

Managing an orchard without tillage. I.

Design, roads, terraces, irrigation system, planting

In a garden without tillage, **all structures can be permanent**, they can be maintained from one year to the next. **The lines consist of a series of elements**: the permanent path to move around, the groove through which the main hose passes (which is usually filled with **BRF** or **compost**), and the two rows of crop plants. **Planting is a slow process**, because the soil is not loose and often requires tools, such as a **double-handed pitchfork**, to facilitate opening the holes to plant in.

■ Managing a non-tillage garden

The main characteristic that defines the orchard management proposed is the fact that the soil is not tilled. This basically implies leaving the soil intact, so that its structure is not broken and its biological activity is much better maintained. An important advantage of this system is that the orchard's structures can be maintained from one year to the next, but other aspects such as planting the crops or removing adventitious plants require more effort. In this sheet and in the next one ('Management of a garden without tillage II: control of adventitious plants, use of forest products, biofertilisers, fertilisers, grazing), the different aspects of managing a garden with these characteristics are described.

■ Orchard design according to the Planeses model

When designing a **non-tillage orchard**, the **Planeses farm garden will be used as a model (Figure 1)**. The aspects described below must be adapted in each case to the characteristics of the orchard to be designed.

In this type of orchard **all the structures can be permanent** because they are not carved, the design can be maintained from one year to another, including large and small paths, irrigation structures or stakes for supporting plants that need them.

The main elements of the Planeses garden are:

- The garden has a **large perimeter system** and central roads to be able to move around easily and facilitate movement with loads of the various materials that must be transported in the garden: BRF, plants and the different crops obtained from the garden.
- The garden has a **central transversal path where two mobile laying hens coops are located**. In this way, the coops can move every day up to the height of the crop lines, to the area where it has been decided that it is more appropriate for the chickens to graze. **Meshes are placed from the hen house to enclose several crop lines**. At night the hens are locked in the hen house again.

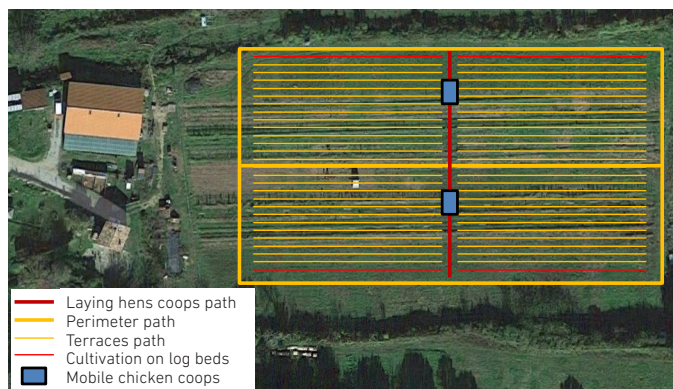


Figure 1. Distribution of the different elements of the Planeses garden (Girona, Spain).

- **The Planeses orchard has been designed with 1 m wide lines arranged in an east-west direction.** The lines are limited by **small permanent paths 0.5 m wide**. In this way, the entire line can easily be accessed from the path. With adapted trolleys with the wheels width separated by 1.2 m, it is possible to circulate through the garden, passing over the lines when there are no tall plants. **The orchard consists of 100 lines 75 m long.**

- **The lines with cultivation on log beds have been located at the limits of the orchard** to limit them from interfering with annual planting as much as possible.

■ System of crop lines

To avoid compaction and maintain the soil structure, **it is important to tread on the growing areas**, which are the crop lines, as little as possible. For this reason, **it is necessary to design the lines with a system of small permanent paths** that allows, on the one hand, all the growing areas to be reached without having to step on them and, on the other, facilitated movement with the loads of the various materials that have to be transported. **Each line consists of a series of elements (Figure 2)**: the permanent path through which the orchard workers can move, **the furrow** (in our case 7 cm x 7 cm) through which the main hose passes that delivers the water to the plants, the substrate (which can be BRF or compost) that covers the hose from the insulation, and **the two rows of crop plants**.

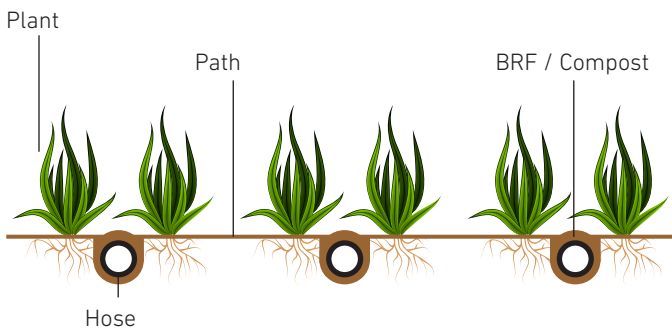


Figure 2. Scheme of the elements that make up a crop line in the garden.

■ Irrigation system

For an orchard to work properly, **an irrigation system that allows water to be supplied efficiently is very important.** In the Polyfarming system, the irrigation system is also **intended to be used to make an efficient contribution of microorganisms and biofertilisers through the water.** For this reason, **it is not possible to use a standard drip system, which gets clogged immediately,** and a system with water outlets that are not clogged with the particles present from the products used should be used.

The system used in Planeses **irrigates by gravity,** without water pressure, and the outlet holes must be large enough so that they are not blocked by the products used or by the lime in the water (**Figure 3**). The irrigation starts from the central path, with a 63 mm pipe from which the **smallest 40-mm hoses emerge for each line.** These secondary hoses have 4-mm perforations every 50 cm. In each case, **we must calculate the maximum distance that a hose will accept for water to flow out of all the holes.** For the Planeses garden, this distance is 70 m. It must also be calculated how many 70-m irrigation hoses can be fed with the main hose, in the case of Planeses there are 4-5, that is, with the required flow rates, up to 5 lines can be irrigated at the same time.

The irrigation hoses of the crop lines take out jets of water, the objective is for it to remain in the centre of the line. To do this, a ditch is made into which the water falls and is well distributed. The amount of water that comes out of each hole varies, but the trench allows it to be compensated. For this reason, **it is best to fill the trench with BRF or compost,** since this way the water does not escape and **the hose is also protected from the sun** and does not suffer expansions associated with heating by insulation. **The irrigation time varies depending on the system used,** in the case of Planeses it is between 20-30 min per line.



Figure 3. Distribution of the irrigation hoses in the crop lines of the Planeses garden. Photo: Ángela Justamante.

■ Planting

When planting is about to start, the first thing to do is **dig up the hoses from the beds** and check that water comes out of all the holes, which can be unclogged with a wire. Then the hose is put back in the trench and **covered with BRF or compost.**

Planting is a slow process because a planter cannot be used, **as the soil is not loose,** it is not ploughed. Therefore, the holes where to place the plants must be made individually. There are various tools to facilitate this process. **An alternative is to use a double-handled pitchfork, which allows a crack in the ground by nailing it and moving it back and forth.** The plant is placed at crack height. **With this method, the water reaches the plant more easily** and an aeration line is opened, which allows greater biological activity of the soil.

It is very important to plant following straight lines and correct distances, as this **facilitates the adventitious plants cutting process,** as cultivated plants are more easily located. On the other hand, in this type of orchard **the soil is more structured** and has more organic matter, so the moisture bubble that extends from the tube by capillarity has a shorter reach. This implies that **the plants must be placed closer to the trench** than with the traditional system.