Plums/ Mirabelle plums | 10–13 |
| Quince | 10–13 |
| Walnut | 16–18 |

Distance between trees within a row based on the vigor of the species (in m)

| | |
|-------------------------|-------|
| Apple | 9–12 |
| Pear | 10–12 |
| Cherry | 10–12 |
| Plum/ Mirabelle Plum | 8–10 |
| Quince | 8–10 |
| Walnut | 12–14 |

-  Cherry trees on the west side for optimum aeration;
-  Plum trees and Mirabelle plum trees; good aeration due to their narrow canopies (even when planted closer together)
-  Apple trees, staggered; for optimum use of space
-  Pear trees to the east; little shade despite their height

Planting by the rulebook ensures a smooth start

When should planting occur?

Planting can take place as soon as the ground is no longer frozen and the soil is properly prepared and dry. Fall is the ideal planting period in Switzerland, as the soil has time to firm up until spring. It is also possible to plant during the winter months if the soil is not frozen.

Protecting the trees during transport and interim storage

Tree root balls must be wrapped in a damp cloth or plastic sheet, or placed in water from the time they leave the nursery to the time they are planted. If planting does not take place the same day, put the plants in a small trench and protect them from mice.

How to plant

What is needed for planting

- Use a stake approximately 2.5 m tall and 8 cm wide to train each tree.
- Untreated, weather-resistant stakes made from locust, oak or chestnut trees are preferable. Leave them attached to the tree for about eight years.
- Attach the tree to the stake with an extensible material that will not cut into the tree bark such as wicker or coconut matting or use an adjustable strap.
- In areas where the mice population cannot be controlled, surround the trees' roots with zinc wire mesh



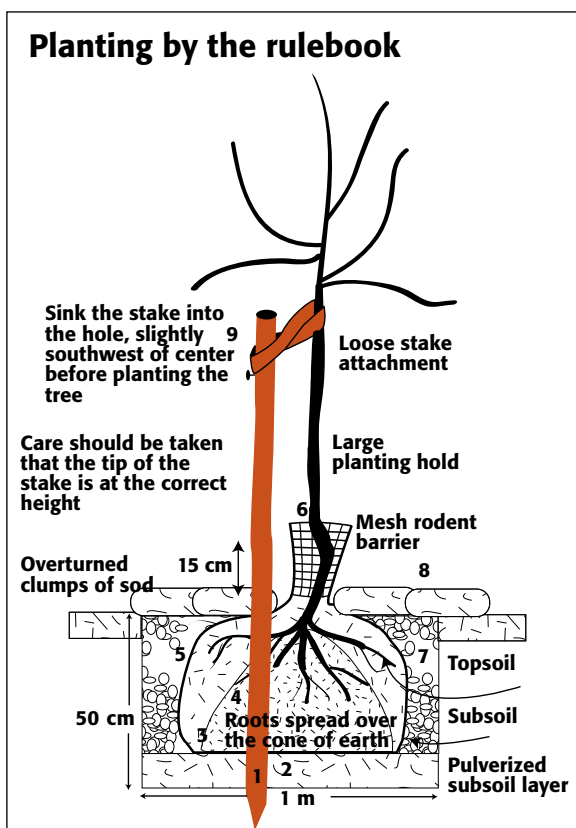
If the orchard will be used as pasture lands, the young trees must be properly protected.

(1 x 1.2 meters with 10–13 mm openings).

- To protect against damage from deer and rabbits, wrap a one meter high piece of 20 cm wire mesh around the trunk such that it can be removed for grass cutting. Alternate protection mechanisms may also be used.
- If the orchard will be used as pasturelands, protect the plants with a cage created from four stakes secured to one another with horizontal bars on the top and bottom edges. Surround the cage with barbed wire to prevent the animals from rubbing against the bark.

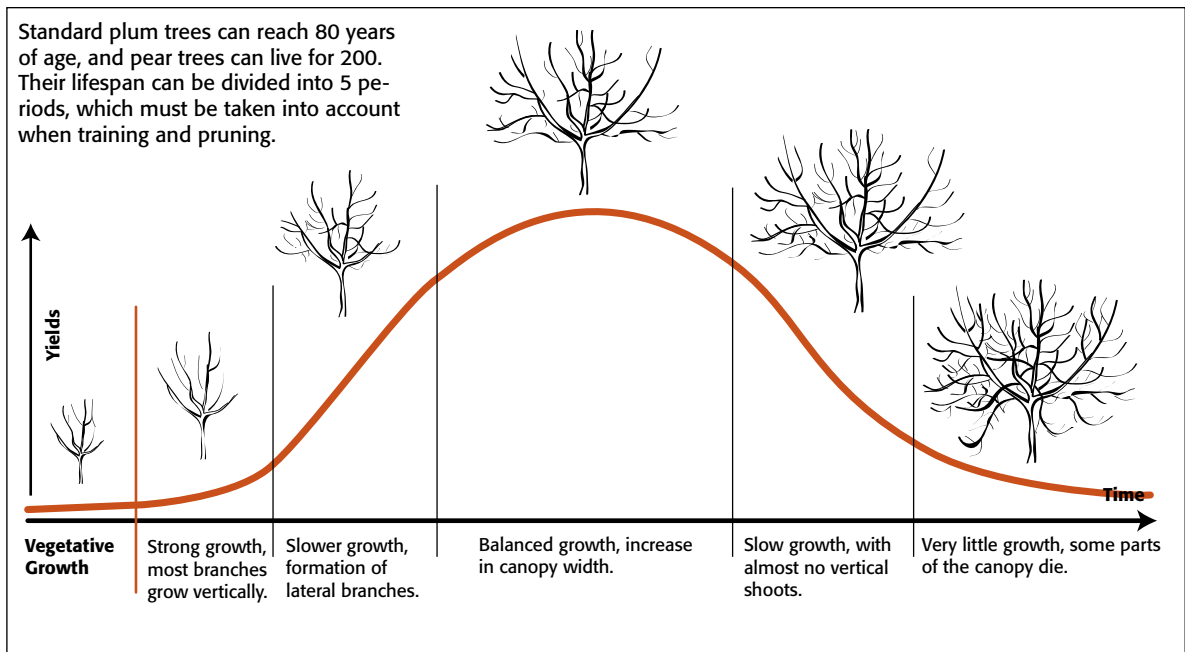
The planting process (see image opposite)

