



# THE CULTIVATION HANDBOOK

*For Good Food*

Linnea Öjes

MERA MÅNGFALD MED MATEN



## **THE CULTIVATION HANDBOOK – FOR GOOD FOOD**

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# The Cultivation Handbook

## For Good Food

### Preface

When I was young, we grew our own vegetables. Both my mother and father were raised on a farm, which meant growing food was a matter of course. We were not alone growing vegetables in our residential area of Sunne as virtually all of our neighbours had a garden plot, which actually was not particularly unusual. It was the 1970s and most people were just a generation away from the agrarian society of the past.

Our family were virtually self-sufficient in vegetables due to the fact that we also grew them at my grandparents' house outside of Grums. We visited them frequently and there was a lot of harvesting. We used to fill the cellar, and bags of freshly harvested beans and suchlike were taken home to be prepared the very same evening. Cutting the tips off beans before bedtime was a completely natural event, although it could be a little tedious for a child.

Creamed spinach with fish, and broccoli with meat were customary dishes, and of course potatoes. It was just as natural to eat pickled food and jams. I remember when I came home from school we would have "hocus-pocus cream" as a snack, which was a dish that my mother made using frozen black currant purée. Maybe not particularly tasty but certainly nutritious and totally home-grown.

In the mid-1980s I moved to Gothenburg, and of course I tried to grow vegetables. I had a few buckets on the balcony and a worm compost that was quite the thing back then. Later we bought a house, where despite only having a fairly small garden plot, I managed to grow a lot of edibles. Everything you can produce from an ordinary garden plot with peach trees and edible berries from our mulberry hedge, blackberries, aronia, sea buckthorn and grapes.

Today there are no vegetables in our old garden in Sunne, as was the case when my parents had it. Many people today have no connection with the countryside and farming, as they buy all their food from the supermarket.

But what is exciting is that young people in the city are slowly returning to the countryside. There is a craving to start growing more, and to keep livestock in order to support yourself.

Online I read: "We live in a villa out in the country among farmers and a good set of neighbours. We try to grow a lot in our garden and have common areas where we cultivate in partnership with our neighbours. We are two parents who have continued to work although I only work part-time, partly for financial reasons but also because we both enjoy our work. Learning slowly without any pressure of having to withdraw money from our crops has been good for us. We had previously talked a lot about living in an ecovillage or suchlike but prefer to dig where we stand. I think relationships are equally as important as gaining knowledge in order to create resilience."

Today my family and I are back in Värmland, where we live on a small farm outside of Grums. Our sons were inspired by their upbringing; the youngest is studying to be a landscape architect while the oldest is a vegetable grower. All sales are made directly to consumers and to restaurants, as this is largely a must to ensure your economic survival in a small-scale business today.

As chairman of Förbundet Sveriges Småbrukare (*Swedish Small Farmers' Association*), I am both pleased and reassured to see the emerging trend of reverse urbanisation. We need many more people to produce food, either on a large or small scale. This book serves as an excellent guide for those looking to start their journey as a food producer.

Jonas Wangsten

## Introduction

This guide is aimed at those looking to start a business in organic vegetable growing on open land, or for those interested in farming in general.

The guide is produced by the *More diversity with food* project with the purpose of contributing knowledge and inspiration for growing food locally. I want this guide to provide growers with the ideal platform for starting up and running a successful business, and they can view this guide as the first step in their business and be inspired to search for the information they need.

The guide showcases growers and farmers currently active in Värmland, who are faced with a range of conditions and have different goals. Through their voices, we can appreciate the complexity of being a farmer today, and the difficulties they face. But we also get to see their solutions and what motivates them.

I hope that this guide helps you along the way so that you too can become a grower in Värmland.

Linnea Öjes, Höje 2021

## Past, present and future

In the northern part of Värmland, agriculture has previously been focused on milk and meat production. The climate and soils are well suited for grass and pastures. Grain has been cultivated for animal feed and bread grain; mainly rye but also oats for the Värmland speciality oat flour. The 20th century saw the emergence of both large and small potato producers, and it was the smaller family farms with a mixed production that dominated for a long time. Over the last 20 years, the scope of both potato cultivation and agriculture in general has diminished, which is mainly due to competition from producers in areas with a more favourable climate, where yields are often higher, but also because of the general downsizing in agriculture. Much of the arable land has been taken out of use and is now woodland or has become overgrown. Statistics show that there were 160 companies in Värmland engaged in

horticulture in the 1970s, while in 2017, there were just 26. Over the same period, dairy farmers in Värmland have dropped from 2,000 to around 40.

The soils of Värmland, especially in Klarälvdalen, are highly suited for growing potatoes and other root vegetables, having the river as a water source. Small-scale vegetable farming has been around for a long time. A milder climate along with the conditions for better crop rotation with breaks in grassland cultivation and opportunities for collaborations should provide the means to increase vegetable production. Demand for locally produced and organic food is on the rise. More people are aware of what they are eating and are keen to have non-toxic and nutritious food.

## Soil

It is the top layer of soil that determines your type of soil, referred to as topsoil, and it is this soil you should cultivate. If you dig too deep, you will hit the subsoil, which is a greyish soil with few nutrients, beneath which is the mineral soil.

The two most common soils in Sweden are brown soil and podzol. Brown soils are the soils that form under deciduous forests and contain large amounts of organic material that over time have built up the humus content. Agriculture is often widespread across these lands.

Podzol is a very acidic soil that is formed under coniferous forests. The trees here will not have shed any organic mass in the form of leaves; rather, the different mineral layers lie on top of each other with clear strata. Under the thin layer of leaf litter there is an equally thin layer of humus. Below that is a pale, grey soil and then a red-coloured rust soil. If you grow in areas of coniferous forest, where you can see layers in the soil when you dig, you probably have podzol, which is not suitable as arable land. If this is the case, you need to add new soil to your plot. The easiest method for smaller farms is to build up a new layer of purchased soil on top of the land.

Where brown soil has been cultivated by people, arable land is created with topsoil as the top layer. Topsoil can consist of anything from heavy clay to light sand, and can be wet, dry, nutritious or nutrient-poor. The type of soil can also vary across

your own farm. Examine the soil where you plan to cultivate and identify your type of soil. The easiest way to find out what type of soil you have is to test it in different weather conditions. You can also examine your ground profile, by digging a pit with a vertical wall on one side. This should allow you to see the difference between the topsoil and the subsoil, or the different layers if you have podzol. You can also perform a simple test, see below.

In Värmland there are many different types of soil, ranging from the lightest sandy soils to stiff clay soils, but the most common type of soil in the region is silt.

The Geological Survey of Sweden, [sgu.se](http://sgu.se), has a soil map indicator that will show the type of soil you have in your area.

## Clay

Clay soil consists of particles smaller than 0.002 mm, which due to their size can be packed very tightly. Clay soil is cold and wet but also rich in nutrients and minerals. The small particles mean the plants' roots have the best possible contact with the soil, which simplifies the nutrient exchange between the soil and the plant. In addition, the soil buffers the nutrients over time.

Clay soil takes a long time to heat up in the spring, as it contains a lot of water, which as a result could shorten the growing season somewhat.

Densely packed clay soil means that the water remains in the ground instead of running away, which deprives the soil of oxygen. You then get waterlogged soil, which cannot be cultivated unless measures are taken. Soil with low oxygen content also suffers from nitrogen losses. Bacteria in the ground converts the soil's nitric nitrogen into compounds such as nitrogen dioxide and nitrous oxide. (The climate impact of nitrous oxide is about 298 times greater than that of carbon dioxide.) Drainage is usually the most important method to tackle waterlogged soil, along with increasing the humus content.

You should avoid working your clay soil too much. Using a cultivator during the wrong period, for example when it is too wet, could break up the structure and produce a dense cover over your entire plot making it difficult for plants, rainwater and oxygen to penetrate. The soil is sensitive to being heavily packed by heavy

machinery. You should also be careful about walking a lot on the crop beds if you have clay soil, especially on smaller plots.

One way of ensuring the ideal structure for clay soil is to let the frost break up the clods of earth during the winter. Just before the frost comes, you can turn or plough the soil, to allow the frost to get at the larger clods of earth which will make the soil porous and easy to work in the spring.

The best way to break up clay soil is to sow plants that have deep roots, such as sweet clover and sunflowers. Even cabbages, which like the green manure plant alfalfa form pile roots that grow deep down and thoroughly break up the soil. The easiest method of breaking up the surface is to use a fork during the growing season to prevent a crust forming on the surface.

## Sand

Sandy soil has larger particles than clay, 0.06–2 mm, and is warm, dry and light. The large particles allow water to flow through without any hindrance, but so do the nutrients, which means sandy soils are often poor in quality.

Sandy soils, unlike clay, are very easy to work. If you perform a lot of physical work with a spade or similar tools, sandy soil is ideal to work with.

In the spring, the sandy soil warms up rapidly and growing can start early. Overwintered plants also find it easier, as they do not have to stand in wet and cold soil for a long time.

Access to water can be a problem, as water flows easily through the soil and you need to irrigate regularly. This also leads to a risk a risk that the nutrients are washed out. Small regular applications of water that just provide the roots of the plants the soak they need are preferable. In the same way, you add nutrients several times over the course of the season. Plants in sandy soil have difficulty finding water deeper into the soil, which means that the roots often spread near the surface, making the plants even more sensitive to dehydration, and they also find it difficult to absorb minerals from the soil. This can be counteracted by mycorrhiza fungi (learn more about mycorrhiza under “Caring for your soil”). Covering the soil prevents the soil from

drying out but can also result in shallow roots. To preserve moisture in sandy soil you should not cultivate it too much in the spring, as this can easily cause dehydration.

