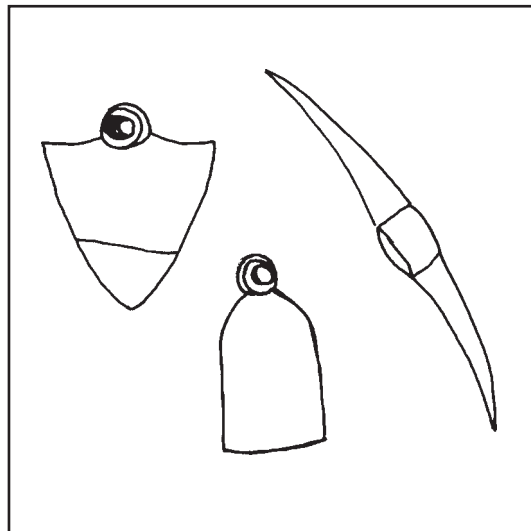
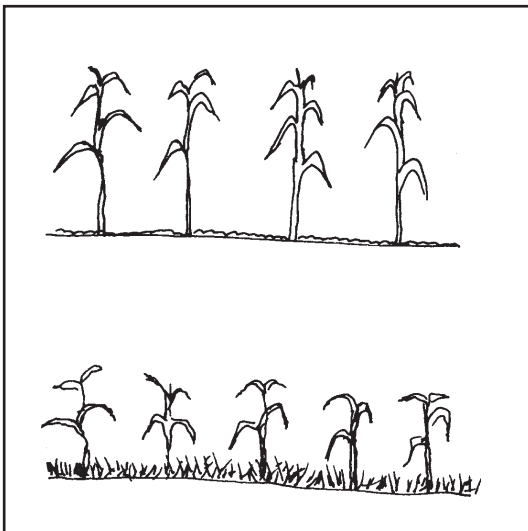
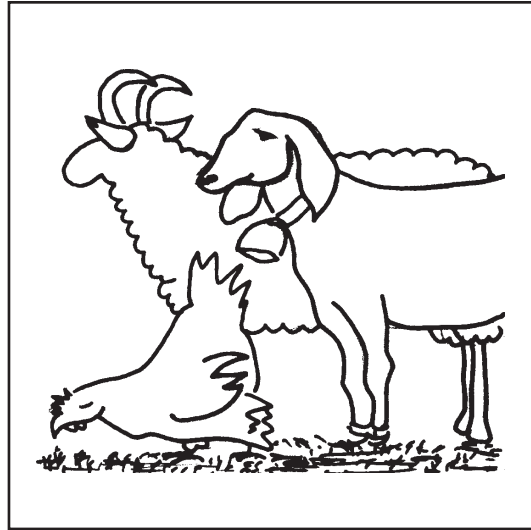


Weed Control



produced by
HDRA - the organic organisation

What is a weed?

In food production systems (garden or field), a weed is a plant that competes with crops for water, nutrients and light. This can reduce crop production. Some weeds have beneficial uses but not usually when they are growing among crops.

Types of weed

Annual weeds

Annual weeds grow, flower and seed within one season. They can produce a lot of seed and they can take over an area very quickly. Annual weed seeds may germinate as they fall, but others may lie dormant in the soil until conditions are favorable for germination. Weed seeds can survive in the soil for many years and finally germinate when they are brought to the surface through digging.

Perennial weeds

Perennial weeds have a longer life cycle than annual weeds. They produce seeds as well as spreading in the soil by growing persistent roots and stems.

Weed control

The ideal situation is not necessarily the elimination of weeds but their control. Except in certain situations, it is very difficult to completely kill all weeds. Weed control means reducing the effects of weeds on crop growth and yield.

Weeds do have some useful purposes. They can provide the following:

- Protection from soil erosion
- Food for animals and beneficial insects
- Habitat for beneficial insects
- Food for human use
- Medicine for both humans and animals

The following pages describe various techniques which help to control weeds.

Ploughing

Ploughing is a useful way to clear an area of land of perennial weeds that have persistent roots and stems. However, ploughing once is unlikely to be useful. In fact, it can make the problem worse as roots and shoots are chopped into smaller pieces and may regrow. Dormant weed seeds brought to the surface, may germinate. For success, the ploughing should be repeated several times, at around 2 to 3 week intervals or as soon as the ground starts to look green again. Ploughing should always take place when the soil is quite moist but not wet or dry. However, the need for weeding should be balanced against the potential of causing soil erosion.

Advantages: Ploughing can enable you to deal with large areas quite quickly.

