MANAGING THE TREE ROW UNDERSTOREY IN AGROFORESTRY SYSTEMS

A range of possibilities

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THE WHAT AND WHY

The tree understorey – challenges and opportunities

In a silvoarable agroforestry field, there is always a certain area under the tree canopies (e.g. strips of land under the tree rows in alley cropping systems), where it is difficult to cultivate the main crop. We call that the tree row understorey here. However, these areas can have several important functions: (i) tree protection against possible damage through e.g. agricultural vehicles, (ii) giving access to the tree row for tree maintenance or fruit harvest, (iii) a range of ecological aspects like habitat function and food provision for beneficial biodiversity. The tree row understorey can also be part of the AF production system itself, although the management of this area seems often to be a challenge where following questions need to be addressed:
(i) What is the optimal width of the tree row understorey?
(ii) What is the best way to manage this area?
Managing the tree row understorey in silvoarable practices can be done in many ways, and will depend on the main objective of the trees, the type of understorey vegetation, the available machinery and the amount of time one can or wants to spend.

Sowing a mixture of green manures is one option to manage the tree understorey. Furthermore, hazelnut shrubs are planted in between the trees.
Bert Reubens - Consortium Agroforestry Vlaanderen

Short rotation coppice (hazelnut) at an agroforestry field at Wakelyns farm.
Victoria Nelissen - Consortium Agroforestry Vlaanderen

HOW IS THE CHALLENGE ADDRESSED

A range of possibilities for managing the tree understorey

There is a range of possibilities for managing the tree row understorey:

- Controlling the understorey vegetation through mowing.
- Keeping a strip with bare soil under the tree canopy.
- Controlling grasses and weeds through the use of mulch materials.
- Sowing a cover crop or a flower mixture.
- The tree row understorey could also be cultivated with short rotation coppice, berries or hazelnut shrubs, or through the introduction of alternative crops like herbs, flowers, or perennial crops.

Generally, a width of at least 2 m is recommended (1 m on each side of the trees). However, if you want to manage the strip mechanically, a width of 2 m on each side of the trees is better. The width can be adjusted as the trees grow older; but reducing the width by e.g. ploughing half a meter closer to the trees after 5 years would damage tree roots with negative future consequences for tree growth and health. Conversely, it is advisable to broaden the strip after a couple of years, for instance to harvest fruit more easily.

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HIGHLIGHTS

- Managing the tree understorey is a function of the main objective of the trees, type of understorey vegetation, available machinery and the amount of time one can spend.
- Possibilities are mowing, keeping the area free from vegetation, the use of mulch materials, sowing a mixture of green manures, or introducing short rotation coppice, berries, etc.
- Generally, a width of at least 2 m is recommended.

Keeping the area under the walnut trees free from any vegetation, in order to facilitate nut harvest and other activities such as fertilizing the trees.
Bert Reubens - Consortium Agroforestry Vlaanderen

FURTHER INFORMATION

More information (in Dutch) on the management of the tree understorey in agroforestry systems can be found at https://www.agroforestryvlaanderen.be/NL/Kennisloket/Praktischeaanpak/Beheer/beheerboomstrook/tabid/9437/language/nl-BE/Default.aspx

BERT REUBENS
Flanders Research Institute for Agriculture, Fisheries and Food (ILVO, Belgium)
bert.reubens@ilvo.vlaanderen.be
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ADVANTAGES AND DISADVANTAGES

Evaluate the feasibility of each option

Leaving the tree row understorey undisturbed can result in the development of undesirable plants, which can then be spread throughout the field in arable lands. Furthermore, uncontrolled growth of grasses and herbs can reduce tree growth. Controlling the understorey vegetation through mowing before seed production can reduce the spread of weeds in the field. However, farmers need to be careful to avoid tree damage, and weeds that are spread through rhizomes won't be controlled sufficiently.

Keeping the strip under the tree canopy free from any vegetation could be advantageous for fruit or nut harvest, and facilitates other activities such as fertilizing the trees.

Another option is to control the grass and herbs in the understorey vegetation through the use of mulch materials. Many materials are available: wood chips, coconut/hemp/miscanthus fibre, cacao shells, bioplastics, geotextile, etc. Each type of material has its own (dis)advantages, but the use of these kind of materials is often expensive, limited in lifespan and rather labour intensive but it increases soil organic matter and fertility and maintains temperature and humidity for the tree growth if placed around the tree. Furthermore, the additional ecological advantages of an understorey vegetation, such as the creation of food and a habitat for beneficial biodiversity (pollination and natural pest control) and other animals, will be missing at short term.

In order to suppress weed growth and to create a habitat for beneficial biodiversity, a mixture of cover crops (grass species and leguminous plants) could be sown. This will also force tree roots to grow below the root zone of the crop and be better anchored, due to the competition for water in the top layer of the soil. In this way, it is expected that there is less competition between the crop and the trees for water in the future.

A flower strip will function as food source for insects, which will increase beneficial biodiversity. However, practical experience shows that it is not easy to install and to manage a flower strip in a tree row, and that it is inevitable that undesirable grasses will become dominant after a few years.

The tree row understorey could also be part of the production system itself through the cultivation of short rotation coppice, berries or hazelnut shrubs, or through the cultivation of alternative crops as herbs, flowers, or perennial crops like artichoke, rhubarb, mushrooms, etc.