

# IMPLEMENTING SWEET CHESTNUT TREES IN BELGIAN AGROFORESTRY SYSTEMS

Why sweet chestnut trees and how to get started?



## THE WHAT AND WHY

### What do (sweet) chestnut trees have to offer?

Chestnut trees have been cultivated for centuries in Europe for their nuts and/or timber. Mountainous countries in the South are traditionally the largest producers of chestnuts in Europe. Although remaining a marginal crop, healthy chestnut industries are recently expanding over less rugged terrain.

Sweet chestnuts are the species with the highest economic importance. European sweet chestnut (*Castanea sativa*) originates from southern Europe, Asia and northern Africa. Its broad crown can reach a height of 30 m and more during its 250 to 500 year life span. Japanese chestnut (*C. crenata*) is a tree, introduced to Europe because of its resistance to chestnut blight. Euro-Japanese hybrids have been selected for their

excellent nut quality. Chestnuts are rich in carbohydrates (comparable to wheat and rice) and sugar while low in fat. Together with the rich flavour this makes chestnuts very attractive for consumers. Most of the produced nuts are directly consumed fresh, roasted, fried or boiled. There are also several value-added products. For example, some varieties are used for making gluten-free chestnut flour or bee hives are moved in chestnut orchards to produce chestnut honey.

Chestnut timber is highly valued for its colour, natural durability and ease of working. It is widely used for outdoor posts, furniture and flooring. The tannin rich wood makes the use of chestnut timber very sustainable.



Young plantation of European sweet chestnut (*Castanea sativa*) in an agroforestry system in Flanders.  
Inagro



Detail of male and female flowers  
Martin Crawford

## HOW IS THE CHALLENGE ADDRESSED

### The right tree in the right place

In the temperate climate of Belgium, the deep-rooting sweet chestnut trees grow well in the shade as well as full sun and are relatively drought-tolerant. A continental climate (hot summers, cold winters) is preferred. In cooler temperate climates, the European sweet chestnuts (and hybrids) usually are the best choice. Apart from heavy clay soils, they tolerate a range of soil types with a preference for well-drained loam soils. Optimal pH ranges from 5 to 6, but they also thrive on more acid soils. Blooming of male and female flowers is time-separated, meaning they seldom self-pollinate. Pollination (June – July) is wind-driven, although bees and other insects become increasingly important in humid and cold conditions. In terms of chestnut production, it is therefore advised to provide

a good pollinator cultivar for every 3 trees planted and plant different varieties.

In agroforestry systems, a minimal planting distance of 12 m in-rows and 20 m between rows is advised (e.g. density of 40 trees per ha) because of the broad crown resulting in a lot of shade. Minimal feeding (N and K) of the trees up to an age of 5 - 8 years can be useful on poor soils. Irrigation is needed with young trees in periods of severe drought, while mulch around the tree is always a good option when young. Except for some typical formation pruning in the first 3 to 4 years (removing low branches that can interfere with the harvest and access underneath the trees) relatively little pruning is required later on when aiming at chestnut production.



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## HIGHLIGHTS

- Nutritious nuts are very attractive to consumers and timber is highly valued
- European chestnut trees thrive in a wide range of climatic and soil conditions
- Broad crown and relatively slow decomposing litter make chestnut trees less interesting in silvoarable systems.
- Special attention needed in the prevention of several wide-spread pests and diseases



Productive chestnut tree  
Inagro

### FURTHER INFORMATION

Crawford, M. 2016. How to grow your own nuts. Choosing, cultivating and harvesting nuts in your garden. Green Books, Cambridge, UK, 320p.

