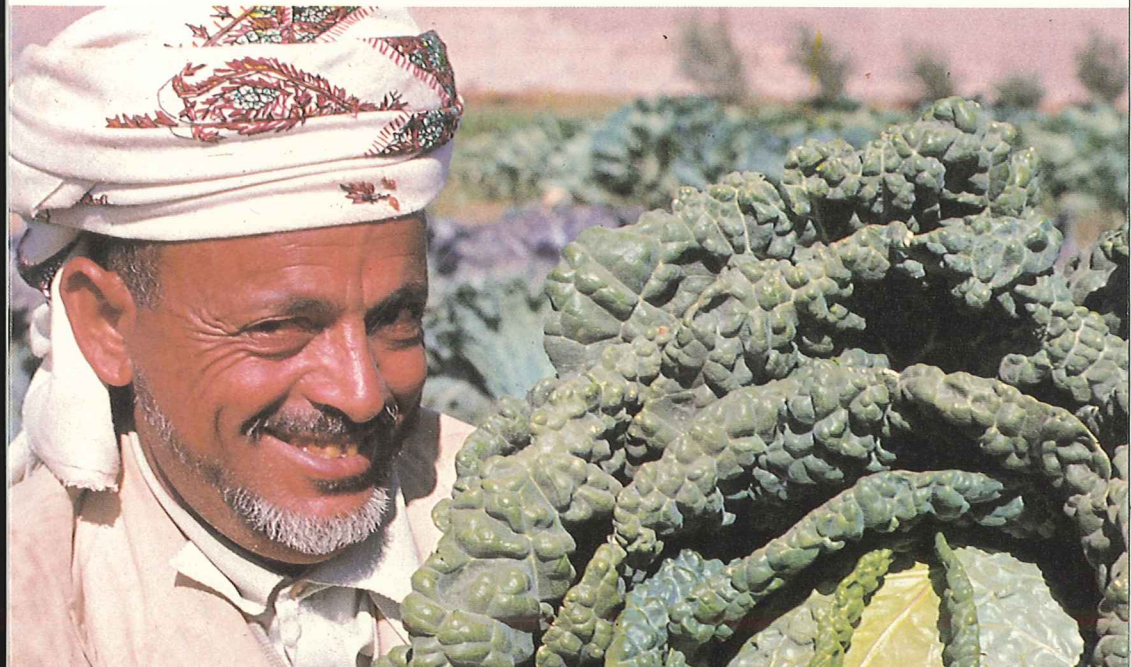
Vegetables — for the family and for cash

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

Dieter Lippmann



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by
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What's in the book

Foreword

Vegetables are becoming a major potential source of nutrition and income for farming families; their production for home consumption and for the market should be fully exploited in all rural development strategies.

This booklet covers the practical aspects of growing vegetables under arid conditions, where special techniques must be applied to obtain acceptable yields. The brochure serves as an instruction manual for extension workers and a do-it-yourself guide for the farming family itself.

The information contained herein is based on several years of experience in vegetable growing in arid regions. Special thanks are extended to the farmers and co-workers who contributed their know-how. In particular, we greatly appreciate the cooperation of our partners in the Al Boun Project, Yemen Arab Republic, where all techniques contained in this manual were tried and tested and where the pictures were taken.

Eschborn
Summer 1985

Dr. Werner Kiene
Section 154/131
Region Rural Development

Why grow vegetables?

There are two main reasons to grow vegetables:

1. FOR THE FAMILY TO EAT
2. FOR CASH.

For the family

There are several good reasons to eat vegetables. One is that they taste good. Another is that they're good for our health. They can be made into refreshing and tasty salads, as with cucumbers and tomatoes. Or they can be boiled and cooked in different ways, as with potatoes.

A long time ago many different wild vegetables were collected or grown in home gardens. But often only the rich could afford vegetables and sometimes they were eaten only at festivals and celebrations.

But why don't we have vegetables all the time? We can sow and plant them whenever we want to.
Besides the pleasure of eating vegetables they are also important to keeping us healthy, especially growing children.

It has long been known that vegetables are rich in valuable minerals and vitamins. These help to keep us strong in working and learning.

For cash

As soon as we know more about vegetable growing in small quantities for the family and as soon as we know which of the vegetables can be grown to sell well on the markets we can gradually increase production for cash. Vegetables can be sold almost anywhere.

Shortage of water

Shortage of water can be another reason for growing vegetables. There is hardly ever enough groundwater for irrigation and it is very expensive. So, sometimes what little irrigation water there is, would be put to better use on more valuable crops like vegetables.