Disadvantages: Ploughing can destroy soil structure and cause soil erosion. It cannot be carried out in wet weather. It is not suitable when crops are present.

Digging and removing weeds by hand

Forking and digging land over and removing weed roots and shoots by hand can be an effective way of clearing weeds, if it is done thoroughly. Annual weeds can be turned and dug into the soil where they should die. However some deep rooted perennial weeds will not be killed in this way. You should aim to remove as much of the plant (stem and roots) as possible. These weeds should be disposed of, preferably by composting (a process of decomposition). Persistent weed seeds may need to be laid out in the sun to dry or even burned in order to kill them.

Never attempt this kind of job when the soil is very wet or very dry because this can damage soil structure.

Advantages: This method can be used between crops that are planted close together.

Disadvantages: Digging is time consuming and hard work. The problem will not be totally solved especially when dealing with deep-rooted perennials. This kind of weeding method is dependent on the weather.

Double-digging to bury weeds

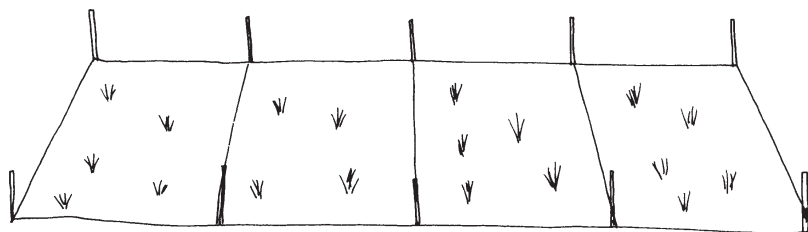
Double-digging is used to clear an area of land of weeds. This method can take care of plots of land where annuals and shallow rooted perennials are a problem. The ground is turned over and weeds buried upside down in the soil. The deeper they are buried, the better. However great care should be taken not to mix subsoil with topsoil. This method is very useful when preparing land for cropping. To make a bed for crops, follow these instructions and the illustration given:

1. Select a site. Measure a long bed (1.5 metres wide and 7 metres long) and divide into sections of approximately 60 centimetres.
2. Take the topsoil off one of these sections, taking care not to disturb the surface with the weeds on it. You will know when the topsoil layer is finished and you have reached the subsoil because this will be harder and a different colour. If you do not reach subsoil quite quickly then you have a lot of topsoil, so you should dig to approximately 30cm deep.
3. Dig and loosen the hard subsoil or the soil at 30cm depth. This allows roots to reach into this part of the soil to get more nutrients.
4. Dig up the next section of topsoil and turn it upside down into the previous pit.
5. Repeat this until the last pit is reached and then fill it with the topsoil removed from the first pit.

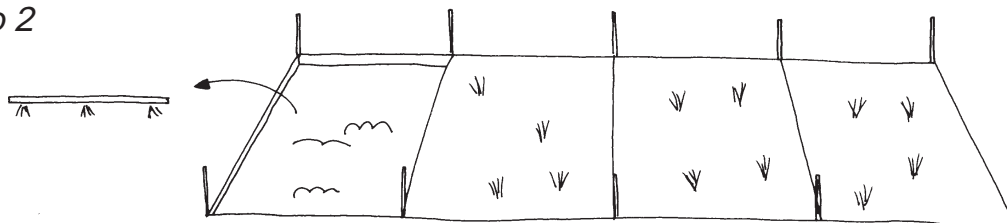
Advantages: Land is made available quite quickly for use. It is a cheap method. The digging means the hard subsoil is dug over which allows roots to grow bigger and go deeper. Double-digging also means that manures and other organic residues can be incorporated into the soil during the process.

Disadvantages: Double-digging is hard work. It is weather dependent and should not be carried out in wet weather as this can damage soil structure. It is not useful for large areas of land or for deep-rooted perennial weeds, unless they are removed by hand.