Chastaing S., Méry D., Pages G. Tournade J. 2015 Conduite du châtaignier en agriculture biologique dans le sud-ouest. Chambre d'agriculture Dordogne. ([http://lot-et-garonne.chambagri.fr/fileadmin/telechargement/Productions\\_vegetales/GuideChataignierAB\\_OK\\_Web.pdf](http://lot-et-garonne.chambagri.fr/fileadmin/telechargement/Productions_vegetales/GuideChataignierAB_OK_Web.pdf))

Gauthier Michel. Les carnets du Croqueur de pommes - le châtaignier. ISBN 978-2-909717-63-0

More information (in Dutch) on the usage of sweet chestnuts in agroforestry systems can be found on <https://www.agroforestryvlaanderen.be/NL/Kennisloket/Boomspecificieinfo/tabid/9776/language/nl-BE/Default.aspx>

Within the European AGFORWARD project innovation leaflets have been written on chestnut trees in agroforestry systems (17. Protecting trees in chestnut stands grazed with Celtic pigs; 18. New approaches for producing selected varieties of chestnut). These can be found on <https://www.agforward.eu/index.php/en/Innovation-leaflets.html>

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## ADVANTAGES AND DISADVANTAGES

# Creating and managing a productive agroforestry system with chestnut trees

### Silvoarable or silvopastoral systems?

Shade resulting from the broad crown of full-grown trees and the slowly degradable leaf litter makes chestnut trees less suitable for silvoarable systems on the long term. Silvopastoral systems with increased animal welfare due to shade and shelter offered by the trees is a better option.

### Choosing the right variety

Variety choice is especially important when the focus is on chestnut production. The choice mainly depends on the climate and the usage of nuts. Sweet chestnuts come in a range of varieties each with their own harvest period, nut flavor and shape, preferred climate and resistance to pests and diseases. Late-ripening cultivars are usually better suited to warmer climates and store better than the early-ripening ones.

Some of the best French varieties interesting in the Belgian context:

- Early season: 'Marigoule', 'Vignols'
- Early to mid-season: 'Marron Comballe', 'Précoce Migoule'
- Mid-season: 'Bouche de Bétizac', 'Marron de Goujounac', 'Marsol'
- Mid- to late season: 'Belle épine', 'Bournette', 'Dorée de Lyon', 'Maraval', 'Marlhac'
- Late season: 'Bouche Rouge', 'Maridonne'

### Harvesting and yields

Harvest period in temperate regions is from September to November. Nuts should be collected directly after falling or shaken from the trees. They can be hand-harvested or automatically with vacuum and sweeper harvesters. Starting from the age of 5 (variety dependent), the first small amounts of nuts can be harvested. The production peak is reached at the age of 12 - 15 years, with high production from then onwards. Average yields in agroforestry plantations are estimated around 1.5 - 2 tons per ha per year (i.e. 15 - 25 kg per tree), assuming a density of 70 trees per ha. To increase production in the first years, planting at half of the recommended planting distance is possible, but requires thinning after 10 years.

### Pests and diseases:

- Oriental chestnut gall wasp (*Dryocosmus kuriphilus*): lays eggs on terminal buds and limits tree growth and fruit development (up to 80% loss in case of severe infestation). Biological control by parasitic wasps can be a solution. In smaller orchards, pruning and destroying infested branches can also be a way of reducing infestations.
- Chestnut weevils (*Curculio elephas*) and moth (*Pammene fasciana*): feed on the kernel of chestnuts just before harvest. Pheromone traps or housing animals under the trees (chickens) just before and after harvest can be a solution.
- Chestnut blight (*Cryphonectria parasitica*): parasitic fungus attacking aerial parts of the trees through wounds. This seems less devastating in Europe (due to hypovirulence) than it was in the past for the American sweet chestnut, but can loss can still be significant regionally. Disinfect your pruning materials and pay attention to the origin of your plants.
- Ink disease (*Phytophthora cinnamomi*): fungal disease attacking the trunk base through the roots. Roots cease growing and release a black liquid (oxidized tannin). Avoid standing water around the tree roots as this is an efficient dispersal medium. Research is going on to find or breed resistant varieties.