

Costs and key points of setting up a pasture

The development of a pasture has three main types of costs: (1) **costs of adapting the field and removing the current vegetation**, which includes the time to remove remains and previous vegetation; (2) **costs of sowing the pasture**, which include the price of the seeds and the time to sow with the no-till seeder or, if not possible, broadcast; and (3) **costs of irrigation and other post-planting activities**, including watering if possible, reseeding if necessary, and removing sprouts of trees and shrubs in the area.

■ Quantification of the costs for setting up a pasture

The quantification of what the set-up represents a pasture (Figure 1) is based on calculating different costs:

1. **Costs of adapting the field and removing the current vegetation.**
2. **Costs of sowing the pasture.**
3. **Costs of irrigation and other post-planting activities.**

The various alternatives that we have analysed for each of these processes are described below, indicating the costs they represent and their variability (Table 1). The cost of the cattle that will graze in the meadow is not included, since it is part of a different element of Polyfarming.

1. Cost of adapting the field and removing the current vegetation. This cost has two components:

- The **cost of adapting the field** is very difficult to assess, as it depends entirely on the situation it is in, the amount of stones, logs and other debris to be removed. **An average value cannot be given because it can vary according to the initial situation:** if it is **an old crop field**, if they are **old terraces occupied by forest** (in which case the trees and stumps must be removed because if they are there, they cannot be planted with a direct seeding seeder) or if it is a degraded area.

- In the **case of vegetation, it also depends on the previous state**. In this sheet we take into account more or less complete coverage of the herbaceous or small shrub layer. **If the farm has livestock to graze that vegetation, then the cost can be considered 0**. If it is not available, it must be removed with a forest hammer brush cutter, which has an approximate speed of 0.6 km/h (yield of about 8 h/ha). The cost of renting can be estimated at €80/h.

2. Cost of planting the pasture.

The first cost to consider is **the price of the seeds**, which can vary considerably depending on what is sown. We must count about 20-40 kg/ha and a price per kg of €5/kg. Altogether it can be estimated at **€100-200 of seed per ha**. It can be sown in two ways:

- Whenever possible, sowing should be done with a direct seeding seeder. If it is not available at the facility, it can be rented, estimating an approximate cost of €350/day. Given this price, it is only justified if we have a large area to sow.



Figure 1. Pasture in Planeses (La Garrotxa, Catalonia), where Polyfarming is carried out. Photo: MJ Broncano.

- If this is not possible, sowing should be broadcast. This type of sowing requires approximately 3-4 h of work per ha by one person.

3. Cost of irrigation and other activities after planting.

The costs after planting depend on the situation that is created after it. There are three possible costs that should be considered:

- If it does not rain enough during the first few days, whenever possible, **it is convenient to have a system prepared to irrigate the surface of the future pasture**. Therefore, the cost of the system to irrigate the pasture surface must be counted. This system includes about 75-100 m of main pipe per ha (price around €1.5/m), about 400-450 m of smaller pipe per ha (€0.5/m) and a sprinkler in each 1000-m² plot, about 10 sprinklers per ha (€10-12/sprinkler). **This gives a cost of around €500/ha.**

- If the sowing has very low coverage, it is necessary to re-sow, especially in areas where there are patches without vegetation. It is difficult to estimate this cost because it depends on how the pasture is, but an approximate estimate of half the time and the number of seeds can be made with respect to the first sowing.

- **The cost of removing regrowth of tree and shrub stumps** in the area that have resprouted after initial clearing is not easy to estimate either, because it depends on the number of tree and shrub stumps there were. It is done with a **manual brush cutter** and can be estimated at a maximum of **one hour per 1000 m plot, 10 h/ha.**

Once the pasture has been installed, **the cost of maintaining it can be considered 0**, since the **movement of animals allows the grassland to be conserved at no additional cost.**

Based on these considerations, we can establish a series of simple calculations to estimate the total costs of setting up a pasture in an agricultural field. The overall cost is the sum of three costs:

$$C_{\text{total}} = C_{\text{adequacy}} + C_{\text{sowing}} + C_{\text{postsowing}}$$

Adapting the field, the sum of two costs:

C_{field} = highly variable

$C_{\text{vegetation (1)}}$ = 0 (if done by the farm's livestock grazing)

$C_{\text{vegetation (2)}}$ = 1 ha x 8 h/ha x € 80/h (if done with a forest hammer brush cutter)

Sowing (per ha), the sum of two costs:

C_{seeds} = 5 kg/ha x € 30/kg

C_{sowing} = 1 ha x 4 h/ha x Salary/hour (broadcast sowing)

Post-sowing (per ha), the sum of three costs:

$C_{\text{irrigation}}$ = 100 m x 1.5 €/m (main pipe) + 400 m x 0.5 €/m (smaller pipe) + 10 x 12 €/sprinkler (sprinklers)

C_{resowing} = 1/2 x (1 ha x 4 hours/ha x Salary/hour)

$C_{\text{re-sow}}$ = 1 ha x 10 h/ha x Salary/h

■ Considerations on the optimal strategy for operating a pasture

We must consider the following **key points** when setting up a pasture:

- The **starting situation of the area** where the pasture is going to be established determines all the subsequent costs. The fewer actions that have to be done, the sooner the pasture will be profitable.
- The **cost of the seeds** varies completely depending on the species, the price per kg and the amount of kg to be sown. **It is necessary to perform a detailed study of the**

most suitable mixture to sow in a pasture, considering all the possible conditions (climate, species, exploitation objectives, etc.).

- If it is possible to **sow with a direct seeding seeder, it is recommended**, although the cost is higher, since the process is much more controlled. With broadcast seeding, if there is no rain or no flocks of birds come, a very small emergence occurs and it is necessary to re-sow.

- **Irrigation has a significant cost**, but if there is water nearby, it ensures that the production of the pasture is much higher.

Parameter	Unit	Value used	Variability and causes
Time to prepare the land	h/ha	very variable	It is very variable but it completely determines the costs that will be in putting the pasture ready
Efficiency to clear the previous vegetation with a hammer brush cutter	h/ha	8	It again depends on the starting situation. It also varies considerably on the type of machine
Rental cost of a forestry hammer brush cutter	€/h	80	It depends on the offer in the area
Cost of seeds for sowing	€/ha	100	It ranges from €100 to €200/ha
Cost of the direct seeding seeder	€/day	350	It is a very high cost that is only justified if the surface is large
Broadcast sowing time	h/ha	4	It can range from 3 to 5 depending on the skill of the workers
Irrigation system including tubes and sprinklers	€/ha	500	It may vary slightly depending on the models of tubes or sprinklers
Re-seeding time	h/ha	2	Estimated as half of the sowing time
Time to remove the sprouts of shrubs and trees	h/ha	10	It can also vary depending on the number of resprouting species in the area

Table 1. Parameters used to calculate the costs of forest harvesting, indicating the values used in Polyfarming and any variability that can occur in these values.