Sandy soil rarely has problems with compaction damage, although over-cultivation could reduce the presence of organic carbon in the soil. Carbon holds the soil together, helps it retain soil moisture and prevents soil erosion.

## Fine sand

Fine sand has a particle size between clay and sand. It is warm, easy to work with, porous but poor in nutrients. Fine sand is an older name for a type of soil that today falls under the general type of soil we call sand.

## Silt

Silt, formerly known as rock flour, 0.002–0.02 mm and fine sand, 0.02–0.06 mm, has a particle size somewhere between clay and sand. Depending on the actual size, you can call the soil clay silt or sandy silt.

Silt soils are structurally weak, which can cause sludging and debris flow in heavy rain. They are also prone to becoming waterlogged. Silt is a common type of soil in Värmland, as it is found around Lake Vänern and in the river valleys.

## Organogenic soil/Humus soil

Humus soils are found in wetland areas and their primary content is of course humus. These arable lands have come into being after draining wetlands. Today, they account for a third of Swedish agriculture's emissions of greenhouse gases, such as carbon dioxide and nitrous oxide. For the sake of the climate, they are now trying to restore some of them to wetlands.

## Moraine

Moraine is an unsorted type of soil containing a lot of stone, gravel and blocks mixed in a fine-grained ground mass. Moraine soil is Sweden's most common type of soil and is often mixed with other types of soil.

## Soil test

In order to determine the type of soil, you can perform a simple test, which involves forming the soil into a ping pong ball shape. If the soil is too dry, soak it a little.

- If the ball is sticky, dense and malleable then you probably have clay soil. You can also try rolling long strands of earth in the palm of your hand to see if they stick together. If the thread is less than 2 mm thick, this indicates that it is clay.
- If the ball is dense but falls apart into larger pieces, you probably have clay soil with elements of sand or gravel.
- If the ball just collapses or simply does not form at all then you have sandy soil.
- If you produce a ball reasonably well, but that easily falls apart and feels grainy, you could have sandy soil with clay elements.
- Hopefully your soil also contains humus nutrients. The humus makes the soil porous and your ball will be more airy. Sandy soil with a lot of humus nutrients also holds together better than pure sand.

## Soil samples

You can send in a soil sample from your plot for analysis to identify the nutrient content, humus content, pH value and the presence of heavy metals.

On a commercial farm, it may be well worth knowing these values so that you to work with the supply of nutrients in the right way.

## Plant nutrition

To calculate how much plant nutrients are consumed for an individual crop, you can base your calculations on the finished crop's content of plant nutrients, as well as the cultivation time. In other words, the time it takes for the crop to go from seed to ready-to-harvest vegetable. Make an estimate of the harvest across the entire plot and fertilize accordingly. You also need to consider precipitation and temperature over the course of the season, as well as the rules that apply for the amount of manure.

The difference between added and removed plant nutrients is referred to as the plant nutrient balance. You measure whether the crop has a surplus or deficit of nitrogen, phosphorus and potassium. Depending on the conditions of your soil, you fertilize in line with the plant nutrient balance. If you need to build up the fertility of the soil, your soil should have an excess of nutrients. If your soil is already rich in nutrients, and you add more nutrients than the crop needs, you then risk nutrient leakage into watercourses, lakes and the sea, which will cause damage to the environment.

Free advice is available from the Swedish Board of Agriculture's Focus on Nutrients programme. You can also calculate plant nutrient balances yourself using the calculation tool Vera:

[greppa.nu](http://greppa.nu)

### Minerals

A plant is made up of 80-90 per cent water, as well as carbohydrates and minerals. Minerals account for one to two per cent but are still important. These are divided into two groups; macronutrients and micronutrients, where the name indicates their content.

Macronutrients: nitrogen, phosphorus, potassium, sulphur, calcium and magnesium.

Micronutrients: boron, chlorine, molybdenum, copper, iron, manganese, nickel and zinc.

## Nitrogen (N)

Nitrogen accelerates vegetation and produces lush plants with a large leaf mass and is important for energy metabolism and the transmission of genetic information. No other substance can replace the role of nitrogen.

If the soil is deficient in nitrogen, the plants turn pale and then yellow, and sometimes have a reddish hue. The colour shift first begins in the older leaves. The plants grow slowly or stop growing completely and wither.

Too much nitrogen makes the plants less resistant to diseases and pests, and the plants turn dark green with a shift to blue. The vegetables can become tasteless as the nitrate levels increase. Too much nitrogen also results in a poorer quality for your harvest. When growing carrots, for example, the leaves benefit from nitrogen at the expense of the roots.

## Phosphorus (P)

Phosphorus is important as a carrier of genetic information and for transporting and storing energy that comes from photosynthesis. The plant absorbs phosphorus through the soil fluid.

Phosphorus deficiency delays the maturation of crops and growth is hampered, and flowering is delayed and the blooms are small. Plants with a small root system such as onions are exposed to a greater risk of deficiency. Mycorrhiza is therefore of the utmost importance for providing these plants with phosphorus. An early stage of phosphorus deficiency is revealed through the leaves often turning dark green, becoming stiff and bending downwards. The underside of the plants' leaves often turn purple-red. Cold impairs the plant's uptake of phosphorus. By way of example, this can be clearly seen on tomato plants that are too cold. In the event of deficiencies due to the cold, the problem is rectified with a warmer temperature. Even

in phosphorus-rich soils, plants can show phosphorus deficiency when the soil is still cold in the spring.

Phosphorus is easily mobile which means it usually takes a relatively long time before the deficiency causes the plant to stop growing completely; in these cases the plant starts to fade.

Excess phosphorus rarely causes any symptoms to the plants but is harmful to the environment.

## Potassium (K)

Vegetables have a strong need for potassium in order to grow.

Clay soils often have good access to potassium, while there is almost always a shortage when it comes to sandy soils where it needs to be supplemented.

Potassium is not bound to the organic substance; it is found in the cell fluid instead. As vegetables contain a lot of water, major amounts of potassium are removed following each harvest.

This lack of potassium results in poor growth and the crops wilt easily. Leaves often turn brown at the edges and fade. The plants become susceptible to disease and dehydration and have difficulty withstanding frost. Potatoes with potassium deficiency turn dark in colour after cooking.

Composted cow manure contains a lot of potassium, especially urine. Urine can be used as a fertilizer preparation or form part of a deep litter bed, such as a bed of straw that cows walk on during the winter. Potassium is easily diluted from the manure by rainwater, which means it is important to cover your manure pile or compost with, for example, tarpaulin or straw.

## Look after your soil

The key requirements for maintaining good growth, moisture and a favourable growing climate are to feed the soil with organic material, to improve the humus content of the soil. A good soil should contain mineral compounds, sand or clay and dead decomposed organic material, i.e. humus. The humus content is normally a few

per cent but can be as much as 10-20 per cent and has a positive effect on the fertility of your soil. This applies to both clay soil and sandy soil, whereby the clay soil becomes more airy from the humus, while the sandy soil retains moisture and nutrients better. The humus content can quickly diminish when cultivating the soil, which means it is vital to regularly supplement with new organic material and fertilizer.

The living entities in the soil, such as earthworms, fungi, including mycorrhiza and bacteria, protozoa and nematodes mix the mineral sand or clay soil together with the humus. This is what makes the soil fertile and gives it a good structure.

## Mycorrhiza

Mycorrhiza are root fungi that live in symbiosis with 80–90 per cent of all plants on the planet and can exchange nutrients and water with each other.

As the mycorrhiza fungi have long mycelia that extend over large areas, the vegetables have access to nutrients far beyond their own roots. This helps plants absorb macro and micronutrients such as phosphorus, manganese, molybdenum and zinc. To ensure a good quality to your vegetables, it is vital that they have access to these substances.

Other benefits of mycorrhiza are that the plants become less susceptible to dehydration and are less likely to suffer from diseases. There will also be a minor leak of nitrogen.

Many vegetables such as onions, leeks, celery and carrots have a relatively weak root system. These benefit particularly well from mycorrhiza, which in turn draws benefits from these particular vegetables. Cabbage plants and chenopods rarely live in symbiosis with mycorrhiza, which means that there will be fewer root fungi following intensive cultivation of these crops. Therefore, it may be a good idea to avoid growing cabbages prior to carrots or onions in your crop rotation. Learn more about crop rotation below.

It is also important to keep tabs on the nutrient balance. Too much easily soluble phosphorus and other nutrients in the soil will impair the mycorrhiza. If the plants are given too much fertilizer, they could stop interacting with the mycorrhiza. This is also

the case if you add mineral fertilizers and pesticides. Mycorrhiza is also disadvantaged when cultivating the soil as the structure is damaged when digging, as it is with hard-packed soil, fallow and the cold.

You can buy mycorrhiza to add to your soil when planting out your vegetable seedlings.

## Previous crop and crop rotation effects

Some vegetables and plants can have a positive previous crop effect on the crop that follows, through crop residues and green manure, which can improve the harvest the following year. Harvest residues and other organic material can provide an excess of nitrogen, phosphorus and other important organically bound plant nutrients, which benefits the new plants. It is therefore important to consider what you have sown on the cultivation site the previous year. The plants are divided into nourishing crops and consuming crops. Nourishing crops include legumes which build up the humus content of the soil through their ability to fix nitrogen from the air, as well as crops with a large root system or plants that provide substantial amounts of crop residues. Consuming crops on the other hand consume the humus.