What will grow where?

Modern crops need more knowhow to grow than existing traditional vegetables. This book gives some basic techniques which are very similar for all regions. It should help village level workers to advise smallholders and the farmers themselves under smallholder conditions.

These modern vegetables need the right sort of climate. We must consider that some can stand spring frosts while others are not hardy. Those which grow better in cooler seasons don't do so well when it's warm.

The following table shows the vegetables by resistance to spring frosts and the seasons they grow best. Most of the spring frost resistant vegetables mentioned in the first column, as well as those mentioned in the second column (except for cauliflower) can also grow during the warm season.

Making the soil ready

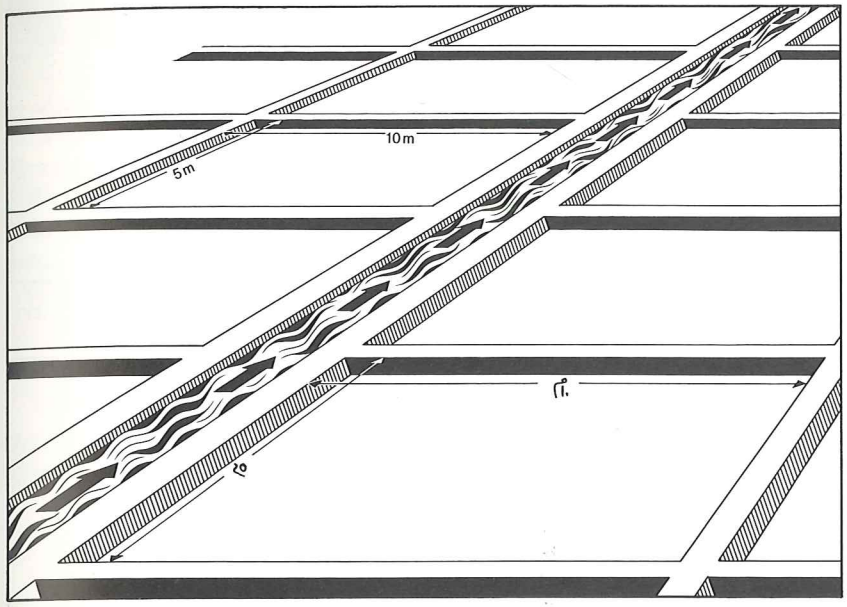
In general the soil must at first be prepared in the same way as for other crops. It should be ploughed approximately 20 cm deep. After that it must be harrowed and the surface levelled with a scrapper.

Up to this point the soil is made ready in the same way for all agricultural crops. Now the special preparations for growing vegetables begin. It is impossible to grow vegetables in arid and semi-arid regions without irrigation. The following instructions on soil preparation are aimed at distributing the irrigation water in the most uniform quantities to the plants.

We use three different cultivation methods to get the irrigation water to the plants by gravity. The method used depends on the soil conditions and on the needs of the different vegetables.

- Vegetable cultivation in basins
- Vegetable cultivation along furrows
- Vegetable cultivation on ridges

Making water-holding basins



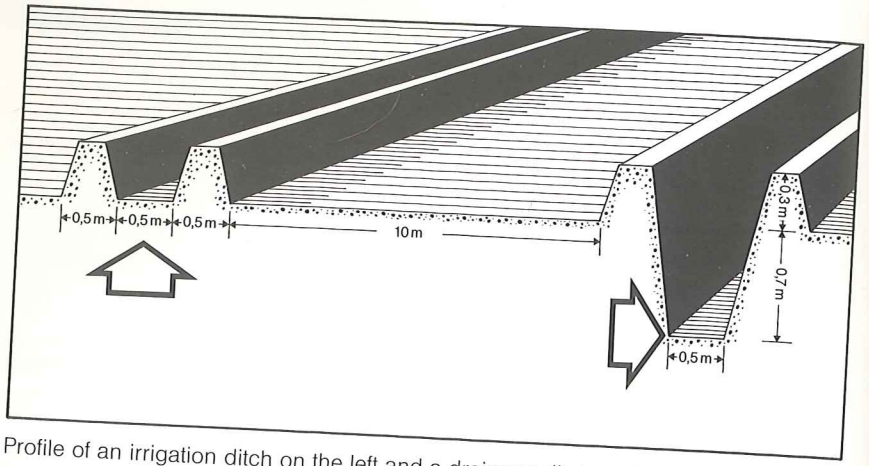
A field divided into small basins.

The idea of the basins is to divide the field into small plots so as to spread the irrigation water equally in the field. The greater the slope, the smaller the basin.