- 1 Sink a stake 60–70 cm into the ground at the site where the tree is to be planted.
- Dig a hold for the tree, approximately 1 meter wide and 40–50 cm deep. Make separate piles for sod, humus-rich soil and subsoil.
- 2 Break up the soil with a trowel.
- 3 Place the wire mesh mouse barrier in the hole (cut a slit in the middle of the trellis and pass the roots through), or wrap the mesh around the base of the roots.
- Cut the roots until living tissue is reached (white with sap) to encourage the formation of absorbent roots.
- 4 Form a cone around the stake using the humus-rich soil such that the base of the roots is located 5 cm above the soil surface (keeping in mind that the soil will be compacted) and that the stake point extends 10–20 cm below the surface.
- 5 Place the tree on the cone, 10 cm away from the stake to the northeast side (to prevent the trunk from bursting in the event of frost). Cover the roots with earth, taking care not to create air pockets.
- 6 Secure the rodent protection mesh tightly around the trunk to about 10 cm about the soil.
- 7 Cover the roots with the remainder of the humus-rich earth and fill in the areas further away with the subsoil.
- 8 Cover the hole with the pieces of sod.
- Do not spread fertilizer, manure or young compost as it could burn the roots.
- To accelerate soil settling, water as needed based on the precipitation and weather conditions.
- Spread a thin layer of manure or compost around the base of the tree to reduce evaporation and inhibit weed growth.
- Attach the stake 10 cm below the first branch and erect the cage to protect the trunk from game and grazing animals.
- 9 Several weeks after the earth has settled, tighten the attachment and



Minimum, well-planned intervention yields the best results

To ensure long-term yields, fruit trees must have a stable, vigorous canopy structure with good sun-exposure.



Adequate sunlight inside the canopy ensures the development of numerous fruiting branches. Proper pruning gives each of these branches a specific purpose and shapes the canopy.

General physiological principles that can be useful:

- A tree's fruitful growth (development from buds to flowers) competes with its vegetative growth (development of new shoots). A balance must be struck between the two.
- The more a branch grows vertically, the more its growth is vegetative rather than fruitful. This principle applies to training scaffold branches.
- The more a branch grows laterally, the less vigorous it is and the more it tends to bud. This principle applies to training fruiting branches.
- The thicker the branch and the more vertically it grows, the more it competes with other branches. Thus, any undesirable branches should be removed as soon as possible.

Reduce maintenance by creating a proper canopy structure

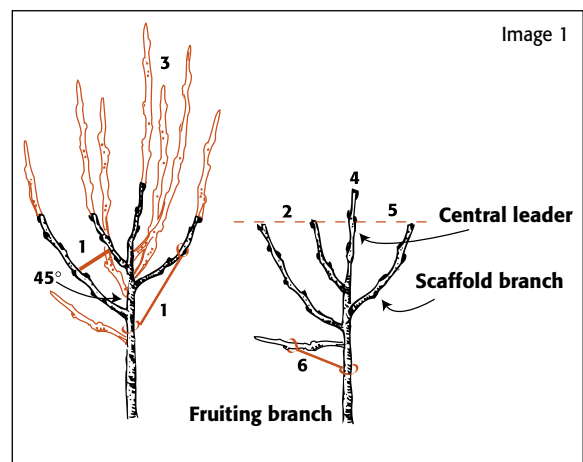
Before beginning the process of training the canopy, it is necessary to identify the scaffold branches. These must be vigorous, and situated the right distance from the ground but not at right angles to the path. In all training systems the central leader and/or scaffold branches form the base of the canopy and support the fruiting branches. Each scaffold branch can be seen as its own little tree, and each must have sufficient space to grow fruiting branches up to the center of the canopy.

Proven canopy training systems:

- Round canopy (Swiss Öschberg system) with one central leader and 3–4 main branches.
- Oval canopy with 2 main branches (appropriate for sloped orchards)
- Multi-level canopy with one strong central leader and multiple levels of fruiting branches

Pruning the tree to be planted (see image 1)

- 1 Pear tree branches should form a 30° angle with the central leader, and other species' branches should form a 45° angle. This can be attained by attaching the branches at their base or by using an elderwood spacer.
- 2 Until the tenth year after planting, one-third of the annual new growth for apple scaffold branches and one quarter of the new growth for pear scaffold branches must be pruned.
- 3 Prune near an outside bud and remove competing branches.
- 4 For pear trees, do not let the central leader develop as it has a tendency to become dominant.
- 5 To keep scaffold branches from becoming overdominant, prune them laterally at the same place.
- 6 Tie the fruiting branches laterally. For young trees that lack vigor, remove them completely rather than pruning them.