The crop rotation effect refers to more long-term previous crop effects. You achieve this through planned crop rotation, where all crops in the crop rotation are considered and where the nitrogen is bound to the humus making it more difficult to degrade. If you achieve such a balance, and the soil attains a more long-term fertility level, you become less dependent on other fertilizers.

## Manure and compost

Manure from cows or other animal species as well as compost improves the humus content of the soil. If you run an organic farm, you must not use mineral fertilizers. One advantage of mineral fertilizers can be that you can fertilize each specific plant with exactly what it needs, which results in the best possible growth of your crop without any problems of eutrophication. But mineral fertilizers do not improve the humus content. This means that conventional growing, where you fertilize using

mineral fertilizers, causes the soil to leach out its nutrients and bacterial cultures making you more dependent on adding artificial nutrients. These must be manufactured and transported a long distance. The manufacture of mineral fertilizers emits enormous amounts of nitrous oxide. Leaching of nutrients can also occur on an organic farm, where fertilizer preparations that are not long-acting and humus-forming are applied, such as pelleted manure. This is a problem on larger farms today.

## Spreading manure

There are rules governing the type of manure and how much of it you can spread, as well as the times it should be done and where you can spread it. Go to [jordbruksverket.se](http://jordbruksverket.se) to see what applies. One aspect is that you are only allowed to spread manure on arable land. Between December and the end of February, you must fertilize with manure at least ten centimetres down. There are also restrictions on how much phosphorus you can spread. If you have animals on your farm, you must calculate how large of a spreading area you need. You can calculate this using the calculation tool on [jordbruksverket.se](http://jordbruksverket.se). You can also use Focus on Nutrients' calculation tool, Vera. One method can be to prepare a land analysis where you identify the nutrient content of the arable land.

In some areas, the soils are more sensitive to nitrogen leakage, and are referred to as nitrate sensitive areas. In Värmland this is around Karlstad, Kil and Forshaga, as well as Grums, Kristinehamn, Säffle and up towards Fryksdalen in Östra and Västra Ämtervik and Molkom up towards Älvsbacka. For nitrate-sensitive areas, there are rules governing the times of the year you are permitted to spread manure, and under what conditions. By way of example, you may not spread manure at all between November and the end of February. You must not spread manure on water-saturated, flooded, frozen or snow-covered ground. From August, you can only spread manure on growing crops.

Learn more about the rules that apply at [jordbruksverket.se](http://jordbruksverket.se). To find out exactly where the boundaries for nitrate-sensitive areas are, see the county administrative

board's map service VISS. You will find a link at the Swedish Board of Agriculture's website.

Special local rules may apply in some municipalities regarding the spreading of manure. Contact the environmental administration in your municipality to find out what applies to you.

## Fertilizers

If you are a certified organic grower, you are allowed to fertilize with:

- Manure, straw and other organic material. Composted, fermented, such as bokashi, or dried material. In dried form it often comes as pellets and in several different varieties.
- Animal by-products, such as blood meal, wool, bone meal, fish meal and more.
- Peat and biochar, which improve the structure of the soil.
- Algae and seaweed, which are nutritious along with waste from households, parks, gardens and grocery stores. You can also fertilize using digestate from biogas plants providing they only contain the permitted materials.
- Stone flour, crude phosphate and apatite for extra minerals.
- Eggshells, limestone lime, algal lime, dolomite lime and silicate lime, if necessary to raise the pH value, as well as wood ash, gypsum and the mineral kieserite.
- Liquid nutrients, composted or fermented from a shop or on site, such as nettle water and comfrey water.

For the applicable rules for permitted fertilizer preparations, read more at [krav.se](http://krav.se) and [jordbruksverket.se](http://jordbruksverket.se).

Before you start growing, you should consider how to obtain manure and compost. If you do not have your own animals, your neighbours or others nearby may have them. Working with your own composts is good, although it can be tricky securing sufficient volumes depending to the size of your farm.

The optimal factor for growers and for the environment is to work up the humus content from materials originating nearby, where the farm, village or your immediate area contributes to a cycle, known as recycling agriculture.

You can learn more about fertilizer preparations on the organic food label KRAV's website, [Krav.se](http://Krav.se). Recycling agriculture is common in biodynamic crops, which you can read more about at [demeter.se](http://demeter.se) (*international network of inspection bodies for biodynamic cultivation*).

## Green manure and grasslands

An important aspect in organic farming, especially on the slightly larger scale, is green manure and grasslands. Green manure, in the form of legumes, binds nitrogen from the air and transports it into the soil. Rhizobium bacteria are infected at the plants' roots, which in turn bind air nitrogen to ammonium nitrogen. Once the green manure plants are cut back, all the material is added to the soil, which improves the humus content and prevents nutrient losses. This is the same way nature works on land that has not been farmed. For this to succeed, you must have good drainage, as the soil must have a good air supply. The amount of humus in the soil is also important for the ability to bind nitrogen. Green manure is also used to break up the soil deep down with plants that have deep roots. These are also called structure-improving crops.

Grasslands which often consist of a mixture of grass and nitrogen-fixing plants, are grown to provide winter feed for the animals. The manure from the animals is recycled back into the soil where you can also grow vegetables. The grassland is often called the heart of an organic farm and regulates the balance between animals and plant cultivation.

## Crop rotation

Crop rotation means that you move each type of vegetable or plant to a new location for each growing season. The crops are rotated one step every year. If you grow

cabbages one year you might grow green manure the next. The longer the crop rotation, the greater the benefits.

As early as in ancient Rome and Greece, different types of crop rotation were applied, and have since been copied by cultivators around the world. In the 18th century, the concept of crop rotation was established in Sweden and developed as a method. It was not until the 1950s that the cultivation system with sequential cropping and crop rotation largely disappeared and was replaced by mineral fertilizers and pesticides, only to re-emerge as a “new” alternative cultivation method in the 1970s.

For a small farm, crop rotation could be four years, whereas for a commercial farm six or eight years is more common. This also includes green manure, preferably two applications.

The type of crop rotation can be different, depending on the conditions and what you grow. It can be difficult to achieve equal volumes, and it is rare that your plan goes according to wishes. It is therefore important to document what actually unfolds in practice every year.

Crop rotation is primarily based on a plant family, such as the cabbage family, which is one of the most sensitive crops for soil-borne diseases and pests, and can also be divided up according to the growing conditions of the crops. Crops requiring a lot of nutrients should be grown together. Leeks, which are a nutrient-demanding crop, may be better suited to grow together with, for example, cabbages rather than the rest of the onion family. The cultivation time, from seed to finished crop, should also be considered when planning your crop rotation.

Working with crop rotation counteracts many of the problems caused by monoculture. Growing one crop in the same place will attract insects and pests to that specific crop, such as carrots that attract the carrot fly. If you have multiple crops, several different insects and pests will come to your crops, but these in turn affect each other. A great richness of species creates balance; the same balance that prevails in nature.

Soil fatigue is when there is a shortage of certain nutrients and when the soil suffers from soil-borne diseases. Monoculture in one place can cause these particular problems. One example of a soil-borne disease is clubroot, which can

affect cabbages. If you have contracted a fungal disease in your crop, there may be spores left for up to 20 years. The clubroot disease causes the cabbage plants to die and it is impossible to grow cabbages as long as the spores remain.

You can learn more about crop rotation from the Swedish Board of Agriculture's cultivation folder, but also from most other books on vegetable and crop cultivation. You can read about the nutritional needs of different vegetables in the book *Odlå till försåljning (Growing for sale)*. Part 2 – our best vegetables, Ylva Lundin, Sanna Mattsson Ringqvist, Jonas Ringqvist.

### Example of six-year crop rotation

Crop rotation can vary greatly depending on the soil you have, the weeds that dominate and what you intend to grow. There are many aspects to consider and crop rotation needs to be adapted to suit your specific conditions.

Growing perennial grass crops with grass and clover is positive, as it enhances the soil structure and improves the humus content and thereby the fertility and water holding capacity of the soil. If the grassland is used for animal feed, the manure from the animals becomes an important way of nourishing the vegetables and has a positive effect on the micro-life in the soil.

A proposal for crop rotation is shown below for growing cabbages and root vegetables, grassland for animals and grain for human consumption or animal feed.

Year 1: Grassland

Year 2: Grassland

Year 3: Cabbage

Year 4: Green manure, annual.

Year 5: Potatoes and root vegetables

Year 6: Grain. With sowing of grassland in the autumn.

## Tarik and Hassan Hamish, Torfolk & Vänner (*Torfolk and Friends*)

The fields on Torfolk farm are divided into plots. Different kinds of vegetables are sown in each plot. Right now, Tarik is sitting in one of the plots clearing weeds between the plants, where the row hoe on the tractor cannot reach. There are also some other people, who work at an hourly rate when Tarik and his son Hassan feel that they do not have the time. Sometimes father and son work extra-long days on everything that needs to be done, even at night at times. It is laborious, but paying wages, even by the hour, is a major cost and burden on the family business.

Hassan shows us around the farm, where the straight rows are numerous and long. Carrots, cabbages, onions, maize, parsnips, Arabic cucumbers and much more are grown here.

It is the end of June and in a week or so the first cabbages will be harvested, closely followed by the onions to be sold in the farm shop or to a wholesaler, while the leeks still have plenty of time left until harvest. "In previous years, things have not been good," says Hassan. He called his relatives in Syria and asked for advice and was told to provide the leeks with a lot of water, which can be a challenge in Torfolk's fields. In some parts it is almost like walking in pure sand.