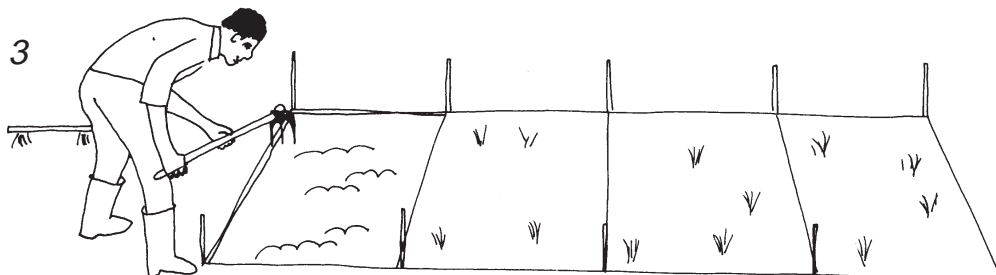
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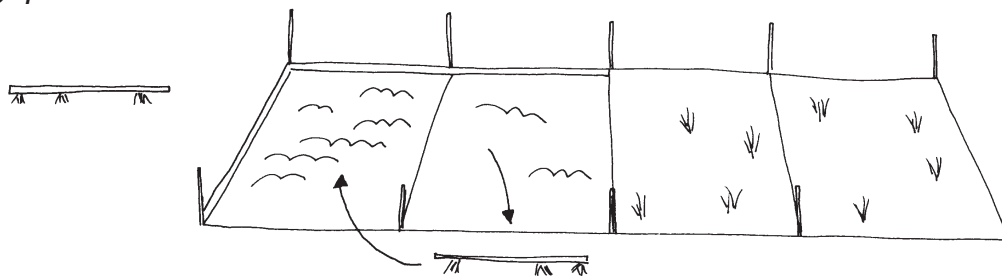
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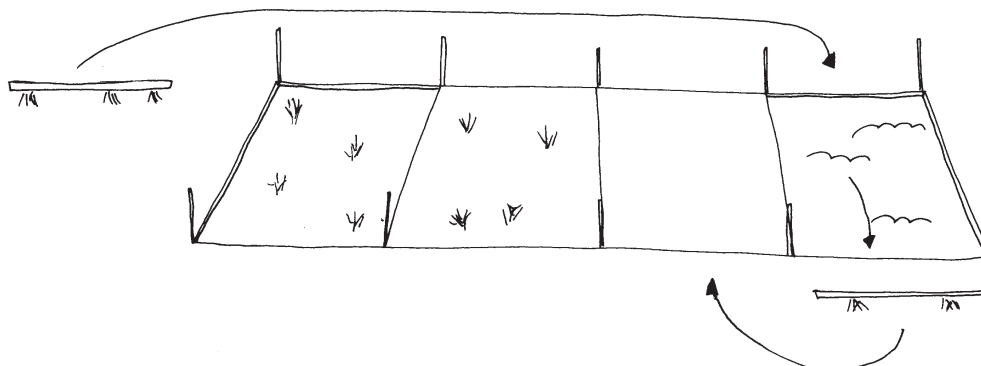
Step 3



Step 4



Step 5



Preparation of land using double-digging to bury weeds

Hoeing and slashing

Using a hoe is one of the quickest ways of dealing with an area of young weeds. A cutlass can be used for larger weeds. It is best to hoe/slash in dry conditions so that the weed tops which have been cut off die quickly. It is also best to hoe/slash regularly because weeding will become difficult as the weeds get bigger. Keep your hoe/cutlass sharp for easy weeding.

Advantages: Hoeing can be quick and easy in the right conditions (dry) and does not bring up too many dormant seeds from deeper down. This kind of weeding is more easily done between rows of crops.

Disadvantages: Hoeing/slashing is not effective against established perennials. It is a difficult task on stony soils. Weeds can easily regrow in wet weather.

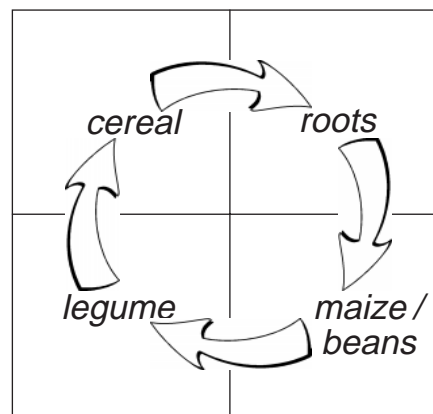


Clearing young weeds between crops using a hoe

Rotation

Growing the same crops in the same site year after year will encourage a build up of weed seeds in the soil. Moving a crop on a yearly basis means that weeds do not have the same stable growing conditions every year. As they are always disturbed, they cannot develop and thrive on a certain plot of land.

For vegetables, a 3 or 4 year rotation is usually recommended as a minimum. Rotation is usually a cycle with cereals, a root crop, maize and beans, and a legume crop. Rotations that include legumes or green manures help to increase soil fertility and add organic matter to the soil so improving soil structure.



A simple rotation that includes a legume

Advantages: Crop rotation helps to build soil fertility and improve its structure. It also helps to control pests and diseases.