Modified drawing based on a Technical Report of the «Verband der Bayerischen Fruchtsaftindustrie»

Training young trees (see Image 2)

To encourage the growth of young trees, remove most of the blooms and immature fruit in the first few years.

- 1 In June and July, remove competing branches growing above scaffold branches that are not appropriate for training. The wound will scar quickly and impede the growth of new branches.
- 2 When the annual growth period is over, branches that are well positioned but too vertical can be adjusted by weighting them or pulling them downward. They will then become fruiting branches.
- 3 Do not prune lower fruiting branches. Remove them when they become thicker than 5 cm to allow upper branches to develop.
- 4 Continually remove root suckers.

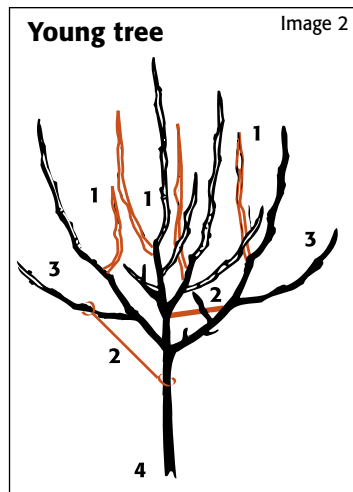
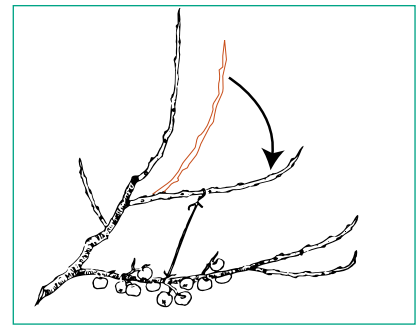


Image 2



Only lateral branches produce flower buds.

Pruning of producing trees (see image 3)

When pruning producing trees, it is necessary to leave each scaffold branch enough room to bud. As a basic rule, eliminate surplus growth using a minimum number of cuts. Making many small cuts needlessly stimulates growth and results in a poorly structured canopy.

- 1 To limit the height of the tree, the scaffold branches are trimmed to the same length.
- 2 If the center of the tree becomes weak, it indicates that the outer branches are too dense and are competing for resources. Not enough sunlight is reaching the inside of the canopy.
- 3 Remove lateral and upright growth.
- 4 Wood that is diseased, non-producing or creating shade must be removed.

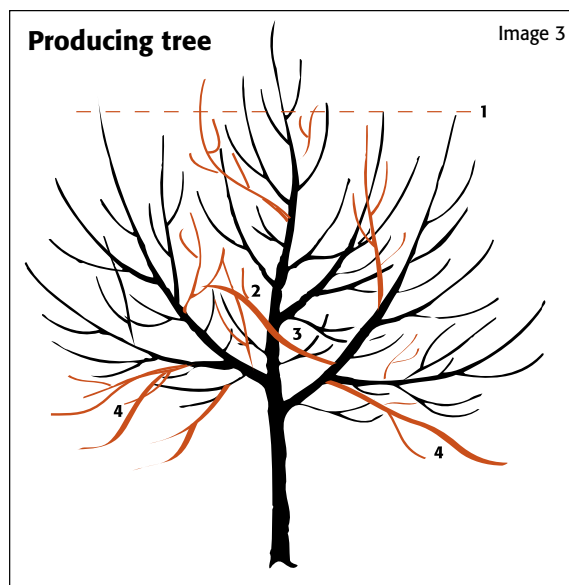


Image 3

Excellent results can be achieved with little effort. Pull the branches downward and secure them to other lateral branches, then remove superfluous branches. Optimum positioning of scaffold branches results in steady growth and abundant production of flower buds.

How and when to prune

When to prune

In Central Europe normally pruning occurs during the winter. Do not prune trees when temperatures fall below -8°C to avoid frost damage. Ideally, young trees should be pruned and trained after the major winter frosts have passed (February or March).

Winter pruning stimulates growth. The reserves stored in the roots are more efficiently distributed when the canopy has been trimmed.

Pruning conducted during the vegetative period slows the growth of trees that are developing too quickly. This is a good time to carry out significant pruning on cherry and walnut trees as the wounds heal quickly. For pome fruit trees where alternate bearing occurs, pruning is best done during the years where they are producing little or no fruit.

How to prune

- Care must be taken so that the least possible amount of damage is done.
- Always saw large branches at the base. Otherwise, the branch may tear the bark on the trunk as it falls.
- Treat large wounds with a healing product, and maintain and regularly disinfect pruning tools to prevent fire blight.
- Use shears to prune young trees and a saw to thin them.



Trees bearing fruit for the fresh market and stone fruit trees should be pruned every one to two years. For cider apples, 2–3 years is appropriate and for cider pears 5–10 years.

Train and prune standard orchards consistently for the first ten years. Errors made during this time cannot be corrected later.

Adjust fertilization for the potential production of the trees and grasslands

For both economic and environmental reasons (subsidies) it is best to cultivate the grasslands extensively without fertilizer. However, vigorous trees producing high yields need fertilization to avoid deficiencies and balance excess nutrients. Both requirements can be met by spreading fertilizer only under the trees.

The nutritional requirements for fruit trees in full production are relatively modest in comparison with other crops. They consist of 30–50 kg of nitrogen, 20 kg of phosphorus and 60–80 kg of potassium per hectare per year. Deficiencies can develop in highly packed, cold or wet soils, in times of drought or if there is a poor nutrient balance (for example poor absorption of calcium and magnesium due to a high volume of potassium).