"The leeks have not been good. This land does not hold water and I know that leeks demand a lot of water."

There is a solution, as the farm has a pond that so far has never dried up. This year, Hassan has tried to water his leeks more regularly. It has also rained a lot in early summer.

"Things look promising now."

It all started for Tarik as an apprentice at the Torfolk Gård farm. The Grön Gryning (*Green Dawn*) association was formed at the same time, which is an association designed to make it easier for new growers to establish their businesses, through joint sales channels, access to machinery and tools and their own brand, Torfolk & Vänner (*Torfolk & Friends*). Tarik and Hassan now have their own family business,

affiliated with the association. The association has set up a cultivation system for all growers on the farm, by dividing the fields into large plots that each grower gets to cultivate.

Hassan shows the rhubarb that they planted the previous autumn. "Growing a few perennial crops that are known to yield a harvest can be a safe option should something go amiss with the other crops," he explains. Some of the rhubarb is turned into juice for the farm's other business, the Norfolk farm jam factory.

"It feels good when you do your job and see how things grow, and you know that you have achieved something."

It would be ideal if the company could support the whole family, and in a few years it may be time for Hassan to take over after his father. But he does not really see any difference in terms of who runs the company as they do things in partnership. Before Hassan takes over, he wants to study agriculture. Although he learns a lot by working on the farm, he thinks it could be an advantage to also study and learn even more. In the future, he also wants to own animals to provide manure. But first the vegetable growing must be a success.

"It is difficult making ends meet, but we hope that things will go well in the future. We are fighters."

A laborious problem for Tarik and Hassan is dealing with the weeds, like when they had planned to clear weeds at one plot, but it rained before they got to it, causing the weeds to grow out of hand. When this happens, you often have to bring in external help, even though it costs a lot of money. Despite the extra workload, an ecological mindset is important for Hassan and his family.

"We adults must pass on a good environment to our children. Not just buy things abroad or use chemicals. I think growing organically is the way to go"

Tarik and his family and relatives had long been engaged in vegetable farming in the city of Homs in Syria. The transition to growing vegetables in Sweden has not been entirely easy. In Homs, the soils are red, fertile and have ample access to water. The growing season extends throughout the year, and it is possible to grow most vegetables.

"Here in Sweden, you have to have a window to grow everything that lasts just six to seven months."

The weather in Sweden is also more variable, with sudden rainy weather and of course the risk of frost. Last year, a huge number of courgettes were destroyed in the spring by late frosty nights. But not trying or throwing in the towel is not an option for Hassan and his family. Every year they learn new things and can adapt the crops to suit the conditions of the farm.

“There is a lot of land to grow food on in Sweden, and good machinery. But not many people want to work on a farm. I want to be a role model in that.”

## Water

An important factor for a successful vegetable farming is the availability of water and the knowledge of how and when to water.

You often need to water when sowing seeds or planting out pre-cultivated seedlings. Good irrigation means that the seeds germinate evenly, and the plants have good contact with the soil in the ground. Even while vegetables are growing, they need ample access to water, which is why you should water thoroughly. Too little irrigation will cause the crops to grow their roots upwards instead of downwards, which will make them susceptible to dehydration. The type of soil you grow in is important for how you water; learn more under the Soil section.

### Watering

The best policy is to water early in the morning or at night, especially if you use some form of sprayer. If you water in sunshine or strong winds, large amounts of water evaporate before it has time to reach the ground and the plants. If you water in the evening, you can encourage slugs and mould spores, which benefit from the fact that the air at night is usually colder and more humid.

Plan the location of your standpipe on your farm. You can bury watering hoses for your posts or run the hoses on the surface. Remember to empty the system before the frost and cold comes in the autumn, which could otherwise cause damage to your hoses, pipes and fittings.

Depending on the size of your farm, different types of watering techniques can be applied. Sprinklers, drip irrigation, pendulum sprayers or a watering can. The watering can is mostly used on small farms but also gives the advantage that you can water exactly where you need it. Drip irrigation is the most water-efficient way and works particularly well in tunnels and greenhouses, but also for plants that require water continuously for good growth, such as lettuce. Very little water evaporates with drip irrigation as it ends up in the soil instead where it spreads over a large area. Water sprayers come in several different models, where an impact pendulum sprayer is suitable when you need to cover large areas. However, the pressure can be robust and it is therefore less suitable for new sowing or watering young seedlings, in which case a sprinkler is preferable.

## Water supply

The water must be approved for human consumption and must not contain any bad bacteria. If you use a municipal water supply, you can be sure that the water is of a good quality, but it will be a cost that you must factor into your balance sheet.

If you are close to a lake, river or stream, you can use this water providing that it causes no harm to the surrounding environment, or public or private interests. If there are any doubts here, you must submit an application to the County Administrative Board. This is especially true in dry summers and if there is a general irrigation ban.

If you have access to your own well, you can use it if the water is approved. You should keep in mind that large amounts of water will be consumed, and that dug wells may have a limited capacity. If you have a deep-drilled well, you can check your water supply at the Swedish Geological Survey's website, [sgu.se](http://sgu.se). There is a database of wells in Sweden here along with their water supply.

You are entitled to use all water that ends up on your property in the form of rain, so it is wise to collect it. If you have a large roof, you can direct the rainwater into barrels, vessels or ponds. If you have the means, you can also dig an irrigation pond, although this may require a permit from the County Administrative Board.

## Drainage

Good drainage is important to yield a good harvest. The crops absorb the nutrients from the soil better once the soil is drained, which also reduces the risk of nutrient losses of phosphorus and nitrogen. Well-drained soil can often be used a few weeks earlier in the spring, and the soil also becomes less susceptible to compaction damage. The plants develop larger root systems when the water drains away and therefore become less sensitive to dehydration.

Review existing ditches on your farm, as the ground may already be drained by open or covered ditches. Open ditches may need to be cleared out, undergrowth may need to be cleared away and covered ditches may require some maintenance.

Covered or uncovered ditches have a range of advantages and disadvantages. A covered ditch takes up less land, while an open ditch can have high natural and cultural values.

There are a few rules pertaining to ditches, the maintenance of existing ones, and also how much you can impact water flows in the ground. Learn more about this and drainage at [jordbruksverket.se](http://jordbruksverket.se).

## Weather conditions

### Strong winds

Strong winds can mitigate insect infestation. Larger fields exposed to wind make it more difficult for insects, such as cabbage moths, to thrive and multiply across your farm.

However, strong winds can cause soil erosion, especially with sandy soils. The best way to keep the soil in place is to let it have plant life for as much of the year as possible. You can plant trees around a crop, as the roots of the trees will hold the soil in place and can also serve as windbreaks. Windy arable land dries the soil out faster. Abundant vegetation, or coverage material on the soil retains moisture better. Planting hedges or setting up boarding with large gaps filters the winds and contributes to a better microclimate.

## Frost

It is good to know when the last frosty nights in your area usually hit as well as when the first frosty nights typically come in the autumn. Of course, there are differences year on year, but this can provide a good indication.

If you plant sensitive crops too early, they can be damaged to such an extent that harvesting starts much later than planned or they could even die. With the help of covering fabric, you can protect your plants when there is a risk of night frost. Continuous irrigation can also be used as frost protection. As long as the plant is kept wet, it will not be damaged by the frost.

It is good if you know how the frost interacts with your crops. It is often better to grow on a slope than in a depression, as the frost passes more quickly on a slope and settles in a depression. Boarding without gaps or fences can hold the frost longer, while hedges and boarding with gaps create a microclimate and better conditions for cultivation. Raised beds can be beneficial as the water drains away more easily and the plants cope better with the frost than when they are in cold wet soil.

## Eutrophication

The fertilizer you add must stay on your farm. Eutrophied seas and lakes are unfortunately a major problem. Nitrate, which is formed when the bacteria in the soil break down the nitrogen, is water-soluble and therefore can easily end up in lakes and seas together with the surface water. When the nitrogen content grows too high, the growth of algae increases. Once the algae die and begin to decompose, the water can suffer oxygen loss. To prevent this, it is worthwhile to build ponds adjacent to your farm, which can also capture phosphorus, known as phosphorus traps.

Information about manure, eutrophication and phosphorus traps is available from the Swedish Board of Agriculture's programme, Focus on Nutrients, where you can also receive advice

## Managing the extreme weather of the future

Extreme weather is when the weather deviates greatly from normal. Research indicates that the weather will have far more extreme deviations than was previously the case, and that extreme situations will happen more frequently, where several events occur simultaneously, such as storms, heavy rain and heat waves. The winters in Värmland will be shorter with less snow and with more variable temperatures throughout the day. Spring will probably arrive earlier in the season, but there will be a greater risk of setbacks from frost.

As growers, it is useful to know that the climate is changing, and you need to be flexible and responsive, which is crucial both for the finances of your business and the environment in general. As an example, you might need to safeguard your water access for hot summers and have good drainage if there is heavy rain. But you also need to see to the health of your soil, working the soil to ensure it can absorb and retain water, by always having plants in the soil and maintaining a good structure with mycorrhiza, fungi and bacteria.

LRF (the Federation of Swedish Farmers) organises courses and training on extreme weather, and the Swedish Board of Agriculture can also provide information. At SMHI.se you can read about climate modelling: the latest calculations about a changing climate.

