



# Vegetables — for the family and for cash

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Basic techniques for growing them  
in arid and semi-arid areas



## More plants from a seedbed

The „Propagation“ of vegetable seedlings in a seedbed means to sow vegetable seedlings into a particularly carefully prepared seedbed with the aim of replanting the well-developed seedlings from this seedbed into the field later on.

Why do we propagate seedlings in seedbeds?

- To save water.
- To speed the growth of the seedlings.
- To save on expensive vegetable seeds.

Why do we save water when seedlings are propagated in seedbeds?

For example the number of tomato seedlings for 1 hectare could be propagated on 12 m<sup>2</sup>. We save the irrigation water for 1 hectare over a 6-8 week period.

Why do seedlings grow faster when propagated in a seedbed?

We can establish a nursery with the seedbed in a place, like a garden behind a wall, for example. By adding special organic matter we can make the soil ready particularly well. Watching, nursing and watering are easier. The small seedbed can be tended better near the house than in the field.

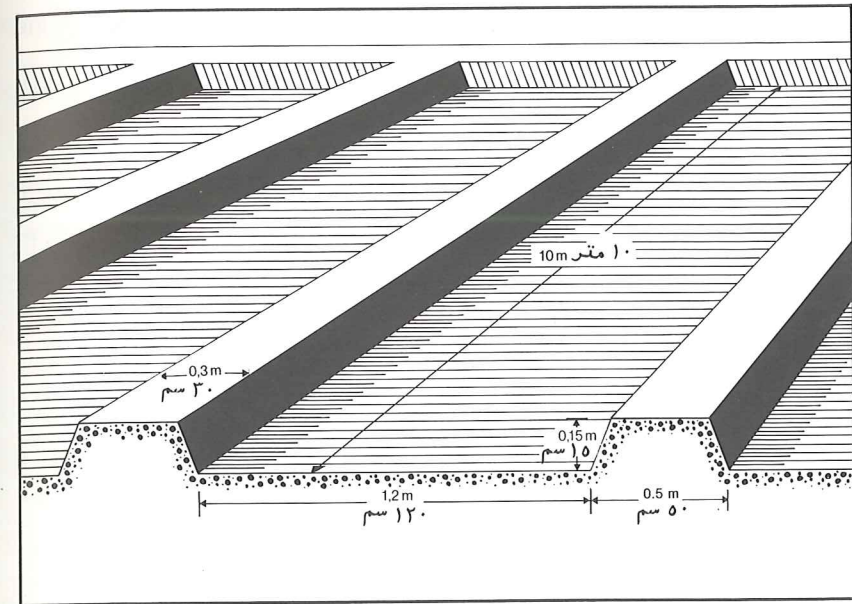
Why do we save seeds?

Compared with direct sowing in the field, we need only 20% of the seeds when sown in a seedbed. The germination rate in the seedbed is more sure than in the open field.

## What kind of vegetables should be propagated in seedbeds?

1. Tomatoes
2. Peppers
3. Eggplants
4. Onions
5. Leeks
6. Lettuce
7. All types of cabbage

## Making the seedbed



A diagrammatic figure of some seedbeds.

The diagrammatic figure shows the seedbed is deeper than the edging footpaths.

The seedbed is a small basin. The irrigation water is not able to flow away. The seedbed should not be wider than 120 cm.

Why?

We can do everything necessary from the footpaths, without standing on the seedbed.

The length of the seedbed should not be longer than 10 metres.

Why?

To make sure that the irrigation water spreads equally. Otherwise germination could be erratic and growth of the seedlings unequal.

The footpaths between the beds are 50 cm wide. They should be very solid so the edges do not break down when walked on.

The seedbed is connected to an irrigation ditch, so that watering can take place any time.

### How to do it:

- Measurement and marking out the planned seedbeds and footpaths with pegs.
- The pegs are joined with strings.
- The planned footpaths are heaped and made solid up to 15 cm above the surface of the seedbed.
- The soil of the seedbed should be loosened to a depth of 15 cm with a hoe, spade or shovel.
- For larger scale vegetable growing with bigger nurseries being used the use of a single axle tractor (cultivator) is recommended.
- After the first soil management it should be improved with manure. A 10-metre long seedbed should get three wheelbarrowsful of well rotted farm manure.
- The manure must be spread over the whole seedbed surface with rakes.
- The manure must be mixed with the top soil by using a hoe.
- After that the surface of the seedbed should be raked level.
- Then the seed rows are drawn with a marker.