Common deficiency symptoms

| | |
|------------|---|
| Nitrogen: | light colored leaves, slow annual growth |
| Magnesium: | Dark spots between leaf veins |
| Iron: | Yellow spots and green leaf veins |
| Potassium: | 1–3 mm at the edge of the leaf is brown and dry |



The habitat is only rich if it receives little or no fertilizer.

In general, fertilizer is spread in early spring. Starting in May or June, it is important to avoid or limit the amount of fertilizer used in order to stop branch growth and provide the best possible conditions for fruit ripening. Excessive nitrogen or potassium will interfere with this goal.

When manure or potassium-rich liquid manure, the dose should be adapted to be compatible with the existing soil reserves and the needs of the grasslands. Long-term mulching can lead to excess potassium storage.

No fertilizer or special corrections in the following instances:

- Strong annual branch growth (>30 cm)
- Dark green, dense foliage
- Before or during a low production year (alternative bearing)
- Physiological problems (for example: bitter pit, vitreous fruit)
- Low production of fodder or mulch

Maximum quantities per hectare:

Cattle manure: before the vegetative growth period
10–20 tons = 15–30 m³.

Cattle slurry: 1 spreading of 15–20 m³ in spring (1:1 dilution)

Compost: 30 m³ over three years

Preventative measures limit

Preventative measures

Each phytosanitary treatment requires labor and involves extra costs for equipment and products. In addition, the ecological balance of the orchard is at stake. Thus, it is very important to evaluate the actual need for a treatment before proceeding.

Organic products act only on contact and only for a short period of time. In order for the intervention to occur at the proper time, it is important to carry out regular, careful inspections of the trees and grasslands. When the symptoms are obvious, it is often too late to intervene with organic products. Preventative measures are thus very important in organic agriculture for combating disease and pests.

The basics of prevention:

- Choosing a favorable site
- Choosing hardy varieties
- Balanced and limited fertilization
- Rapid removal of moisture in the crown with proper pruning
- Development of auxiliary spaces with extensive grasslands, hedges, and wildflower beds

Regularly inspect and care for the young trees

Not only can disease and pests impede the development of young trees or destroy them, they also reduce the yields and fruit quality for producing trees.

During the first years after planting, direct, specific protection methods may be necessary. For example, aphids can cause irreversible damage to young cherry, apple or plum trees. The intensity of the treatment depends on the species or the variety of the fruit and on quality requirements.

In Switzerland regulations require that mowing takes place before treatment occurred and that the earliest drying and silage can occur three weeks after treatment.

Medium to high fertilization in the following instances:

- Slow growth
- Symptoms of deficiency apparent in foliage
- Before or during a producing year
- Intensive fodder production

Maximum quantities per hectare:

Cattle manure: Before the vegetative growth period
20–40 tons = 30–50 m³.

Cattle slurry: up to three spreadings of 20–30 m³ in spring and summer (1:1 dilution).

Compost: 50 m³ over three years

the need for organic pest control products

Basic guidelines for optimum treatment:

- Products should only be used when absolutely necessary (identified pests, warnings from the phytosanitary agency)
- Comply with the inspection periods: before and after flowering, in the final growth period and during harvest. Record observations and compare them with those from the previous year to optimize treatments (appropriate forms may be obtained from the Swiss Research Institute for Organic Agriculture (FiBL)).
- Treatment frequency and product selection should be determined based on the severity of the disease or infestation, the age of the tree (young trees are more sensitive) and the end use for the fruit.
- Use well-maintained and calibrated equipment only.
- Follow recommendations on product dosage.
- As organic products operate only on direct contact, thorough coverage of all parts of the plants is necessary. Use a large quantity of water, high pressure and a properly calibrated device to distribute the product without it dripping from the tree's leaves (for example: 1000 liters per hectare for treating scab).



Some phytosanitary treatments are needed outside of the vegetative growth period, such as removal of fruits mummified by brown rot and diseased wood and application of sticky tape to catch moths.



Aphid treatment must be carried out before the leaves unfurl so that the product can enter into direct contact with the insects.

Vole control – a continuous battle

The expanse of grasslands provides voles with the perfect source of food and shelter and their numbers grow quickly. To prevent the damage that they cause, mowing under the trees is recommended. It is also necessary to surround the roots of young trees with 13 mm galvanized wire mesh during the process. This mesh protection is especially important for isolated trees or when the orchards are surrounded by extensive grasslands. However, voles' underground tunnels can be partially destroyed by grazing animals, and birds of prey and other predators can regulate the population as well.

A diverse well-structured landscape can increase the numbers of natural enemies, and the installation of perches in young standard orchards can encourage the presence of birds of prey.

Direct control techniques: traps and gas

At this time, only traps and gas are authorized rodent control methods in organic agriculture. The implementation of traps is only effective against the ground vole and requires significant expertise. To gas large populations of rodents, an easy-to-handle benzine engine is effective. As the carbon monoxide that escapes is heavier than air, it is necessary to gas slopes against the wind and from lower areas to higher areas. It is important to treat the grasslands after the snow has melted in the spring and before winter.

Spring traps:

- Identify a tunnel location using an iron pipe, about 30–50 cm from the molehill. Use a spade to remove a 25 cm section.
- Rub the traps with dirt to eliminate odors and place them 10 cm below the surface on both open ends of the tunnel.
- Place a stick (which is visible above the surface of the soil) in the trap spring to identify its location.
- Recover the tunnel entrances with a little grass. Inspect the traps after 1–4 hours. Reposition those that have been covered with earth. Do not leave them overnight as some predators carry away the traps along with the voles. Leave the tunnel entries open and do not move the sticks. Flatten the molehills and inspect after 1–2 days to see if the entrance has been blocked.