## Climate change

Agriculture accounts for some 13 per cent of Sweden's greenhouse gas emissions. These come from sources such as the soil and earth, manure management and the production of mineral fertilizers. This is causing climate change around the globe.

The alternative for not growing food in Sweden is to grow and produce it elsewhere, which increases the emissions in those countries. A more important measure is therefore to plan ahead and make improvements in agriculture. Agricultural emissions have been dropping since the 1990s, which is partly due to the

fact that the number of dairy cows and pigs has decreased, but also because the use of mineral fertilizers has declined.

Different farms and different kinds of agriculture can face different challenges, measures for the climate can therefore vary.

You can receive help through advice from the Swedish Board of Agriculture's programme Focus on Nutrients, [greppa.nu](http://greppa.nu).

## Grain

The demand for organically grown grain is substantial both in Sweden and internationally. The most important factor for successful grain cultivation is the grassland and having good crop rotation. In Värmland, oats, spring wheat and spring barley are mainly grown on organic grain farms, of which oats for porridge are the most common.

More information about grain cultivation can be found at [jordbruksverket.se](http://jordbruksverket.se)

## Milk and meat

Agriculture developed during the 19th century up until the 1950s. Animal husbandry and crop production were interdependent and fully coordinated. Production was high as was self-sufficiency. This trend was broken in the 1950s when fertilizer made a major impact, grassland farming was made redundant and so were the livestock. Today you are typically either a plant grower or run an animal rearing operation, and these farms are often far apart. The manure from these animals is now often superfluous and problems can arise with eutrophication.

On an organic farm with cattle, 60 per cent of the feed must be grown on site or grown in collaboration with neighbouring farms and by observing ecological principles. Grassland is important and in a five-year crop rotation system, it is advisable that three of these are grassland. The rules concerning animal husbandry are very much about promoting the natural behaviour of the livestock. The goal is for agriculture to be in balance between animal husbandry and crop growing.

In the same way as for vegetable farming, it is beneficial when you start producing beef or milk, to identify a market, sign a contract with a slaughterhouse and have an overall plan for your business.

You can get advice from Hushållningssällskapet (*The Rural Economy and Agricultural Societies*), [hushallningssallskapet.se](http://hushallningssallskapet.se).

## Per-Håkan and Laila Häll, Katringården (*Katrin farm*)

The red and black spotted steers come running and line up when Per-Håkan approaches the pasture. The neutered young animals are tame after being fenced in earlier in the spring while the pastures have recovered. All of them have been given names, such as Ringo, Elvis, Osis and Bebis. And they are used to being stroked. For 30 months, the dairy breed steers graze at Katringården. A tranquil and natural life before they go on to be slaughtered for high-quality marbled meat. The meat is popular and often the farm does not have enough to meet customer demand from both private individuals and restaurants. If there is anything left over, the farm is connected to Gröna gårdar (*Green Farms*), which look after smallholdings producing high quality meat. And our customers are loyal.

“If a customer comes once, they always come back.”

It is with an ecological mindset that Per-Håkan and Laila have been running their farm over the 20 years they have been rearing meat cattle on grasslands. And the health of the soil has gone from strength to strength. When they started up, the farm had a history of potato cultivation, where the “Ekshärad” potato, a variety of snowball potato, was grown for many years and fertilized using mineral fertilizers. A somewhat complex potato variety that had major problems with potato leaf mould in the autumn and were treated by spraying pesticides. Nevertheless, the farm, which was previously run by Per-Håkan’s parents, was still one of the first to adopt a more sustainable mindset. Stem shredding reduced the need for pesticides, and clover grass built up the humus content. Despite this, the soil was depleted, and it took a

long time before a change was noticed after Per-Håkan and Laila introduced their ecological methods. The sandy soil is generally poor, and it easily loses its humus content with heavy cultivation. They rarely break up the grassland where the animals graze. They work more on the fields a little further away from the farm, where they plough in the manure that the farm produces and where the grassland is then cut to provide a good supply of winter feed for the animals.

Outside the wire fences to the pasture, the meadow flowers bloom and the steers stretch out to enjoy some tasty treats. The trees are full of chirping birds, which have grown in number each year, and the Klarälven river meanders through the pasture. The farm is a really idyllic place located in the town of Ekshärad in Värmland, where animals and plants thrive in harmony with each other.

Right now they are worried that the soil will deteriorate again now that they have decided to phase out the rearing of animals as part of their business.

“It is difficult to envisage that anyone would want to take over, as agriculture provides meagre returns when compared to other businesses. The potential of earning a living on a small-scale farm was lost a long time ago. Farm life today is a lifestyle that is virtually impossible to earn a living from.”

Per-Håkan and Laila have never been able to rely on their farm as their principal business but have kept the steers alongside their other jobs. Their lifestyle has involved a lot of hard work, and now that they have retired, they do not really understand how they managed to get by in the past.

“You start having other visions of the future when you get older. You would like a little freedom.”

But the fate of the farm is a concern. The open riverbank with meadow flowers. In Per-Håkan’s childhood, it was overgrown as the farm had already been allowed to grow wild back then. He laughs and says how far he thought it was to the river back then, with the undergrowth in between. In reality, the house is just a stone’s throw away. He thinks about when his grandfather stopped working the land, how it became overgrown. Will the same thing happen now?

Looking after animals has probably always been a part of Per-Håkan, he thinks. He talks about when he worked as a milk truck driver in Klarälvdalen. There were smaller dairy farms everywhere back then, with 6 to 20 animals per farm. On one

occasion a cow had suddenly calved when he showed up. Per-Håkan immediately jumped in and started laying out straw for the animals. He tells me there is no shortage of interest in animals and agriculture on his part, it is the ability to earn a living that is the issue.

We walk past a grassland filled with clover and Per-Håkan thinks it is growing too high. The animals graze best when the clover is two hands high. It is important to apply crop rotation to prevent parasites but also because the ground binds carbon in the best way if the animals are frequently moved around. Sometimes it is difficult to get everything to go to plan with such a small number of animals and the time you have to make everything a success.

“You try to do the best you can.”

The younger steers are grazing in another pasture. It is noticeable that they have not been on the farm so long as they are a little cautious, and do not come to us directly. Actually, they would not normally be in a pasture right now. A few days earlier, a heavy thunderstorm rolled through the farm.

Per-Håkan points across the farm, saying: “They were over there but then suddenly they were no longer to be seen. When the thunder struck, ten steers charged out of the pasture but managed to find good grazing at our neighbour’s place. There they could eat their fill,” laughs Per-Håkan, which meant we could prepare a new pasture here virtually undisturbed.

“It took well over 20 years before we learned properly what to do when they got out. And yet it is always different every time.”

Per-Håkan and Laila follow developments in agriculture closely. What are the new crops, what are the opportunities that lie ahead? Although there will be no animals left, there may well be other ways of running the farm.

“Quality has been sacrificed for quantity, something I want to work to reverse. I will not stop being a farmer yet, I cannot let go completely.”

A change is needed, he says, and voices his opposition to everything trending towards large-scale farms. There has been too much global development, market forces mean everything is just going to get bigger and bigger and the pendulum has already swung too far in the wrong direction.

The farm will continue to be run organically, and they are prepared to let someone take over and continue working with it, should anyone want the challenge. If they have many different parts to their business, their hope is that maybe it could be possible to live fully on the proceeds in the future, that the younger generation will be inspired by the possibility, and that there will be an effort to attract young people with an interest in the environment. Maybe more people might consider earning a little less but see the potential of living in the country.

“I hope something good will come from everything we have built up.”

## Starting a vegetable farm

You may have been growing vegetables for many years for your own needs, but now want to expand your crop so that you can generate sales? Maybe you already have a farm? Or you have just gained access to land or want to take that step now. Even for those who do not have a large area of land, there is the possibility of growing vegetables. There is often land to lease, so ask around. Sometimes you are given the opportunity to collaborate with others and exchange resources. A farm close by may have the machinery you need; you may be able to look into whether you can start a partnership? Get in touch with existing growers in your area. You will often meet with a positive response, even from a potential competitor. A region with many businesses often benefits society more than the other way around.

## Organic farming and certification

Organic farming can be as profitable as conventional farming, although it requires more work, especially when it comes to weeding. The production costs for the grower are usually greater, although higher prices can cover these costs as consumers are often willing to pay more for organic and locally produced produce.

Organic farming is more environmentally friendly and contributes to biodiversity. You operate in a cleaner and better environment by not using chemical pesticides. Conventional farming uses artificial mineral fertilizers to fertilize the crops, along with many different pesticides. On an organic farm, you may only use organic fertilizer and build up the humus content and nutrients in the soil using methods such as green manure. Crop rotation is an important tool in order to avoid being dependent on pesticides.

When switching from conventional to organic farming, you can get advice from the Rural Economy and Agricultural Societies or the County Administrative Board. The adjustment period is two years.

If you grow organically you need to certify your farm, which is mandatory if you plan to sell to a wholesaler or supermarket. This must be conducted by an approved inspection body. When you certify your farm, you do so using the EU label for certified organic produce. You can also certify yourself with KRAV or Demeter, where the rules are usually stricter.

Learn more about certifications and adjustment work on the Swedish Board of Agriculture's website, as well as KRAV's and Demeter's own websites.

## Regenerative agriculture

Regenerative agriculture means you avoid ploughing the soil, and you try to emulate nature's own way of cultivating the land instead. This cultivation method is becoming more common and is designed to improve the health of the soil and benefit biodiversity. It will also contribute to better carbon storage in the soil.

