# Agroforestry with standard fruit trees in Switzerland

**Improving production and enhancing biodiversity**
www.agforward.eu



**High stem apple trees in combination with winter wheat.** *Ref : Felder 2015*

## Why plant fruit trees?

There are various reasons why farmers in Switzerland have increasingly combined fruit trees with crops in recent years. One important motivation is to reduce soil erosion, and other benefits include the reduction of nitrate leaching, and increased carbon sequestration and biodiversity.

Through intercropping, farmers are benefitting from increased productivity and product diversification since, in addition to arable crops, they gain the profits of a fruit harvest. Farmers also receive direct payments for their ecosystem service. The Swiss agricultural policy, which is independent from the EU Common Agricultural Policy, promotes the planting of standard fruit trees on agricultural land. Tree contributions are paid irrespective of whether they are traditionally combined with grassland, pasture or in combination with crops.

## How to plant

Agroforestry systems with cultivated or wild fruit varieties, offer many possible combinations. Depending on soil type and rainfall distribution, all stone and pip fruit trees can be planted.

When combined with wild fruit species (e.g. mulberry, *Sorbus* species, wild pear, wild apple), a lower labour demand for tree care can be expected. However, it will take longer for the trees to produce a substantial yield of harvestable fruit. If the harvest and processing of wild fruits are of interest, large fruiting varieties should be chosen.

Planting in a north-south direction is recommended to reduce shading of the crops. Within the rows, the tree distance should be 10-12 m for apple and pear trees and 10 m for wild fruit varieties. Between rows, spacing should be 18 - 26 meters to facilitate access by agricultural machinery.

The trees are planted in a 2 m wide tree strip, which is sown with grass. The grass must be regularly mulched or mown in order to limit the population of mice. Especially in the case of walnut trees, the grass around the trunk has to be kept very short or even suppressed in the first few years, to minimize grassland competition with the trees. It is recommended that trees are planted starting from the middle of November in order to make use of winter humidity for the growth of the young trees.



**Mulching of the tree strip in an agroforestry system with chestnut and spelt.** *Ref: Jäger, 2016.*



**Optimal plant protection in a newly planted agroforestry system with fruit trees: stable support post on the windward side, protection against browsing and fraying on the stem base.** *Ref: Jäger, 2016*

## Advantages

- Fruit trees have a positive influence on the surrounding biodiversity - they offer an additional habitat for birds and insects.

- Through the leaf fall of the trees and the developing root system, soil humus can be enriched, thus improving soil structure and water holding capacity.

- The fruit produced can also contribute additional income and be processed into high-quality products. Therefore, great attention should be given to the selection of varieties and a clear marketing goal should be developed.
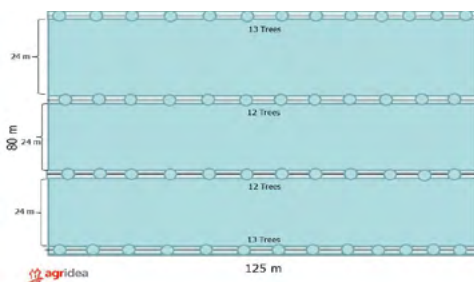


During harvesting time, the fruit has to be collected with tarpaulins or special catchers in order to avoid damage. *Ref : Jäger, 2015*

**Mareike JÄGER, Félix HERZOG**
Mareike.jaeger@agridea.ch
*AGRIDEA, Lindau*
www.agforward.eu

November 2017

Typical planting scheme in an agroforestry system with fruit trees and arable crops. *Reference: Jäger, 2016*

## Tree yield

Standard fruit trees can yield approximately 100 kg of fruit per tree 10 years after planting. Swiss agroforestry systems have an average of 50 trees per hectare (see planting scheme). The tree component (i.e the tree strip) is approximately 10% of the area. Therefore, under optimum conditions, a fruit yield of 5 t/ha can be expected, in addition to the crop yield from the remaining 90% land area, starting 10 years after planting.

However, the high maintenance cost of fruit trees is not to be underestimated. On average, maintenance and harvesting require about 120 working hours per hectare. For comparison, one hectare of arable crops (organic crop production) requires about 50.5 working hours. The economic viability of the system is therefore dependent on: the fruit yield and the income from sales, the costs for tree maintenance and any direct payments for ecosystem services (e.g. biodiversity and resource protection).

## Crop yield

Agroforestry systems with fruit trees are still relatively new in Switzerland. So far, no loss of yield has been observed due to shading by the trees. As the age of the trees increases, the yield of the arable crop is expected to decrease due to shading by the tree crowns.

## Pests and diseases

Depending on weather conditions, standard fruit trees can be attacked by fungal, bacterial and viral diseases common to these species. It is important to select healthy and robust varieties. Plant protection management is very demanding. Under no circumstances should trees be treated with plant protection products while arable crops are underneath, because there may be a conflict with the consumer safety regulations that restrict the application of pesticides for certain crops and during a certain period before harvest.

## Harvesting and marketing

There is only a narrow time window available for the mechanized fruit harvest. For this reason, varieties should be chosen that can be harvested in the period between the crop harvest and the sowing of the following crop. High revenues for fruit products can be achieved through direct marketing. Possible marketing outlets should be evaluated before planting.

## Further information

Kuster M, Herzog F, Rehnus M, Sorg JP (2012). Innovative Agroforstsysteme - On farm monitoring von Chancen und Grenzen / Systèmes agroforestiers novateurs - monitoring des opportunités et limites. Agrarforschung Schweiz / Recherche Agronomique Suisse 3(10): 470- 477.
Jäger M (2016). Agroforstsysteme – Hochstamm, Wildobst- und Laubbäume mit Kulturpflanzen kombinieren. https://agridea.abacuscity.ch/de/A~3048/0~0~Shop/Agroforstsysteme
Agroforestry Network Switzerland: www.agroforst.ch.