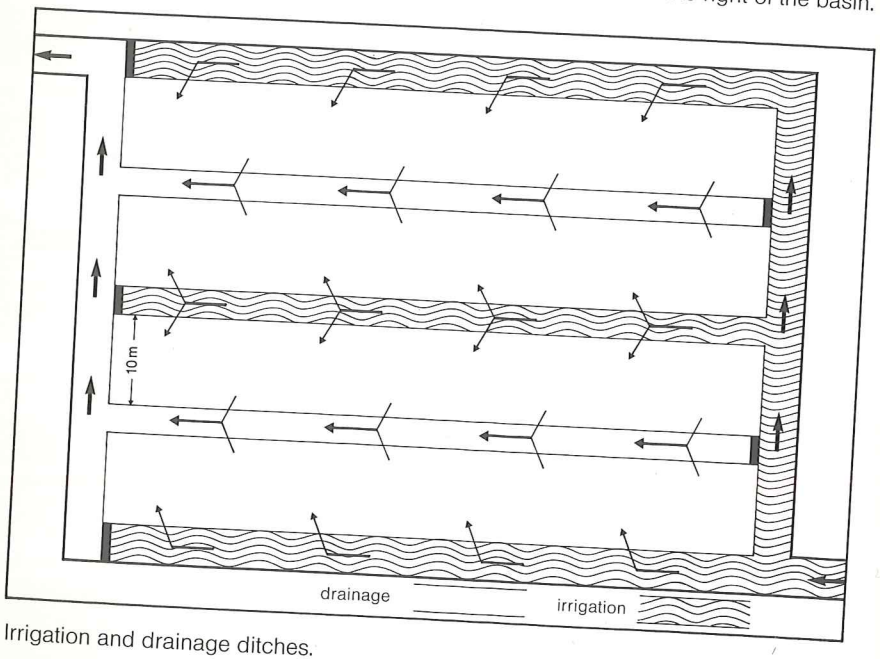
But even on an ordinary field the basins should not be longer than 10 metres and not wider than 5 metres. The right size of basin guarantees the best yield.

The basins are edged with small ridges of soil. The bottom of the ridges is approximately 50 cm wide and the top 30 cm. Just after the ridges have been made they should be about 25 - 30 cm high, but may later settle to 15 - 20 cm. This is from the ridges becoming compacted as they are used as footpaths.

Soil scrappers or shovels are used to make the ridges. The smaller side of the basins always edge on the irrigation ditch. If the soil is extremely heavy you will need to make a drainage ditch opposite to the irrigation ditch to allow the surplus irrigation or rain water to run out of the basin. That means that the drainage ditch has to be deeper than the surface of the basins.



Profile of an irrigation ditch on the left and a drainage ditch on the right of the basin.



Irrigation and drainage ditches.

The soil surface inside the edge ridges of the basins has to be levelled in a very exact way. Uneven soil levels will allow puddles to form. Avoid this because it could cause poor growth and death of the plants. The problem is more likely to happen with heavy soils.

How to do it:

- At first the distance of the ridges of the basins are measured and marked with pegs.
- After that the pegs will be joined with string.
- The strings show the height of the ridges when the basins are finished. After that remove the strings.
- Compact the heaped ridges with a shovel or a plank.
- After this the surface of the soil in the basins will be levelled again with a shovel or a soil scrapper and rake.

Once basins have been made they can be used for several years. Of course a different crop must be grown each time (rotation).

Soil can be made ready for a new crop with a spade or hoe if the field is not too large. For a bigger area a single axle tractor can be used.

Vegetables which grow well in basins:

Spinach	Turnips
Carrots	Radish
Leeks	Beetroot
Onions	Swiss chard

All types of cabbage are suitable if the soil is not too heavy. Egg plants and peppers can be grown this way in sandy soils.

The distances of the basin ridges are measured and marked with pegs.

After joining the pegs with string the ridges are heaped with an earth scrapper.

Level the surface of the soil in the basins.