## Farm size

The scale of the cultivation method you should choose needs to be in relation to your physical location and to your sales channels. Three types of vegetable farming are presented here. A large-scale farm, a medium-sized farm and a small-scale farm.

## Large-scale vegetable production

Large-scale vegetable production can be about growing on 10 to 20 hectares per crop. Perhaps you have your own packing plant and can sell consumer-packaged produce directly to a wholesaler, or on to another company for processing. Other agricultural crops are often grown on this scale and have access to many different types of custom machinery. The workload for each crop is usually lower for large-scale vegetable production than for a smaller one. This is because many work operations are made more efficient. Using carrots as an example, calculations show that for large-scale vegetable production you put in 271 hours per hectare up to and including harvest, while for small-scale vegetable production you have to put in 650 hours per hectare, where you mostly use hand tools in addition to tillage with a tractor. Large-scale farms are rare in Värmland, especially in the central and northern regions, and are more common in southern and central Sweden.

## Medium-sized vegetable production

If you are already involved in agriculture, you probably have access to machinery, such as a four-wheeled tractor with implements, and you may already be cultivating grassland. The step to also include different kinds of vegetables does not have to be a major one. You can grow crops that require a small amount of work but produce good yields in larger volumes, such as potatoes, carrots and cabbages.

It is beneficial if you already have a sales channel plan, which usually goes through wholesalers and packers. You need to have a loading dock to receive lorries and a storage facility where you can store the vegetables for longer periods.

You should choose vegetables that are suited to your soil quality.

A larger field where you plough the soil regularly has a greater need for green manure as well as a catch crop, which is green manure you sow right after you have harvested another crop. Soil that has no vegetation results in greater nutrient leakage and the humus content can deteriorate over a relatively short period. By always leaving the soil covered with growth, you bind the carbon in the soil and build up its fertility.

A medium-sized farm with larger machinery brings several advantages. Through more mechanisation, you bring down your labour cost and thereby the overall production cost; the larger the area of arable land the smaller the machinery costs per hectare. The amount of custom machinery you need should be weighed against your sales, as you will not require all types of machinery for your particular farm. The investments can be extensive, but they must be weighed against the size of the company.

You eradicate perennial weeds more easily, for example couch grass, through continuous tillage and mowing.

There are also some challenges with a medium-sized crop. Tillage through ploughing can cause problems with annual weeds, because ploughing the soil brings up deeply buried seeds to the surface that previously had no way of germinating. Heavy tillage also depletes the soil structure, as mycorrhiza is negatively affected when it is cut off. The humus content is impaired through tillage, and you must work constantly on restoring the soil structure by adding fertilizer and compost but also green manure and catch crops. In the case of organically certified cultivation, the latter is also a requirement. Compaction damage that can occur from larger machinery is common, especially in heavy, clayey soils and happens when the soil structure is compacted together, which impairs fertility and causes problems with the water supply, and this damage is also permanent.

The Swedish Board of Agriculture has some useful information about cultivation technology and more.

The Swedish Board of Agriculture's folder – Organic vegetable farming on open land.

## Small-scale vegetable production

Small-scale farming can be around one hectare of land. You can have farming as a spare time job but also as a professional operation. It is possible to have small-scale vegetable production as your sole source of income if you grow intensively, by extending the growing season and growing several crops on the same bed during the same season. You need to produce a high yield from your arable land.

For a small-scale farm, it can be of the utmost importance to have a well-thought-out workflow and good planning. An effective working method is to have plough-free fixed beds, and only aerate using regular size or wide forks. The earth's living organisms, worms and bacteria break up and aerate the soil and make it rich in humus. It can be a good idea to cover the plants in the beds, either with organic material or with plastic, to reduce weeding work. Having good access to manure allows up to three harvests from each individual bed over the same season. This means that the return from each bed can be relatively large. There are several implements adapted for this form of farming, and most of them are suitable for beds between 75 and 80 centimetres wide. This width ensures a good workflow as you have good access to the beds and can easily step over them.

You can prepare your beds at ground level or raised. With raised beds, you dig at a height difference between the aisles and the cultivation beds, which can be just a few centimetres up to 40 centimetres. If your soil is clay, wet and cold, having raised beds is best as this provides a draining and warming effect. If you grow in sandy soil, the beds can be at ground level.

Plough-free farming means fewer problems with seed weeds. When you turn the soil when ploughing, seeds from the soil seed bank come up to the surface and germinate. Using fixed beds means that you can cultivate them both early and late in the season, times when you usually cannot use heavier machinery.

Root-propagated weeds can be troublesome on a non-mechanised farm, as it is easier to get rid of it through mechanical cultivation. If you have a lot of root-propagated weeds but still want to work with fixed beds, black fallow can be a solution. Slugs and other pests can also proliferate under cover material and here too it is more efficient to adopt mechanical cultivation.

There are several books dealing with small-scale vegetable production.

The Market Gardener, Jean-Martin Fortier

The New Organic Grower, Eliot Coleman

Odlå till försäljning, (*Growing for sale*), parts 1 and 2, Jonas Ringqvist, Ylva Lundin, Sanna Mattsson Ringqvist

## Kalle Hultmark, Nordsjö trädgård (*Garden Farm*)

In the forests between Deje and Forshaga you will find the Nordsjö farm where Kalle operates an intensive, small-scale vegetable farm. The permanent beds are grouped close together, sandwiched between fruit trees, berry bushes and buildings. In addition to farming, he also sells vegetable plants and holds cultivation courses.

Kalle started growing vegetables because he found it to be enjoyable and soon this developed into a small-scale vegetable farm. He was attracted by the challenge of farming and making money over a small cultivation area, which has gradually grown to a point where all the land is now being cultivated. But this limitation has also served as an incentive.

“Is it possible to make a profit and an hourly wage from this plot? How much can I squeeze out of it if I streamline all the operations? This became a major motivation for me.”

Kalle applies the no-dig method, which is based on 8 metre long and 75 centimetre wide fixed beds that are almost never cultivated mechanically. The manure, in the form of composted cow manure in bags, pelleted manure and his own compost is mulched in superficially. The soil is aerated using a wide fork and crop residues and other organic material is composted directly in the beds or in the compost pile next to it. He thinks this cultivation method works well, and believes that the system could be profitable, but emphasises that it is labour-intensive.

The vegetables grow so densely in the beds that you cannot see the soil underneath. Kalle began by covering the ground with plastic to ensure all the root propagated weeds died off before he started to cultivate the land. He has since been mindful to remove seed-propagated weeds before they flower and go to seed. He has had to be disciplined, but this work along with the close planting distance method has now paid off handsomely in the fourth season.

“The weeds are now gone.”

To learn as much as possible about small-scale vegetable production, Kalle read many books and watched YouTube videos. There is a lot of good advice to take on

board there, he says. But he also sees that there is a lot of glossing over. The message is that it is both great fun and very easy to grow vegetables for sale.

“Nobody wants to write a book that is grey and realistic. There is a tendency to exaggerate and glamorise.”

Kalle thinks it is useful to find a mentor if you want to start selling vegetables; a person that has been growing for a long time and can provide advice and tips. You can also try working on another farm before starting your own to see if you like it.

Kalle has been able to grow his sales by 50 per cent three years in a row. He has always been able to improve and streamline his farm by producing a greater harvest from the same area and selling more. But he feels that the cultivation area is too small to be able to provide a full-time salary. He thinks he would need to triple the ground area. Then he would be able to hire people to do the repetitive work, such as planting and harvesting. It's a fine line; making his farm a little bigger could make it too much work for one person, but too little to employ anyone. If he falls sick for a week then he currently has no one who can go in and do the job. There is no fail-safe system.

In order to optimise sales, Kalle plans carefully ahead of each growing season, and he only grows crops that pay well. From the beginning, the challenge was to generate the greatest possible return from each square metre, while he now also calculates the hourly rate for time spent. He wants to strike a balance between the sales price, time spent and also how much space the crop takes up in the farm. There are some crops he is unsure whether to continue in his range; maize is one. It is easy to sell and can be harvested quickly but takes up a lot of space on the farm and therefore produces a relatively small harvest per square metre.

This year, Kalle has started a subscription service. Customers pay in advance and have their vegetables delivered every week from June to early October. The delivery consists of the vegetables that are available at that particular time, and Kalle decides the content. As a complement, Kalle also sells through the Local Food Nodes app, where he posts his offering each week and where customers can order what they want. On its own, Kalle thinks the system of individual orders is time-consuming, although it works well combined with subscribers, as there is typically a certain surplus to guarantee produce for everyone. However, Kalle does not believe that

freedom of choice for the customer is necessarily better. He feels that both customer groups are satisfied to the same extent; those who get to choose, and those who are subscribers where Kalle controls the content.

Kalle grows without mineral fertilizers or pesticides, which he also communicates to his customers, but is not certified and therefore does not trade as organic. He sees no point in certification as he only sells directly to his customers.

“Not a single customer has ever asked if I am KRAV-labelled or anything about how I grow.”

Kalle will now harvest what he plans to deliver later in the day to customers who ordered using Local Food Nodes. He has printed out the list of orders and harvests accordingly. He then rinses the vegetables at his portable rinsing station, packs them in the garage and drives them to a collection point in Molkom. A main crop grows in each bed, in a four-year crop rotation, where he can also always take out a pre-crop or after-crop, to maximise the harvest. The vegetable bags will contain a large and varied range.

The challenge of streamlining is perhaps the main incentive for Kalle’s business. But there is no doubt that he thrives on his farm, working outdoors. To see the power of plants, the seed that develops and grows into large vegetables. That the work brings pleasure.

