Organic Cotton Crop Management: Crop Establishment & Field Design

About the Farmer Toolkit

The OE Farmer Toolkit is a compilation of best practices - scientific research and farmers’ experiences - collected to provide crucial information on core organic cotton agricultural practices.

The information was compiled by the OE Farm Development team, and a list of sources and other publications on organic farming are available from Organic Exchange at www.organicexchange.org.

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We are thankful for the support of the ComMark Trust, ICCO, Nordstrom, C&A and Shell Foundation in the production of the Farmer Toolkit.
Establishing the Cotton Crop

**Step 1: Methods of increasing yield**
At this stage it is best to introduce the concept of maximizing yield in the cotton crop, as cotton is a low value cotton crop, maximum returns are achieved by producing maximum yields. The following have been identified as means of achieving this.

2. Early planting
3. Adequate plant population
4. Correctly timed weeding
5. Good pest management (referenced in the pest management fact sheet)

**Step 2: Land preparation and Field Design**
The first decision the farmer has to make is to which system of cultivation should be used, in organic farming minimum cultivation systems are recommended but where conventional plowing is carried out this should be carried out in a way were the soil is left bare for the minimum period to reduce losses of organic matter and reduce any chance of soil erosion.

Minimum tillage can be either planting in a ripper line or hand hoe basins, if the crop is dry-land the cultivation should be carried out after harvesting the preceding crop to make use of residual soil moisture to ease cultivation. Manure or compost should be applied to the field at least two weeks prior to planting (the crop nutrition fact sheet gives the amounts that should be applied).

Marking out the field prior to carrying out this operation is also important as the farmer will have to decide on the spacing of the cotton plants and the spacing of inter-plants growing in the field. A sample field design is shown below.

The spacing used in the field design is 1m between cotton rows and within the rows is 0.15m (0.3m for dry-land cotton) this will allow the farmer to obtain the optimum plant population. The farmer must remember that the field layout should allow for the contours of the land. Crop rows should always go across the slope to prevent erosion.

![Sample field design](image-url)
**Step 3: Sowing**

**Time of Planting.** Timing of planting is critical in achieving maximum yields. It is recommended that the farmer plant with the first good rains at least 28 mm of rain should have fallen for dry land planting. The ideal planting time varies from region to region (reference the “Growing Calendar” for your specific growing region). Alternatively, the farmer may dry plant a small portion of the field if he or she is confident that he or she can replant the area if there is a prolonged dry spell. Dry planting the whole field would be too much of a gamble.

**Spacing.** The ideal spacing is a row spacing of 1m and a plant spacing of 15cm-30cm depending if the crop is irrigated or rain fed. In higher rainfall countries the irrigated spacing of 15cm can be used for rain fed crops.

**Using the basin system.** Farmers using the hand hoe system will be limited in their spacing by the basins but seeds should be planted in groups of 4-6 seeds at each end of the basin. Basin length will be 30cm and the basins will be 40cm apart.

**Using ripper lines.** The seed should be planted in groups of 4-6 seeds 15-30cm apart along the ripper line. In both cases the initial compost or manure will have been applied to the ripper line or basin 2 to 4 weeks prior to sowing the seed.

**Sow the cottonseeds at a depth of 1-2cm and cover them with fine soil.** This protects the germinating seed so it won’t dry out. Depending on the seed quality, 4 to 6 seeds are sown per spot. Seed should be re-sown in gaps where the seeds did not germinate or the seedlings have been destroyed, within 2 weeks after emergence of the young cotton plants. Seeds sown later will not produce much as they are shaded out by neighboring plants. Therefore, it is better to fill these later gaps with trap crops such as sunflower, maize or okra.

**Step 4: Thinning**

Seven to fourteen days after emergence, remove weaker seedlings so that there are only one plant in each spot. If thinning is done too early, the seedlings could still die off; if it is done too late there is competition among plants and chance of root damage when the seedlings are pulled out.

**Step 5: Sowing**

| The importance of timely weeding cannot be overemphasized, as weed competition is one of the major contributory factors in yield loss. In dry years yield loss due to weed competition can be 3% per day or 21% in one week. (Source CFU Zambia). |

Timely weeding has a higher impact on increasing cotton yield than fertilization or pest control. Most important for successful weed management in cotton are proper crop rotation and timely soil cultivation. However, this does not mean that the cotton fields need to be kept free of weeds throughout the season. In the initial stage of crop growth, weeds take up nutrients which otherwise would be lost through leaching. These nutrients are returned to the soil and made available to the cotton crop when the weeds are cut and decompose. Once the cotton crop has developed a dense stand, weeds usually will remain below a level where they significantly compete with the main crop.
Some weeds are important hosts for beneficial insects, or act as trap crops, deterring pests from the cotton plant. Careful observation of weed populations and the use of shallow soil cultivation (hoses, weeder), combined with selective hand weeding, usually allow the experienced organic cotton farmer to ‘keep on good terms’ with weeds. To prevent the spreading of weed seeds through compost, it is important that composts containing weed seeds go through a heat phase, which destroys the seeds. It is recommended that the farmer should first remove the weeds within the row, that is, the weeds growing between the plants. At the first weeding this might have to be done by hand as well as with a hoe to avoid damaging the young cotton plants. Weeds can then be removed in the rows using an animal drawn cultivator, hand weeder or a hoe. Using this system the farmer will achieve much faster and efficient weed removal.

The timing of the first weeding is most critical in achieving a good cotton crop for if it is left too late the weeds will benefit from the basal dressing of manure or compost and will prevent the young cotton plants from establishing properly. For this reason it is important that the first weeding is carried when weeds reach 4-5cm in height and not left any later. If weeding is delayed it will make the job harder as weeds will be stronger and bigger and will be difficult to remove. The job will take longer and if any hired labour is used it will cost the farmer more money, further reducing profits as well as reducing potential yield.

The number of times a farmer has to weed cannot be stated as this will depend on the weed population in a particular field and type of weed (whether perennial or annual) and also the previous cropping and weather conditions in the growing season. Generally the farmer will have to weed 3 times before the cotton plants become big enough to compete favourably with the weeds. As mentioned earlier on, the farmer in an organic system does not have to remove all the weeds if they are not posing a threat to the crop. If weeds are not competing for nutrients and are not harbouring pests they pose no threat. It must also be remembered the cut weeds will act as a mulch and when decomposing will return some nutrients back to the soil further assisting the crop. Some weeds such as stoloniferous grasses and weeds with seeds should be removed from the field if possible to prevent growth but this material should not be wasted but used for compost making.

**Additional Resources:**
Visit Organic Exchange (www.organicexchange.org) for more information including PowerPoints and Posters for farmer development and education.