Gassing:

1. In areas where the presence of voles is suspected: find the tunnels using a stick and enlarge the entrances.
2. Inspect several hours later. If the tunnels are blocked again, open them and flood them with gas for 3–5 minutes until it exits from the other end of the tunnel. Mark the site and flatten the molehill. For meadow voles, work with a partner. One person concentrates on closing tunnel entrances.
3. Inspect 2–3 days later and re-gas the tunnels if necessary.

For both economic and environmental reasons, only the lowest possible level of phytosanitary protection should be used for standard orchards.

Some phytosanitary treatments are needed outside of the vegetative growth period, such as sticky tape to catch moths or removal of fruits mummified by brown rot and diseased wood.

Appropriate equipment can mean significant savings

Using machines for harvest can cut costs considerably. To do so, it is important to grow varieties that can be easily machine harvested.

Since the 1960s there have been an increasing number of machines invented to make work safer and more efficient. Nevertheless on most farms ladders are still used for pruning, and harvesting is still done by hand, which adds up to a lot of labor. Many of the machines described in this section are specifically designed for orchards, while others, like hydraulic ladders, are used for a wide range of applications.

Accident prevention during harvest:

- Use only well-maintained ladders in good condition that have stakes and safety straps.
- Wear a safety belt and shoes with non-skid soles.
- Establish limits for maximum tree height.
- During the harvest of ((missing text?))

Establishing what equipment is appropriate:

- Is the orchard large enough to make it profitable to use equipment?
- Is it possible to jointly purchase machinery with other farms?
- Is it possible to rent these machines from a co-op or hire a specialized company to complete the work?



Using a machine for harvesting is also profitable for small orchards.



Safer and more practical than traditional ladders, hydraulic ladders are economically viable for maintenance and harvesting in large orchards.

Machines and equipment for efficient maintenance and harvest

| Machine/Equipment | Purpose | Capacity | Labor | Cost (in Swiss Francs) | Profitability assessment* |
|----------------------------------|------------------------------------|---|-------|------------------------|--|
| Manned harvesting machine | Cider fruit, nuts | 1,250 kg per hour | 2 | 10,000 | More cost-effective than manual harvest after 43 trees |
| Automatic harvesting machine | Cider fruit, nuts | 2,700 kg per hour | 1 | 23,000 | More cost-effective than a manually driven machine after 600 trees |
| Hydraulic ladder | Pruning, tying branches | 3 times faster than with a traditional ladder | 1 | 25,000–30,000 | More cost effective than a traditional ladder after 290 trees |
| Shaker | Cider fruit, nuts | 75 trees per hectare | 1 | 180 per hectare | More cost effective than manual shaking after 5 trees |
| Cherry tree shaker and destemmer | Cherries for processing and brandy | | 2 | 3,300–5,300 | See case study |

*According to the data presented in «Profitability Assessment for Cider Fruit Production» by Hitz and Locher, HWV Aargau, Switzerland, 1996 (article only available in German) and Technical Report 3/91 from the Swiss Center for Arboriculture.

High quality fruit is an absolute necessity

Fresh market fruit

Fresh market fruit from standard orchards are especially important for self use and direct sales. Organic label quality standards should ensure that all fruit sold is of high quality and visually appealing.

Cider fruit

Cider fruit must be ripe, healthy and clean when delivered to the processing site and must not be damaged during storage. It must be processed as rapidly as possible, which requires good coordination between the delivery personnel and the processor. Storage in bags can diminish the quality of the fruit. At the end of fall, shake the trees so that the rest of the fruit falls onto clean, mowed grass. When fruit is mechanically gathered or the grass is too short, the fruit often gets dirty. Inspect the quality of machine-gathered fruit when it is emptied into the truck. Take care to remove every piece of rotten fruit. It only takes several rotten pieces to be noticeable in the juice. In damaged parts of fruit, microorganisms can produce patulin, a substance that is toxic to humans (regular analysis by laboratory recommended).

What varieties can be mixed to make good apple juice?

To make good juice use a mix of fully ripe varieties with high acidity levels and strong flavor with varieties that press easily or less easily. Using 10–30 % pear juice results in smoother, more full-bodied juice that is easier to digest. Only special varieties are suitable for the production of pure apple juice or apple cider.

Varieties that are particularly well suited for juice production have the following characteristics:

- Easy to press, with high juice yields, even when fully ripe
- High sugar content, which is especially necessary for vinegar and apple cider
- Pronounced acidity



Just a few rotten apples will spoil juice from many tons of fruit. Unripe, damaged or dirty fruit should not be used for cider production.

For both fresh market and processing fruit, only top quality products will satisfy buyers' demands.

Stone fruits

Stone fruit from standard orchards are primarily used for the processing industry and brandy production. Organic agriculture specifications and buyers impose strict quality standards (size, color, cherry fruit fly damage, etc).

Processing fruit can be mechanically harvested. This requires good organization as well the following: a shaker or vibrator, a washer, a destemmer and a tarp for collecting the fruit. To obtain high quality and good yields for brandy production, it is necessary to wait for the fruit to reach optimum ripeness to ensure high sugar content in the fruit. A refractometer allows the correct harvesting time to be determined. The market rewards high sugar content with a quality premium. Fruit for brandy production must be washed, destemmed and stored in a cool place the same day that it is harvested or soaked.

Standard orchards can be profitable, if labor is minimized

Mechanization is the surest path to profitability. If larger profit margins are to be obtained through direct sales, on-farm processing or market fruit production, labor and investment requirements must be carefully calculated.