“I like to hang out with vegetables. I like their aromas; I like to touch them and I like to see them grow.”

## Analyse the market

Before you start your farming business, it is useful to analyse the market: To whom and how you can sell your vegetables.

Having the opportunity to talk to your potential customers in advance can be an advantage; identify what they want and how they might go about buying their vegetables. Perhaps multiple households in your area are interested in buying vegetables regularly, in which case a cooperative farm could work well. If there are many potential customers at your local town square, this may be where you should have your main sales point.

Often you'll have to utilise several different sales channels; you can learn more about these under the Sales heading.

## Pricing

When you sell your vegetables, you don't want to price yourself out of the market, so that no one is willing to buy them, or sell them too cheaply and make a loss.

Find out what different vegetables cost in the supermarket. If there are other growers in your area, you can see how they price their produce. This gives you something to relate to and it is probably beneficial to be at a similar level.

You need to make sure your sales generate a profit. Calculate your expenses and consider the workload in order to identify the right level. Some vegetables require so much time that it makes it impossible to ensure a good return from them, so you might consider excluding them from your range unless they provide some other value for your business.

It takes time to grow vegetables; some crops require more than others. Vegetable farming does not provide a high hourly wage compared to many other professions. But streamlining and smart solutions can help you increase sales and thereby secure a larger profit margin. You also have the opportunity to influence your pricing by working actively on the sales activities in relation to the customer. Show the added value your produce bring. For many small businesses, this priority is relatively low, as time and resources often have to be spent on other things. But it is probably an area that needs to be developed and prioritised in order to generate better profitability for growers in general going forward.

Good planning can also be a key factor. For example, if you have strawberries for sale by midsummer, you can charge significantly more than you can just a few weeks later into the season.

## Financial goals

Set a financial goal. Identify how much money you need to generate to make ends meet. Prepare a multi-year budget and set a goal of how much income you plan to

generate. It can be difficult to secure enough returns the first year, as in most businesses, but after a few years you should have reached the right level.

## Sales

When you plan the scale of your farm, you must also have a plan of the sales channels you have at your disposal, a plan of how you reach out to the customers with your goods in a cost and time-efficient way. If you sell directly to the customer, you can get the highest price for your produce, but the time you spend on the sale must also be factored into the calculations.

Remember that you need a cash register system and an approved cash register when selling directly to customers.

### Direct sales or wholesaler

When pricing your vegetables, you must consider all the time you spend on growing and the time you set aside for sales. The time spent harvesting, trimming, rinsing and packing must be included. If you sell in larger volumes to a wholesaler, who picks up the vegetables directly from your farm, there will be a distribution cost. Selling directly to customers is often more time-consuming, as it must also include any travel to the point of sale, setting up and dismantling the market stall, the time spent on the actual sales and the subsequent work involved.

### Farm shops

The customer comes to your farm shop and buys vegetables. A farm shop can create a loyal customer base and if you have an impressive farm, it can also be a nice place to visit. If you grow many kinds of vegetables, a farm shop could work well. You can also collaborate with other local producers to expand your range.

A farm shop needs staffing, which requires time to be allotted. If it is well visited, there is rarely time left over for other activities during opening hours. You can operate as unmanned, where the customer takes their goods and pays in cash or

electronically. If you install cameras in such an operation, you reduce the risk of unscrupulous customers. The possible loss from customer mistakes can outweigh the time you would otherwise have to spend on staffing.

## REKO

REKO is a way of selling and buying locally produced food without any intermediaries. It is usually the producers and consumers themselves who start up a REKO ring in an area. If there is no REKO ring in your area, you can start one.

You take orders in advance and only deliver what is pre-ordered at a certain time. Where and when the vegetables are delivered is determined by the local REKO ring. Orders are placed via Facebook in a closed group or using another app.

REKO has the advantage that it saves time and there is no waste involved. However, it does require some administration placing ads, approving orders, and ensuring that you are paid. The idea is that everything is to be prepaid and ready by the time of delivery. One advantage is that growers decide exactly what to sell. If you sell pre-prepared bags, there will be less hassle with individual orders.

## Market and town square sales

It can take time to establish good market sales, to learn what vegetables sell best and what to avoid. To begin with, it can be beneficial to have crops that you know will sell well and that customers are used to, such as tomatoes, cucumbers, carrots and lettuce. Over time, you can attract loyal customers who want to try new vegetables. A major benefit is that you have direct contact with your customers and therefore can sell the goods at a higher price compared to an anonymous sale.

A significant part of the time and work is spent on packing and washing. Bundled and packaged vegetables often sell better, as the customer knows exactly what they cost, as opposed to buying vegetables unpacked. The customer usually buys more this way, and the actual sale goes faster when you do not have to weigh the vegetables on site. Washed vegetables often sell better than unwashed.

There can be a lot of waste when it comes to market sales, especially before you have learned what is worthwhile to sell and at what price. The combination of sales in the town square and REKO can therefore be a successful mix.

Cooling the vegetables in a cold room before selling maintains a good quality over a long period. If you do not have this facility, the vegetables are best harvested early in the morning on the same day as the sale.

## Cooperative farming

A cooperative farm signs up customers to buy vegetables over an entire season, by buying a share in the farm, similar to a subscription. This sales channel provides a major benefit in that growers already know what will be sold before the growing season. You can plan your crops according to the number of shares. The customer receives their vegetables every one or two weeks. The range is in line with what is ready for harvest and the risk of poor harvests is shared between the grower and the customer. The shares are often paid in advance or invoiced later.

Deliveries to the customer may vary, either the customer can pick up at the farm or have the vegetables delivered to their home, or you can also assign another pick-up location.

You can learn more about cooperative farming on the *Andelsjordbruk Sveriges (Cooperative Agriculture Sweden)* website, [andelsjordbruksverige.se](http://andelsjordbruksverige.se)

## Vegetable bags and subscription

You can sell vegetables using a webshop, via Facebook, website or app. The Local Food Nodes app is a tool where some of the administration is included in the service. Otherwise, it requires growers to spend a lot of time on sales and administration, and it is tricky knowing how many vegetables will be sold in advance. This sales channel can be useful to have as a supplement to other channels. One benefit could also be to have a subscription, similar to cooperative farming, where no communication is required week by week. Vegetable bags are delivered once a week and an invoice is sent out every month instead.

## Restaurants

If you can sell directly to a restaurant, you can charge a price that is higher than you would get from a wholesaler. A restaurant may be interested in more unusual vegetables. Contact the restaurant and ask.

## Supermarkets

The grocery trade in Sweden is dominated by three blocks. The largest is ICA, which accounts for about half of what is sold in supermarkets. Coop and Axfood come next. In addition, there are some smaller players such as Bergendals and Lidl. It is mainly ICA and Coop that have stores in Värmland and there are also some Willys and Hemköp that are linked to Axfood, as well as a few Lidl stores. The different chains operate in different ways.

ICA retailers are completely free to choose their range in their stores, so as a grower it may be easiest to sell to them. Coop governs the range in its supermarkets centrally, so you need to contact the management in Karlstad, but ask the proposed store first if they are interested. Hemköp may have a few options to sell local produce, but the remaining grocery trade is governed centrally outside Värmland and therefore is difficult to sell to.

Before you contact the supermarket, you need to be sure about the produce you plan to sell, and the price you want. You also need to know how to solve the logistics to the supermarket. Are you planning on driving yourself or is there a distributor who can transport your produce, and what would the cost be in this case?

Supermarkets generally require you to pack your produce and attach a barcode that they can read at checkout. Discuss these issues with the person in charge in the supermarket. Also think carefully about why the supermarket would want to sell your particular produce. You are competing with cheaper produce from southern Sweden and from imports. What is the advantage for the supermarket to buy your particular vegetables? To be able to sell in a supermarket, you need to create a good

relationship with the person responsible for the vegetables, to ensure a fruitful partnership.

## Wholesale

If you grow crops on a larger scale, the possibility of selling directly to the customer as the only channel becomes more difficult, and you may need to approach a wholesaler instead. Wholesalers pay less to the grower than the end customer. The price can be weighed against the time you avoid spending on sales. Your planning needs to consider how to solve logistical issues and transport costs. Wholesalers who deliver to stores usually require that the vegetables are cleaned, packed and dated.

## Public procurement

Several municipalities in Klarälvdalen have a public procurement in place via the Värmlands Skafferi wholesaler. The agreement states that Värmlands Skafferi must, to the extent available, deliver locally produced food to the schools and elderly care in the municipalities. There are opportunities for new growers to sell vegetables through this channel. To enable this, the logistics required when selling to a wholesaler need to be in place. You should be in a position to deliver larger volumes of what is requested from the municipalities, mainly root vegetables and cabbage. One particular benefit is having your own warehouse where you can store the vegetables during the winter.

The procurement is limited in time with the possibility of an extension. Find out how it is structured at the moment.

Värmlands Skafferi – [skafferivarmland.se](http://skafferivarmland.se)

## Fredrik Wangsten Åshammar Trädgård (*Garden Farm*)

“I felt like a settler when I started working this land.”

Fredrik looks out over his newly ploughed field that undulates with the forest as a backdrop. It is located in the village of Åshammar, a 20-minute drive from Karlstad. A few years ago, there was dense undergrowth here, but Fredrik, with the help of his family, has cleared and prepared some fertile arable land. The farm's small flock of ducks lives up by the farm buildings. They are able to roam in the fields and eat the slugs that thrive in the clay soil. It is then time to fertilize the field and plant out this year's crops.