We recommend sowing vegetable seeds in the seedbed in rows 12 cm apart because sowing in rows has some advantages. Weeding is easier. If there are too many seedlings in the rows it is also easier to thin them. Finally, sowing in rows makes it easier to cultivate the soil between them with a small hoe which helps to speed the growth of the seedlings. The rows should not be deeper than 2 cm.

- If no marker is available we can use a small piece of plank. This plank will be pressed into the soft surface of the soil and moved slightly backwards and forwards. By this method we have straight drills for sowing. The procedure is repeated for each row.



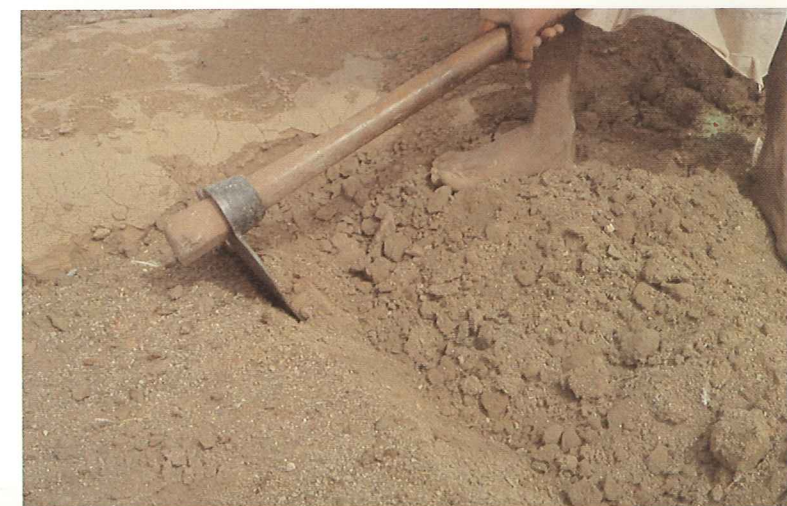
First soil management of the seedbed with a spade.



Single axle tractor with cultivator for use in bigger nurseries.



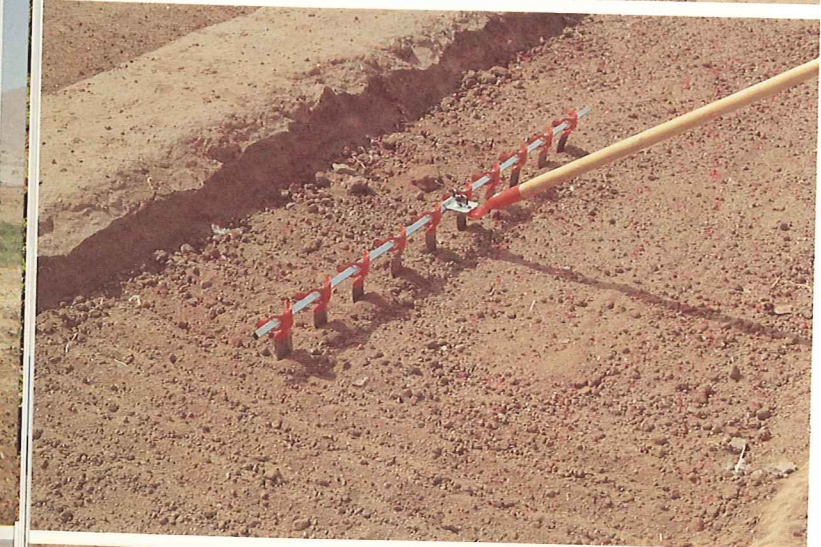
Three wheelbarrows of well rotted farm manure are distributed on a seedbed 10 metres long.



The farm manure is mixed with the top soil using a hoe.



The surface of the seedbed is levelled with a rake.



With a marker the seed rows are prepared 12 cm apart and 2 cm deep.



If no marker is available we can also use a small piece of plank moved slightly backwards and forwards.