Interplanting/Close planting

Interplanting means planting different crops on the same plot at the recommended spacings, for example maize/beans, maize/groundnuts. Close planting means reducing the distance between crop rows, either in a single crop or in an intercropping system. Both methods reduce the light which reaches the soil and therefore prevent weeds from developing.

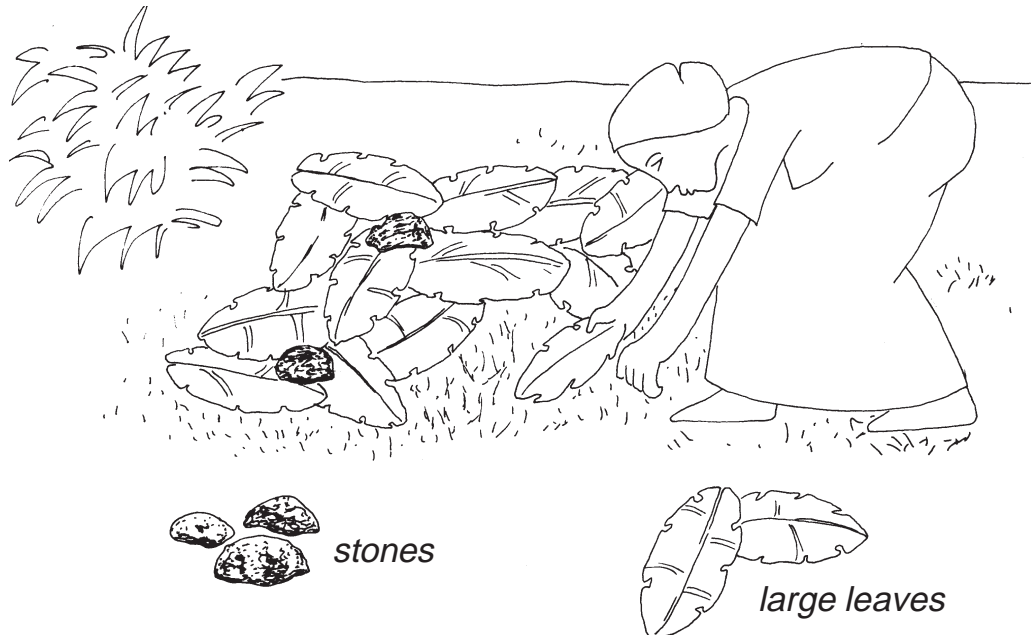
Advantages: These methods help to prevent soil erosion. If deep-rooted and shallow-rooted crops are grown together, maximum use of the soil nutrients is made. It provides safety values for the farmer in case of crop failure.

Disadvantage: The soil needs to be fertile enough to feed high densities of crop.

Mulching

Mulching can be used to clear a piece of land of weeds, or it can be used in between crops.

Plants need light to grow. If they are deprived of light they will die. So, weeds can be controlled by covering an area with a material that will not let light get to the weeds. You can use cardboard, sheets of black plastic, large leaves (such as banana leaves) or grass clippings. This material is known as a 'mulch' and should be applied when the crops are well established but before the weeds are too large. You need to make sure that the layer is thick enough to prevent light getting through. Keep the mulch weighted down with stones. If weeds begin to grow through, flatten them with more mulch.



Mulching with large leaves to suppress weeds

This is a simple and less labour intensive way of clearing land. Mulching is also an excellent method of keeping weeds in check so they do not take over whilst you are concentrating on another plot. Always apply a mulch to warm, wet soil otherwise the mulch keeps the soil dry and the cold in and weeds will not die as quickly.

How long does it take?

The time it takes to clear a piece of land depends on the type of weed which has taken over. Annual weeds should die in a few months. Shallow rooting perennials should die after one growing season. It takes longer to kill deeper growing weeds, maybe up to a year. This factor may be a problem because land is taken out of use and this may affect overall crop yields. However, this is less of a problem when mulching takes place at the same time as growing a crop. The mulch is simply placed between rows and around the base of the plants.



Spreading leaves and grass clippings between crops to suppress weeds

Advantages: As no digging takes place, dormant weed seeds are not brought to the surface where they would germinate. The land gets cleared whilst other jobs are done. Nutrients in the weeds are recycled and provide a food supply for crops. Mulching can be done in any weather.

Disadvantages: It can be difficult to gather and transport materials for mulching to the field. It can be a slow process.