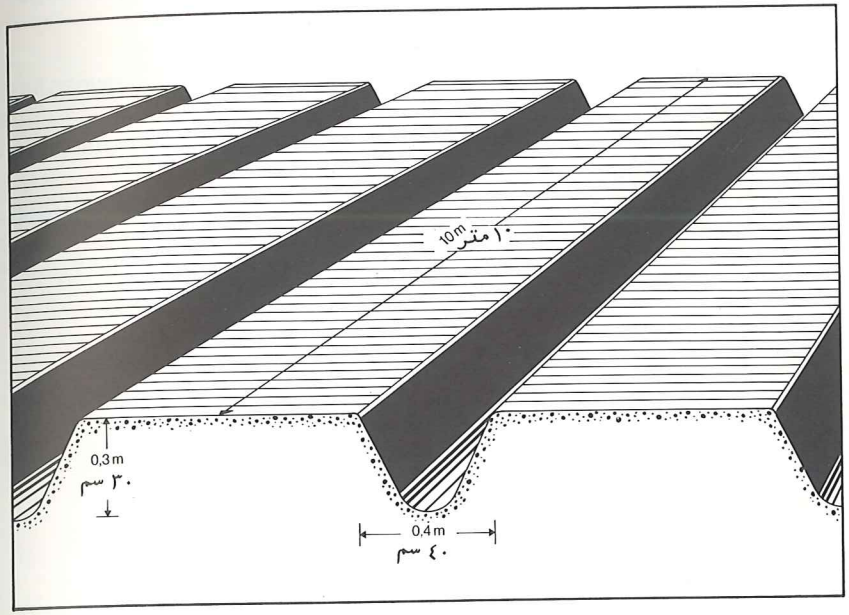
Basins ready for sowing and planting vegetables.

Tilling the soil in an existing basin with a spade.

Tilling the soil in an existing basin with a single axle tractor.

Basins sown with Swiss chard.

Furrows for the lie-down plants



Layout of furrows.

Plants which are inclined to lie on the soil should be grown along furrows. That means they will lie on dry instead of wet soil.

The furrows are small, 30 cm deep, ditches are connected to the irrigation ditch and drainage ditches at right angles.

The distances between the furrows depend on the types of vegetables grown. They should not be any longer than 10 metres and lie between the irrigation and drainage ditches. The ditches may remain for a couple of years. That means the field ditches may be used for furrows, ridges or basins according to the type of vegetables being grown.

But in large-scale vegetable growing the furrows could be up to 50 metres long, if the soil is suitable and not too heavy. In this case the furrows are made by tractor or ox-team.

The furrows must be absolutely even to make sure the irrigation water is equally spread. Otherwise there will be the same problems as with basins.

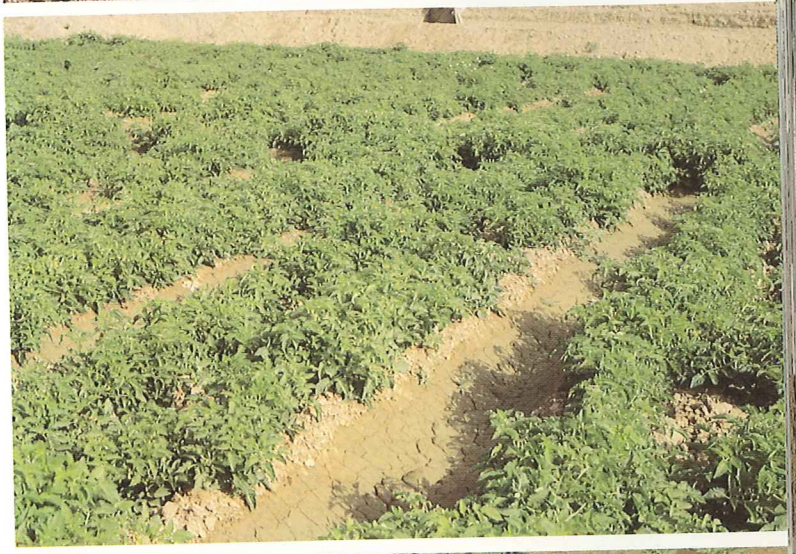
How to do it:

- A small number of furrows could be dug with a shovel or an ox-team after proper measurements have been taken and the planned furrows marked with strings. The distances between the furrows depend on the type of vegetables to be grown.
- One metre will do for tomatoes.
- Watermelons, sweetmelons and cucumbers should be grown between furrows of 2 metres.
- On this bed, between two furrows the plants can grow without coming into touch with moisture.
  The plants on this bed are growing between two furrows – they do not come into touch with the water.