As a standard orchard is a long-term operation, it is difficult to predict its profitability. Something that is valuable today may not be in the future. However, farmers can influence the economic performance of their orchards by choosing appropriate production techniques and aptly managing product marketing. Only suitable sites and well-maintained trees will result in worthwhile yields and high quality.

Collaboration between farms (common equipment use) can drastically reduce costs and increase revenue. The labor required for harvest can vary greatly based on the variety, yields and degree of mechanization. For an orchard producing cider fruit (medium yields), a labor estimate is 150–200 hours per hectare, or 2.1–2.8 hours per tree. This time can be significantly reduced by using shaker and collection equipment.

Subsidies are necessary to balance the books

In the 1990s prices for organic fruit consistently remained 20–30 % higher than conventional fruit prices. Even with high yields and good prices, organic farm operating costs cannot be covered without direct organic farm subsidies or environmental contributions.

Potential contributions for standard orchard products and by-products (in 2000):

- Annual direct government subsidies per tree: 15 CHF
- Annual cantonal contributions per tree: up to 30 CHF (depending on the canton)
- Fodder production products: 6–10 CHF
- Additional direct subsidies based on the regulations for environmental contributions for fodder production: 450–1,500 CHF/ha (7–20 CHF/tree)
- Revenue for the sale of high quality wood for furniture making (300–4,000/ square meter of wood)

Expected yields for trees in full production

| | |
|--------|------------------|
| Apple | 250 (100–350) kg |
| Pear | 300 (250–350) kg |
| Cherry | 150 (100–200) kg |
| Plum | 120 (100–150) kg |

Labor per tree

| | |
|--|--------------------|
| Pruning (at least every 2 years) | 45–75 min. |
| Disease protection, pest control, auxiliary land cultivation | 5–10 min. |
| Other work: mowing, continued training | 20–25 min. |
| Total labor (not including harvest) | 70–110 min. |

Annual production costs per tree ¹⁾

| | CHF |
|---|------------|
| <i>Fixed costs (investments):</i> | |
| Land assets (interest) | 6 |
| Plant assets (amortization and interest) | 30 |
| Equipment (clippers, saws, etc) | 3 |
| Total fixed costs | 39 |
| <i>Variable costs (maintenance):</i> | |
| Winter pruning/summer pruning, removal of pruned wood | 29 |
| Cultivation of auxiliary areas | 5 |
| Maintenance and other work: mowing around trees, rodent control, tying branches, purchasing, continued training | 32 |
| Farm inspections, dues, etc. | |
| Total variable costs (not including harvest) | 66 |
| Total fixed & variable costs (not including harvest) | 105 |

¹⁾ Not including harvest, packaging and marketing costs. Costs based on 70 trees per hectare with most fruit for cider production, and on 23 CHF per hour for labor.

Case Study 1: High Yield Cider A

| | CHF per tree |
|--|--------------|
| Fixed and variable costs | 105 |
| Harvest costs at 250 kg/tree (2.5 hours of manual labor) | 57 |
| Sale of fruit at 33 CHF per 100 kg | 83 |
| Difference between costs and revenue | 80 |
| Direct subsidies/contributions | 50 |
| Deficit (without fodder harvest) | -30 |

Case Study 2 : Cost reduction using a harvesting machine

| | CHF per tree |
|--|--------------|
| Harvest costs at 250 kg/tree (20 minutes of labor) | 15 |
| Reduction in costs compared with manual labor | 42 |
| Profit (without fodder harvest) | 12 |

(Source: Technical Report 3/91 from the Centrale suisse d'arboriculture)

Case Study 3 : Cherries for the processing industry: cost analysis for manual/mechanized harvest

| | Cable shaker | Manual harvest |
|-----------------------------------|------------------|-------------------|
| Yields per hectare | 10 t | 10 t |
| Quantity harvested man-equivalent | 50 kg | 14 kg |
| Maintenance and other costs | 11,637 CHF | 11,637 CHF |
| Harvest costs: | | |
| Work | 3,633 CHF | 11,637 CHF |
| Tractor, trailer | 855 CHF | 591 CHF |
| Cable shaker | 589 CHF | |
| Destemming machine | 812 CHF | |
| Total harvest costs | 5,889 CHF | 12,911 CHF |
| Production costs/ha | 17,526 CHF | 24,548 CHF |
| Production costs/kg | 1.75 CHF | 2.45 CHF |

Promotion and advertizing: good marketing plans pay off

Take advantage of market niches

Direct sales

- Customer contact through sales at the farm or at markets provides the opportunity to sell a wide range of species and varieties that are not of interest to large retailers.
- The phrase "Produced in a Standard Orchard" increases the credibility of the product's environmental soundness

Regional marketing

- For regional marketing and fresh market sales, storage, sorting and packaging are very important. These issues should be addressed before harvesting begins.
- A wide range of flavors and varieties is advantageous.
- Good communication channels and the farmer's availability are not top priorities.

Wholesale distribution

Wholesale distribution requires the delivery of large quantities and has higher quality standards. This niche is generally reserved for large specialized farms. For the delivery of processing fruit, volume and transportation must be arranged with the processors. Processing also has high quality requirements. Rotten or under-ripe fruit must be carefully removed.



A good marketing strategy incorporates the structure and geographic location of the farm, mechanization and available labor.

School groups enjoy watching apple juice pressing demonstrations.



Fresh fruit and processed products from standard orchards (such as apple juice and dried apples) are good profit makers when sold directly.