## Sowing into seedbeds

### How to do it:

- We sow the seeds with the finger tips of the right hand into the drills. This has to be very exact.
- After sowing the seeds in the drills, they must be covered with soil. Do this slightly pressing with the back of the rake.
- Covering the seeds with a fine layer of rotted farm manure is also very useful when the soil is very heavy. The manure will speed up germination of the seeds and growth of the seedlings.  
CAUTION: If the farm manure is not totally rotten, it can burn off the germinating seedlings.
- After using this method the surface of the seedbed must be firmed with a rake. If there is sufficient rotten manure the whole surface of the seedbed can be covered to a depth of 1 cm.
- The seeds can be broadcast, but although this method saves time when sowing it does not have the same advantages as sowing in rows.
- After the seeds have been broadcast they must be covered lightly with soil, using a rake.
- After sowing the seedbed should be watered. A watering can is very good for this.
- If no watering can is available the irrigation water can be led through syphon pipes from the ditch into the seedbed. The first time this must be done very slowly and carefully so as not to disturb the seeds.
- This, of course, has the disadvantage of the surface of the soil becoming silted up and both the seeds and just germinated seedlings becoming choked.
- If the surface of the soil dries up and the seedlings have trouble breaking through the crust, they will die. For that reason the surface of the soil has to be kept moist at all times.
- To avoid the surface of the soil drying up, we can cover the surface with maize straw. This is called mulching.
- We must consider the high costs of maize straw and similar mulching materials in arid regions as they can be used as fodder.
- If we do miss the germination of the seeds under the mulching material the seedlings will become stretched (etiolated). These seedlings might die soon, because of "damping off" diseases.



Now we start with sowing.



First we pour some of the seeds into the left hand.



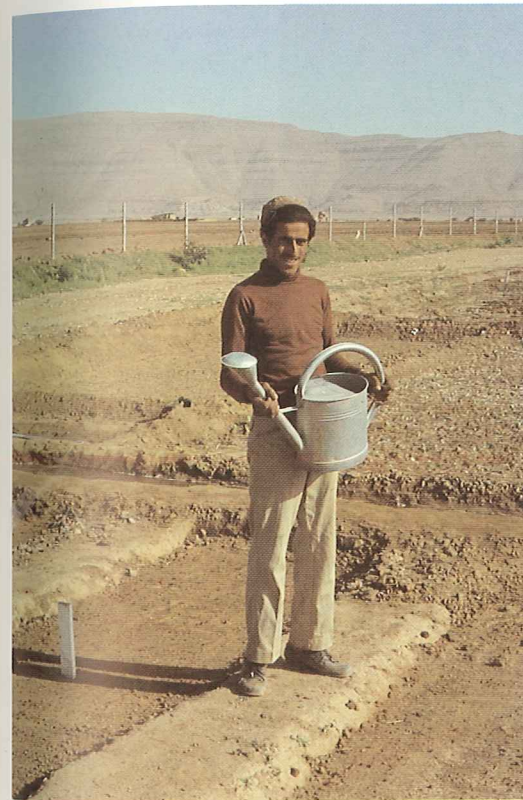
With the finger tips of the right hand the seeds are sown into the drills.



The seeds in the rows are covered with some soil by a slight pressing with the back of the rake.

First irrigation should always be with a shower can.

The water drops into the seedbed like a light shower of rain.





Irrigation through syphon pipes. The water is led from the ditch into the seedbed.



In order to avoid drying up of the top soil the surface is covered with mulching material like maize straw.

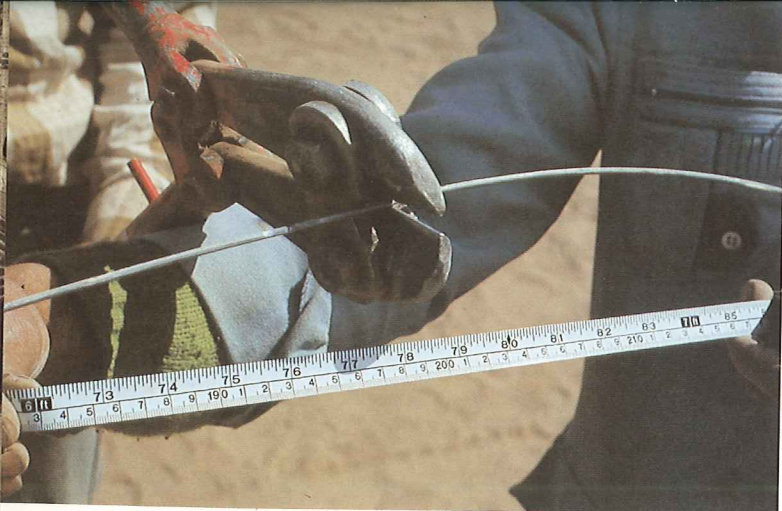
## Plastic sheeting to speed seedling growth

Advantages of propagation under plastic cloches:

- The plastic cloches replace the mulching materials.
- This method is particularly useful to propagate tomato, pepper and egg plants in early spring.
- Rapid drying up of the top soil is avoided. This benefits germinating seeds. Better control of this moisture under the cloche.
- The cloche speeds up growth of seedlings because they are well protected from cold winds and nights.