Green manuring/Cover cropping

Green manures, also known as cover crops, are plants which are grown mainly for the benefit of the soil. They can also help to suppress weeds as they compete with weeds for nutrients, light and water.

Green manures can be sown when land has been cleared or dug over but is not ready for sowing. Green manures will suppress weed growth until the land is ready to be cropped. It is also a good way of improving soil structure and fertility, as well as reducing soil erosion.

Perennial or annual green manure species should be chosen depending on how long a plot of land is to be left fallow. If a plot of land is to be left for less than a year then choose an annual green manure. It will be easier to dig in because it is less persistent.

Green manures can also be grown as part of an intercropping system. For example in Ghana, the green manure Velvet bean (*Mucuna pruriens*) was very effective against the weed Speargrass (*Imperata cylindrica*). The green manure grows much faster than the Imperata grass and it can then be used as a fertiliser or mulch for crops and animal feed.

Green manures can also be used as part of a rotation, which in itself is a way of controlling weeds.

Advantages: Green manuring improves soil structure and protects the soil from erosion and leaching. Some green manures are legumes and 'fix' nitrogen very efficiently. They increase soil fertility. Using legumes means that you do not need to manure or fertilise the next crop. If a legume such as a bean is used as a green manure, a crop can also be harvested as food.

Disadvantage: The use of green manures is sometimes seen as a problem because land is taken out of use and this may affect overall crop yields.

There are many different plants that can be used as green manures and further information about these can be obtained from HDRA.

Stale seed bed

A stale seed bed is used to grow vegetable or tree seedlings. This method is used to clear an area of weeds before the seeds are sown. The method is as follows:

1. Prepare the seedbed ready for sowing.
2. Leave the seedbed for roughly two weeks or until there are plenty of young weeds emerging.
3. Hoe the area without disturbing the soil too much, or if the area is small enough hand pick the weeds.
4. The seed bed is now free of weeds and ready for sowing.

Advantage: This method is useful for vegetable or tree seeds that are slow to germinate or that are broadcast and therefore hoeing would be impossible.



Hand picking weeds from a stale seed bed

Animals

In a very weedy area, the introduction of animals can be a very effective, work-saving method of weed control. They will eat and trample on weeds and make the next step such as digging or ploughing easier. Animals need to be fenced in so that they do not trample on crops.

Cattle, goats and sheep

Cattle are better weeders than goats who like a varied diet. However goats will eat most weeds if kept in the same area. Both need to be confined to a small area and moved around regularly. Goats especially prefer young growth.

Sheep are useful weeders. They eat most vegetation and have the ability to chop weeds off very close to the ground.

Care should be taken that these animals do not increase soil erosion.

Pigs

Pigs are useful because of their habit of searching for edible roots. They can be used to clear the weeds from an area, loosening and fertilising the soil as well. You need to move the pigs around regularly.

Chickens, ducks, geese and guinea pigs

All of these are useful weeders. They need to be confined using cages or fencing as they will also eat crops. However geese should be placed in an area where they have plenty of room but do not have access to crops. If they are confined to a small area they will dirty it before they eat all the weeds.

Advantages: Animals can save you from doing a lot of work. They also provide meat, milk, eggs and manure.

Disadvantages: If goats are forced to eat weeds that they do not like, their milk yield may fall. Fences are needed to keep animals away from crops.

Reference list

'Weed Control without Chemicals' (1990) Step by Step Organic Gardening.
The Henry Doubleday Research Association

'The Useful Plants of Ghana' (1989) Daniel Abbiw. Intermediate Technology
Publication, Bourton Hall, Bourton-on-Dunsmore, Warwickshire CV23 9SD,
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'Common Weeds of East Africa' (1987) P J Terry and R W Michieka. Food
and Agriculture Organisation of the United Nations (FAO), Via delle Terme
di Caracalla, 00100 Rome, Italy

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Further information on weed control, and organic farming generally can be obtained from HDRA. Other publications include booklets covering green manures, weed control and the neem tree, as well as single information sheets about crop pests and diseases and their control, natural pesticides and green manures. Please write to:

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The aims of HDRA - the organic organisation are to carry out scientific research into, collate and disseminate information about, and promote interest in organic gardening, farming and food in the UK and overseas. For more than a decade, HDRA's international programme has been involved in the support and extension of sustainable farming practices; supporting research on aspects of tropical organic agriculture, providing advice and literature on appropriate organic techniques and providing tree seeds and technical information to organisations involved in tree planting and research.

We gratefully acknowledge the generous support of the Charlton Community Development Trust in the production of this booklet.

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