Vegetables which grow well along furrows:

Tomatoes	Cucumbers
Sweetmelons	Watermelons
Squash	

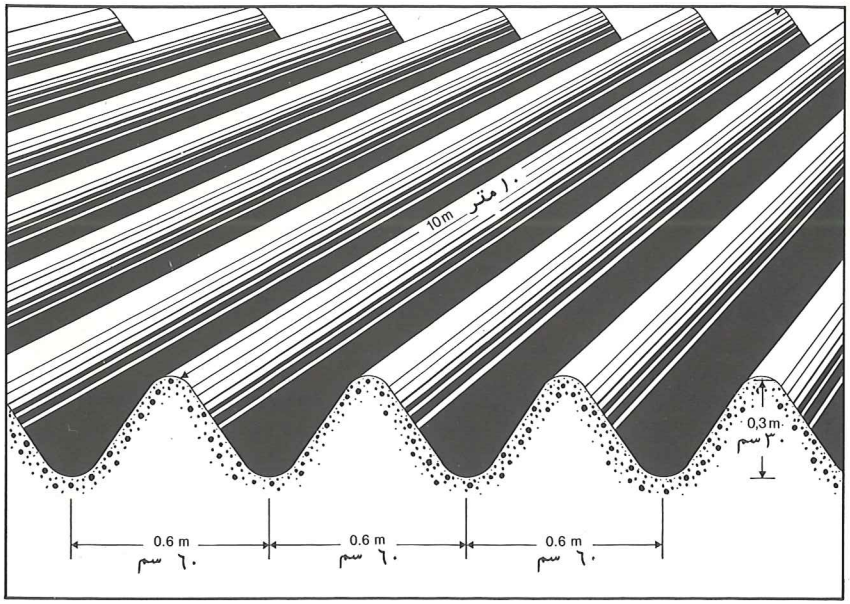
Furrows 2 metres apart growing watermelons.



Furrows planted with tomatoes during the phase of vegetative growth.

Furrows planted with watermelons.

Ridges for air-hungry plants



Layout of ridges.

Growing vegetables on ridges is recommended for those types of vegetables which need a lot of oxygen in the root zone. These plants don't like excess water, particularly on heavy soils. Plants grown on heavy soils do best just at the border between wet and dry soils (side effect).

This side effect is clearly visible on this lettuce seedbed.

Ridges are small and pointed on top, just after being made. Later the tops are rounded. The top of the ridge is never wider than 10 cm. The ridge has water on both sides. This is the difference to a furrow, which is actually a small ditch.

The ridges are connected to the irrigation ditch at right angles. Making ridges is easy and doesn't need as much work as making furrows.

The planned ridges are marked with a marker or string. After that the ridges are heaped with soil scrappers and rakes.

On the large-scale farm the farmer can make the ridges with a tractor-drawn ridger. The ridge can be up to 30 metres long.

Seeds are sown or seedlings planted on top of the ridges or on both sides along a line approximately two thirds the height of the ridge.

In comparison to the furrows the ridges have the disadvantage that they can dry up and the soil can develop deep cracks, which can spoil the ridges. This means that irrigation water can flow uncontrolled through the field, destroying the ridges. The cracks can also damage the roots of the plants.

In comparison with growing vegetables in basins, growing on ridges is much more expensive. Not only making, but also keeping up the ridges needs a lot of work.

In spite of that, all vegetables should be grown on ridges when too heavy soil makes basin-growing difficult.

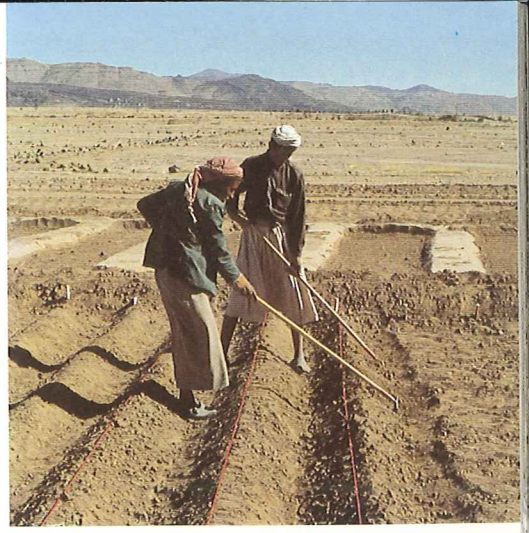
How to do it:

- The planned ridges are measured and marked with pegs. The distance from ridge to ridge is 60 cm.
- The pegs are connected with string.
- The ridges are heaped with the soil scrapper.
- The final work is done with a rake.

Vegetables which grow well on ridges in heavy soils:

Lettuce	Cauliflower
Kohlrabi	Broccoli
Cabbage	Brussel sprouts
Eggplants	Sweet pepper
Okra	Onions

The final work on ridges with the rake.



The ridges are heaped with the soil scrapper.

Ridges ready for planting.

Field with ridges planted with cabbages during the first phase of vegetation growth.