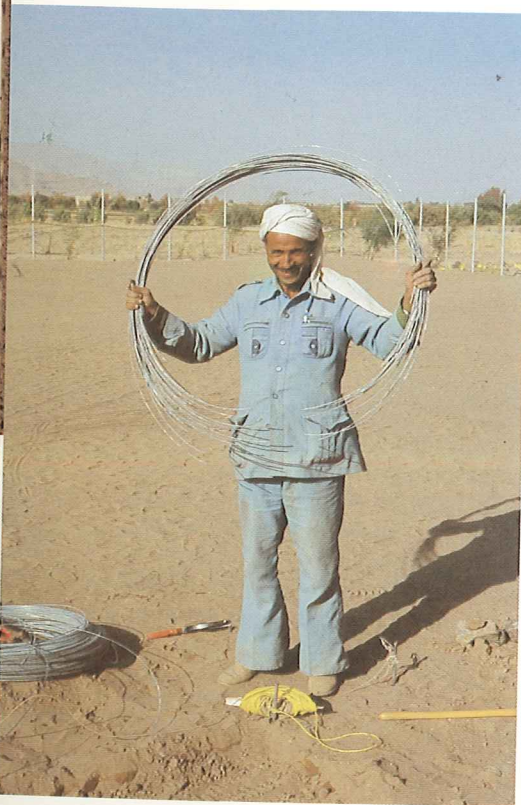
### How to do it:

- To construct a simple plastic cloche we need wire of 4 - 5 mm diameter and 0.1 mm transparent plastic sheeting of 200 - 220 cm width.
  - We use the wire to support the sheeting.
  - Remember that the seedbed is 120 cm wide so we will need for this width support of approximately 220 cm length. We cut the wire into 220 cm lengths.
  - Both ends of the wire support are pushed into the soil - about 10 cm deep - at the edges of the seedbed. They are placed 2 m apart. The supports should be placed a little diagonally to the seedbed.
  - After that the supports will be covered with the 0.1 mm plastic sheeting. The plastic sheeting should be 220 cm wide, the same length as the supports. NOTE: It might be useful to make the width of the seedbeds and the lengths of the supports the same as the width of the plastic sheeting available on the market.
  - On top of the plastic sheeting an upper wire must be fixed also in a diagonal fashion, but in the opposite direction to the lower wire (support).
  - On both ends of the cloche the plastic sheeting is made into a knot and fixed with a small stake which is then pushed into the soil.
  - The edges of the plastic sheeting can be covered with some soil and this will conserve the soil moisture and cause a high relative humidity. If the temperature under the cloche becomes too high then the plastic sheeting can be lifted on one or both sides of the cloches. As growth increases, the seedlings in the cloche will need more air circulation to help harden them off. This is done by opening the cloche wider and wider each day.
- Remark: This simple construction can also be used to protect tomato plants and other frost-sensitive plants against cold in autumn to prolong the harvesting period and increase yield.



The wire for the supports and the upper wire is cut into 200 cm lengths.

The wires that have been cut are now ready for use.



Both ends of the wire supports are pushed into the soil a little diagonally to the seedbed.



The supports are now covered with 0.1 mm plastic sheeting.



The end of the plastic sheeting is made into a knot and fixed with a small stake which is pushed into the soil.



The upper wire has been fixed also in a diagonal fashion but in the opposite direction to the supports.



The edges of the plastic sheeting are covered with some soil to conserve humidity and moisture in the seedbed.

### **Irrigating, singling, fertilising, weeding seedlings**

After seeds have successfully germinated and emerged they need nursing like:

- Irrigation
- Singling
- Fertilisation
- Weeding and hoeing.

The emerged seedlings are not so sensitive to excessive moisture and the seedbeds can be flood-irrigated (see pictures page 50 and 51), but over-watering must be avoided. Speed of growth can be regulated by irrigation. The more moisture in the seedbed the better. But before seedlings are moved, they should be hardened off. This can be done by reducing the amount of irrigation water rapidly. The seedlings become harder and overcome the shock of moving better.



Seedlings may be too close and too many.