



File 5 - Cultivation *Artemisia annua*

The principles of good agricultural management, including appropriate crop rotation according to environmental requirements, must be respected, and ploughing must be adapted to plant development and other crop needs. Where appropriate, conservation agriculture (agro-ecology) should be used, particularly with regard to the accumulation of organic matter (compost, mulching) and conservation of soil moisture (mulching, sustainable irrigation). [1]

Farmers should adopt practices that contribute to soil conservation and reduce erosion, such as creating buffer zones along watercourses, planting cover crops and adding green plant matter (to be incorporated into the soil when ploughing) [1].

These agro-ecological techniques are described in the AGRISUD Guide [3].

1. Preparation of the plot

IMPORTANT: Prepare the plot for transplanting at the same time as the seedbed. These operations are labor intensive and can be time consuming. They should be done about 2 months before planting.

- If possible, fence off the growing area to avoid damage from wandering animals.
Cattle should not be allowed to enter the growing area [1].
- Clear, harrow and surface plough only if necessary. Avoid slash-and-burn agriculture which destroys soil life!
- Rake to remove stones and weeds.
- Apply organic fertilisers if the soil is poor (see AGRISUD Guide [3] p 97 to 103 - Organic manure).

WHO recommends that soil should contain appropriate amounts of nutrients, organic matter and other elements [1].

Ideally, a soil test should be performed and the results recorded in the [batch and cultivation record](#).

Add manure to the soil, preferably 2 weeks prior to transplanting.

This does not dispense you from adding compost and manure as part of regular plant care.

- Hoe to loosen the soil and form cultivation beds or ridges as best.
- Dig furrows (drains) to drain the soil if the crop is grown in the rainy season.

2. Transplantation

- Make a hole approximately one hand deep (approx 20 cm, depending on the roots).
- Water the hole generously to loosen the soil and facilitate transplanting and recovery of young plants (in an intensive cultivation system with irrigation, irrigate the plot for 4 hours, about 15mm).
- Crumble the soil well and mix in a large handful of compost (approx 200 g).

Use of mineral fertiliser (including urea and NPK) is not allowed in organic farming! As nitrogen (N) is a determining factor in the growth of *Artemisia annua*, it is possible to add ground horns (from slaughterhouses) to compost.

- Water the seedbed to loosen the soil before removing the plants.
 - Transplant the seedling, keeping a clod of earth around the roots!
 - Apply 2 large handfuls of compost in a circle around each plant to promote lateral root growth.
- IMPORTANT:** Do not cover the leaves to avoid the risk of burning!



Figure 1 : handful of compost added to hole prior to transplanting (Agathe Cornet-Vernet)



Figure 2 : transplanting an *Artemisia* seedling (Agathe Cornet-Vernet)

The doses to be applied are the same as those traditionally used in market gardening. The staggered application of 1 kg of poultry manure compost per plant gives very good results. It is essential to adapt the type of manure taking into account the specific growing conditions of the region: soil type, climate, possible irrigation. Nitrogen appears to be the determining nutrient in the growth of *Artemisia annua*. [2]

IMPORTANT: Nutrient inputs differ according to the type of compost. Compost made with poultry droppings provides about 3 times more nitrogen than compost made with donkey manure, cattle manure, pig manure or green waste. Triple doses of non-poultry manure compost!

Manure must be carefully decomposed to meet health standards for acceptable limits of microbial contamination and to destroy the germination capacity of weeds. Human excrement should not be used as fertiliser because of the possible presence of infectious microorganisms and parasites. Any application of manure should be documented. [1]

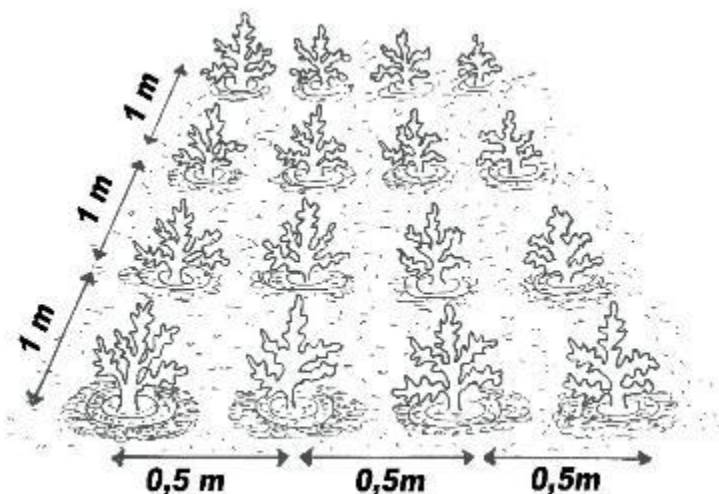


Figure 3 : Artemisia plot (Agathe Cornet-Vernet)

Optimal planting density depends on several factors:

Variety, soil type, period of the year, manure used, association or not with another crop, technical itinerary, ... [2]

Planting at a density of **2 plants/m² (100 x 50 cm)** in lines 1 m apart with 50 cm between plants to promote growth and limit the occurrence of fungal disease has proved best in Senegal under favourable conditions (fertile soil, no water stress, vigorous genotype and not too short day length) [2].

In less favorable conditions, density can be increased to 4 plants/m² (50 x 50 cm).

We advise against monoculture over a large area. These measures should be adapted by alternating Artemisia with market gardening and subsistence crops.

3. Mulching

Mulching the lines with fresh or dry organic matter (green plant waste) helps limit the need for water and weeding, reduces soil erosion, provides additional nutrients and prevents the soil from dirtying the lower branches of the *Artemisia annua* plants.

Use any type of straw, tops, grasses, cereal crop residues, cut or crushed corn plants, decomposed palm oil leaves ... Avoid wood chips from the sawmill as they are too acidic. Favour local reclaimed products!
(See Guide AGRISUD [3] p 143 to 144 - Mulching).

For example, citronella can be pruned every 15 or 21 days to produce the necessary mulch.

A system of cultivation on plant cover or using cover plants can also be considered (see Guide AGRISUD [3] p 197 to 207).

4. Plant care

- **Water each plant generously morning and evening every day** using a watering can, sprinkler or drip. Irrigate early in the morning and late in the evening or at night to reduce evaporation and consequent water loss.

IMPORTANT: Do not flood the soil, but moisten it well. *Artemisia annua* is sensitive to waterlogging and water stress is fatal to young plants, causing early flowering and consequently stopping plant growth!

- Weed regularly after transplanting and then every month.

IMPORTANT: remove all weeds as *Artemisia annua* is very sensitive to competition!

- **Monitor plants regularly and act quickly in case of disease** (such as the appearance of mould if watering is too heavy) **or pests** (goats, rabbits, cattle, termites, grasshoppers, ...)!
 - Replace dead plants several times during 2 months.
 - If necessary, provide shelter from the sun or wind when young plants are first planted out.
 - Do not worry about variations in the shape and height of the plants.

After 2 weeks in the field, when the plants reach a height of 30 to 50 cm, plants can be **coppiced or pruned** by cutting 5 to 10 cm off the top. Topping will produce more productive plants with more branches. This harvest can be used for its health benefits as well as the final harvest. [4]



Figure 4 : watering an *Artemisia* plant (Aaathe Cornet-Vernet)



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