Nothing works better than good advertizing

To ensure that standard orchard fruit is sold, and to obtain a good price, significant marketing work is necessary.

Proven marketing ideas:

- Host a day where the farm is open to the public
- Display and tasting of different varieties
- Farm visits for nature conservancy groups, school classes, journalists and so on.
- Flyers showcasing the farm and its products.
- Create signs with information about standard orchards on walking paths at the orchard edges
- Collaborate with nature conservancy groups on projects to protect endangered species, natural spaces or communal lands
- Offer sponsor-a-tree options
- Belong to an association for the development of standard orchards.
- Create interprofessional committees with retailers and processors.

Standard orchard cultivation calendar

| | January | February | March | April | May | June |
|-------------------------------|---------|----------|---|--|-------|-------|
| All fruit tree species | | | A | D | | E |
| | | B | | J | | |
| | C | | | | | |
| | 2 | | | | | |
| | | |  |  | | |
| Apple trees | | | | 3 | 4 5 6 | 8 9 |
| | | | |  | | |
| Pear trees | | | | 3 | 5 6 | 7 8 9 |
| | | | |  | | |
| Cherry trees | | | 3 | 4 5 6 7 8 | | |
| | | | |  | | |
| Plum trees | | | 3 | 4 5 | | |
| | | | |  | | |
| Quince trees | | | | 1 | | |

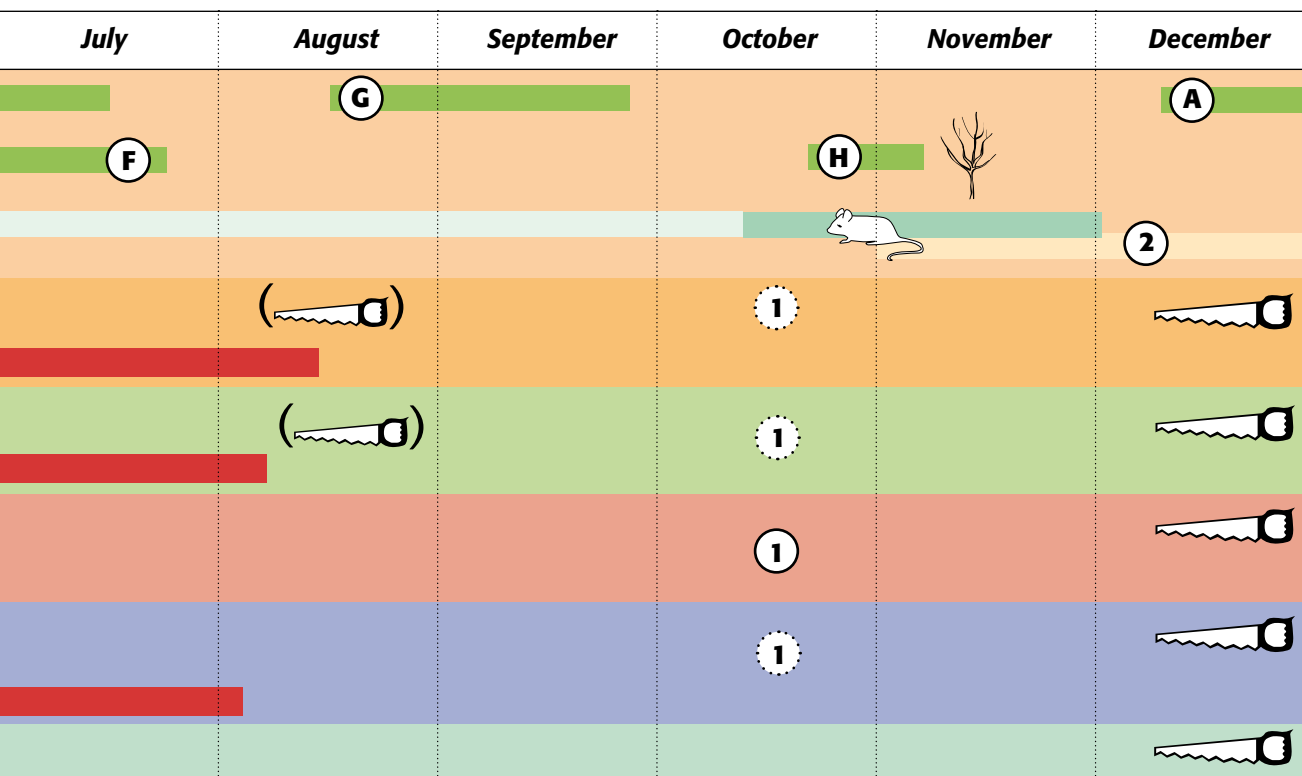
Inspection frequency and treatment intensity are determined based on the sensitivity of different varieties and the quality of fruit desired.

