

***Artemisia annua* – basic agronomy recommendations**

This document is provided as an overview to the agronomy of *Artemisia annua* but it is not meant to be a comprehensive guide as protocols vary with environmental conditions, local agricultural practices and costs. Therefore, if you need detailed advice for your specific situation please contact Dr Xavier Simonnet (xavier.simonnet@mediplant.ch) at the Swiss research institute, Mediplant (www.mediplant.ch).

Timings for *Artemisia* cultivation will vary depending on the growing season in different geographic locations. Seeds are usually sown in a nursery ~45 days before transplantation to the field where they are grown for ~120-150 days from transplantation to harvest.

1. Instructions for sowing seed

1.1. Nurseries used for sowing seeds should be free of pests. If pest infestation is a common problem, this should be treated according to local practice before sowing begins.

Sow and germinate the seed on well prepared compost/media-filled pots, trays or raised beds which have been thoroughly watered. The soil should be pressed down firmly **to ensure the seed stays on the surface** as the germination rate decreases sharply when seed is embedded in soil by even a few millimetres. Seed can be mixed with a small amount of sand or ash to help distribute evenly.

1.2. Humidity must be maintained during the whole germination period. The compost/soil surface should be kept moist around the clock for as long as seeds remain on the soil surface, with direct watering applied as a mist. Watering from below is recommended if seeds have been sown in trays. Seedlings should be protected through the use of shade netting or polytunnels.

1.3. After germination has taken place (usually within 1 week); seedlings may need to be watered, depending on local humidity and temperature. The seeds and seedlings should not be exposed to rainfall during this period and the use of shade netting or polytunnels should continue.

1.4. When seedlings have 2-4 true leaves (about 2-3 weeks after germination), they can be pricked out to trays or thinned in the nursery bed to minimise stress.

1.5. When the plants reach a height of 10cm (2-4 weeks after pricking out depending on local weather conditions) they should be hardened off through exposure to full sunlight for a week before transplantation.

2. Instructions for transplanting seedlings in the field

2.1. The field site should be prepared in advance, for example with the use of fertiliser if required. Usual practice is to apply NPK at transplantation, then apply a further nitrogen (N) treatment ~1 month later, but it may be helpful to take soil samples for analysis before planting.

2.2. The field must be well watered before transplanting to minimise transplant shock.

2.3. Spacing in the field will depend on local practice, but a minimum planting density of ~15,625 plants/hectare (0.8 x 0.8 metres) is recommended.

2.4. Seedlings should be transferred gently to avoid damaging the roots. Seedlings should be kept moist during transplantation. Seedlings should be placed into a small hole, ensuring the tap root remains straight, and the soil should be pressed firmly around the seedling.

2.5. It is expected that irrigation, ideally using a sprinkler, will be needed during the first few weeks after plantation. Throughout the growing period, local commercial conditions for irrigation, nutrition, weeds and pest control should be followed. Ideally, fields will be kept weed-free until the Artemisia plants are fully established. Weeding by hand is usually recommended.

3. Instructions for harvesting

3.1. The goal is to select a harvest date which combines maximum leaf yield with maximum artemisinin content. Maximum leaf yield is usually achieved 120-150 days after transplanting but environmental conditions may induce flowering before this time. In this case, harvesting must begin as soon as flowering starts because leaf yield is reduced upon flowering. Artemisinin content can vary greatly according to plant age, season and environmental conditions. It will be necessary to test artemisinin content in each specific environment to determine the dynamics of artemisinin content and the best period of harvest.

3.2 Artemisinin is almost exclusively located in the leaves, therefore branches and stems are not included in the artemisinin extraction process. To achieve separation of leaf material from stems and branches, plants should be cut down at the base of the main stem and air dried in the field for ~3 weeks in windrows or 'stooks' before separation of the dry leaf tissue using local methods, e.g. threshing over a tarpaulin followed by passing the collected leaf material through a sieve.