- A** Take soils samples; prepare to add compost, manure or commercial fertilizer containing phosphorus, potassium, calcium and magnesium; also prune and revitalize trees.
- B** Plan for phytosanitary measures and develop a marketing strategy for the coming season; have equipment serviced and order phytosanitary products.
- C** Repair tree protection structures before pasturing.
- D** Remove blossoms from overly productive young trees, cut grass or cover it with mulch.
- E** Remove competing branches on young trees; begin appropriate fertilization if signs of deficiency appear; adjust fertilization depending on how intensively grasslands are used.
- F** After June, eliminate excess fruit, prune cherry trees during or after harvest and train young trees. Order new trees.
- G** Train young trees and the end of the growing season. Plan to prune them during the summer. Mow or utilize pasturelands before harvest.
- H** Cut any plants not consumed by grazing animals to keep the rodent population down.
- J** Attach flowerpots filled with wood wool to young tree branches as shelters to encourage the presence of aphid predators.
- 1** For fresh market fruit production: starting in mid-July on sites affected by sooty mold or fly dropping disease, carry out 1-4 applications of coconut oil soap (0.8 %) diluted in a large quantity of water (20–30 liters per large tree).
- 2** During the winter months: cut twigs and terminal buds that are infested with powdery mildew. Remove fruit that was mummified by brown rot and diseased wood to prevent infection. There is no organic plant protection product to fight brown rot.
- 3** Bloom: preventative treatment against scab and powdery mildew as detailed in point 3 above.
- 4** Petal fall: preventative treatment against scab and powdery mildew as detailed in point 3 above. When more than 60 % of the leaves are infected by yellow mites, apply soft soap (2 %) mixed with a large quantity of water (20–30 l per large tree).
- 5** For pear trees only: when lice or aphid infest 40 % and 70 % of twigs (respectively), apply feverfew or rotenone (0.1–0.2 %). Watch development until August.
- 6** Treat with feverfew or rotenone (0.1–0.2 %) if a significant infestation of aphids is present, especially on young trees.
- 7** Fruit development until the end of the growing season: starting in June (based on the recommendations of phytosanitary services) carry out 3-4 treatments against the fruit-tree leafroller with granulosis.
- 8** For apple trees: when lice or aphid infest 40 % and 70 % of twigs (respectively), apply feverfew or rotenone (0.1–0.2 %). Watch development until August.
- 9** For pear trees only: when lice or aphid infest 40 % and 70 % of twigs (respectively), apply feverfew or rotenone (0.1–0.2 %). Watch development until August.
- 10** For fresh market fruit production: starting in mid-July on sites affected by sooty mold or fly dropping disease, carry out 1-4 applications of coconut oil soap (0.8 %) diluted in a large quantity of water (20–30 liters per large tree).

Primary phytosanitary problems and proper response:

Apple and Pear Trees

- 1** In October, after harvest, trap female winter moths by placing sticky tape on tree trunks.
- 2** During the winter months: cut twigs and terminal buds that are infested with powdery mildew. Remove fruit that was mummified by brown rot and diseased wood to prevent infection. There is no organic plant protection product to fight brown rot.



- Planting
- Training and pruning
- Repeated inspections of canopy to locate pests
- Rodent control
- 1** Repeated inspections of canopy to locate pests
- 1** Inspections and treatments of secondary importance

- 3** From green tip to bud burst: prophylactic use of a clay-based product (1 %) against scab and powdery mildew (1–3 times). When temperatures rise above 12 °C, replace the clay with wettable sulfur (0.6 %, in June, 0.3 %).
- 4** From bud burst stage to bloom: apply a product with 0.3 % neem against the bedstraw aphid (treatment threshold: >5 aphids/100 buds); do not use neem-based products on pear trees as they will severely burn the leaves. Carry out preventative treatment against scab and powdery mildew as detailed in point 3 above.

Cherry trees

- 1** In October, after harvest attach sticky tape to tree trunks to trap winter moths.
- 2** During the winter months: eliminate mummified fruit and infected wood to combat brown rot, bitter rot and wood and bark diseases
- 3** From bud burst to green tip: 1–2 preventative treatments against shoot blight with a clay (1 %) or copper-based (0.05–0.2 %) product. If the possibility of infection is high, repeat the treatment until the bloom phase is over. If temperatures rise over 12 °C, replace with wettable sulfur (0.6 %).
- 4** From green tip to bud swell: preventive treatment against shoot blight (see point 3).
- 5** From bud swell to bloom: treatment with *Bacillus thuringiensis* to repel moths
Treatment conditions: >7 caterpillars/100 inflorescences and temperatures above 15 °C.
- 6** Bloom: preventive treatment against shoot blight (see point 3).
- 7** Treatment with a feverfew or rotenone-based product (0.1–0.2 %) if the threshold of more than

- 7 black cherry aphids per 100 inflorescences is exceeded.
- 7** Petal fall: anti-moth treatment (see point 5). Preventive treatment against shoot blight (see point 3).
- 8** Fruit development until end of growing period: when the fruit changes from green to yellow (mid-May) set traps for cherry fruit flies (except for the early varieties) in the south, east and west (1 Fructect trap or 4–8 Rebell traps per tree)
No direct intervention against bitter rot.

Plum trees

- 1** In October, after harvest attach sticky tape to tree trunks to trap winter moths.
- 2** During the winter months: remove fruit that was mummified by brown rot and diseased wood to prevent infection.
- 3** Bud break: treatment with 0.2 % copper solution if significant pocket plums infection was present the year before.
- 4** From bud swell to bloom: use a feverfew or rotenone-based product (0.1–0.2 %) against the green plum aphid (>5 aphids per 100 inflorescences).
- 5** Bud swell: for large areas (>30 trees) install 1,000 pheromone diffusers/ha, concentrated on the edges of the orchard, to combat fruit-tree leaf rollers.

Quince trees

- 1** Treat early for quince powdery mildew (when the first leaves unfurl)
Treatment: same as for scab.
- 2** Remove wood infected with brown rot.

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This FiBL guide has been translated to English by OACC from its original Swiss German Edition. It was written and produced by FiBL for European organic producers, and reflects European conditions and terminology. Therefore, OACC recommends that Canadian growers consider the suitability of the information for their farms and adapt it only with awareness of the context of the original conditions. It is hoped that Canadian organic producers will nevertheless find much of the information beneficial.

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