Fredrik's journey started with subsistence farming and laying hens. However, the laying hens soon had to give way to vegetable farming when he realised that this was much more enjoyable.

“But I had many regrets in the initial years as there was a lot that did not work on the farm. But then when spring returned and with all the new growth, I was reenergised. I had to plan in a hurry, order seeds and get everything together.”

Fredrik sells his vegetables in the town square outside the Artisan bakery in Karlstad. It is a beneficial partnership for both parties. Fredrik believes that it is a major advantage to collaborate with other producers, who have the same ideas and visions but offer different ranges. “If someone already has an established customer base, it is good to be able to utilise this,” he explains. Other sales channels for Fredrik include REKO rings and farm sales. Anything left over from the town square he can sell at REKO the following week. More sales than this would be difficult to manage. It usually takes several days to harvest before a sales day.

“The Artisan bakery would have liked to see me standing there every day really, but that's impossible.”

Fredrik's farm has several different buildings, some of which are completely new. There is a warehouse with a cold room where he stores his vegetables as soon as they are harvested to maintain their good quality.

Fredrik believes the appearance of the vegetables is vital, that they should be clean of soil and bundled. He has also noticed that quantity matters, and the diversity of vegetables is important, customers are attracted when there is a lot to choose from.

"One time I happened to harvest too much so I gambled and took everything along. And I sold a lot, so I continued with this policy. There is a lot of psychology involved."

The past year has seen the business finally prosper with a good bottom line and a surplus for Fredrik. "My salary is at a relatively low level but is still reasonable," he says. However, having the time to grow, harvest and sell is not easy. Fredrik is careful to calculate how much he needs to cover his costs and produce a surplus. He feels that many people see farming as a lifestyle of living cheaply and simply, but Fredrik thinks it is important to highlight the reality.

"It feels like we should start talking about what it actually means to support yourself on a vegetable farm."

We stroll around and check out the different cultivation plots on the farm. The newest is on leased land further down in the village. In total, he cultivates 3.5 hectares, some of which is green manure. The crops are KRAV-labelled. In the courtyard, the tractor is parked next to potato planters and seed drills. In a while, he will continue to service the machinery to ensure that everything is in working order ahead of the growing season.

What motivates Fredrik, among other factors, is that he thinks agriculture should be a more natural part of people's lives, that producers and consumers should be closer to each other. Aesthetics are also important to Fredrik and his eyes light up when he explains how enjoyable he thinks it is to create a beautiful farm.

"Artistic expression also creates a major dilemma. Should you make sure you can support yourself, or should you devote yourself to creating something beautiful?"

We gaze once more over the field that was previously an overgrown woodland. You can imagine the vegetables that will grow here in long rows in the summer, with their different colours and shapes.

“It does not have to be a drawback growing on a large scale.”

He continues contemplating.

“It’s simply a matter of rationalising away the work tasks that take up the most time. Trying to do enjoyable things too. To find a suitable level that enables you to devote time to refining the landscape.”

Up on the hill, you can hear the hum of the bees that have ventured out in search of pollen from the first spring flowers. Fredrik smiles and continues.

“A well-run vegetable farm is a fantastic thing.”

In the future, Fredrik would like more time and opportunity to create an even more beautiful farm and do what he feels is right and meaningful. He is considering planting more trees on the farm, to create a favourable microclimate for the birds, animals and plants.

“It feels like there is a sort of moral panic inhibiting change in the farming world; pity the person who disturbs the soil because then the earth will not yield its harvest. But maybe this is not the challenge. Small-scale growers are doing their best to save the world.”

## Cultivation and harvest

Regardless of the size of your farm, you will need to handle your vegetables in different phases outside of the cultivation beds. Plan your crops and the places for the best workflow.

### Greenhouse

A greenhouse may be necessary if you want to extend your growing season, plant more sensitive crops or grow large amounts of plants. The most common type is some form of plastic tunnel greenhouse. There are several variants on the market in different price ranges. If your main goal is to have a greenhouse to grow tomatoes and cucumbers in the summer, it is wise to choose a model that has good ventilation along the ridge or on the sides because many greenhouse tunnels are only ventilated through the ends.

If you are going to extend the season by growing late or early in the season in your greenhouse, you need to keep the plastic cover in the winter. Winters that have a lot of snow may require that you clear the snow as the tunnels will otherwise collapse easily. There are models that can withstand large amounts of snow, or that are designed to ensure the snow easily slides off.

## Choice of crops

What kind of vegetables should you grow? You should consider crops that sell and what the customer wants. If you sell on the town square, maybe you should grow vegetables that many people are familiar with, such as lettuce, carrots, tomatoes and cucumbers. You can then expand your range once you have built up a loyal customer base. If you sell to a wholesaler and to the municipalities' public procurement of food, it may be worth asking them what they need and want more of.

If you have a certain type of soil, you can grow a crop that is best suited.

For good profitability, you need to review the entire cultivation period, from seed to finished plant, and how much work is required. This could involve growing, for example, chillies, leeks and celeriac, all of which have long cultivation periods, or maize that can be sown later in the season but requires large volumes of soil at an early phase along with space for propagation. Tomatoes, for example, require a long season with stable heat conditions. You may need a heated greenhouse for this, although tomatoes do fetch a good price. A crop with easier growing conditions are peas but here harvesting is very time consuming.

It is often more lucrative if your vegetables are ready for harvest early in the season. For example, strawberries, squash and new potatoes can pay well before they appear in bulk on the market.

## Seeds

On an organic farm, you should use organic seeds as far as possible and that are available on the market. In Sweden, you have Lindblom's seeds that also target

larger producers. Runåberg's fröer mainly target hobby growers but also provide seeds in larger batches.

You can buy the seeds from the companies' websites,  
linbloms.se and runabergsfroer.se

Other suppliers of seeds and seed grain aimed at professional growers include:  
olssonsfro.se and semenco.se.

## Direct sowing or pre-cultivation

In most cases, it is an advantage to pre-cultivate your crops, even those that are able to spend their entire growing time outdoors, such as cabbages, lettuce, chard, maize and beans. Pre-cultivation gives you greater control over irrigation and fertilization. Having the right temperature and water supply helps the seeds germinate evenly. Pre-cultivation allows you to extend the season in such a way that you have finished plants as soon as the risk of night frost is over, (end of May or a few weeks into June). To extend the harvest season, you can sow on several occasions to produce a harvest over a long period; lettuce is a good crop to do this with. Pre-cultivating lettuce is also advisable as it germinates poorly in temperatures above 18 degrees.

Planting seedlings by hand can be time consuming but necessary in some cultivation systems. For larger farms, there is custom planting machinery.

Crops that are sown straight in the open are root crops that could go bad if the root system is disturbed, which is the case for carrots and parsnips. Dill is also suitable to sow straight in the soil. If you have large amounts of land to cover, using a seed drill is the way to go and there are both manual devices and mechanical accessories for tractors.

You can learn more about sowing and planting different vegetables in  
Runåbergs Fröer, Johnny Andreasson (*Runåberg's Seeds*)  
Handbok för köksträdgården, Lena Israelsson (*Handbook for the Kitchen Garden*)

## Propagation and pre-cultivation

For slow-growing crops, such as leeks, celeriac and tomatoes, you need to sow early in the spring, before it starts to warm up outdoors.

You can sow your crops in plug trays or through broadcast sowing in troughs. Some crops need to stand in their plugs or trays for a short time, others for a long time, and thereby require varying amounts of soil, and the trays come in different sizes. Plants can grow close together at first, and a small amount of soil reduces the risk of the plant's sensitive roots drowning or rotting if the soil is too wet. A cramped space also favours root formation, as when the roots meet the wall of the pot they form more roots, which results in stronger plants.

You have both nutrient-poor sowing soil and more nutrient-rich planting soil to sow seeds in. It is usually best to sow directly in planting soil to avoid replanting. If you want to pre-cultivate your plants yourself, you will need space to do so. You need a propagation room or greenhouse with good lighting and heat supply.

## Plant lighting

The best light for plants comes from the sun. When pre-cultivating plants, you often start in early spring, when it is still too cold for the plants to survive outdoors or in unheated greenhouses. You can then create a greenhouse within the greenhouse, by dividing the greenhouse using bubble wrap. The space can be heated by a fan or radiator. The plants absorb the sunlight as long as the days and hours of sunshine are long enough. If you need to start even earlier in the season, the plants need an additional light source as the light from windows is rarely enough. Ordinary fluorescent lamps work well, are inexpensive and can often be bought second-hand. For more energy-saving models, LED lights are a good option. When using plant lighting, it is important that the light is close enough to the plant and you will usually have to adjust the lights to suit how your plants grow.

Depending on the space you have, you can place the plants on larger tables with an irrigation mat. Another method is to build a shelf system where the lamps sit on the underside of each shelf and shine down on what is placed underneath.

## Heating

In order for seeds to germinate, they typically need a temperature of 20–28 degrees depending on the type of plant. Once the seed has germinated, you generally need to lower the temperature. In this phase, the optimal light the plant will need is about 12 hours a day and it will need even watering and access to nutrients.

All plants have different growing conditions, but the general rule is that the plants should be in around 18 degrees Celsius to grow optimally, and ideally the temperature should be constant. If the temperature fluctuates during the day this could stress the plants and can cause them to bloom too early.

## Irrigation and nutrients

The small plants are in need of even watering and can be sensitive to dehydration.

Irrigation mats are available for the plant pots to stand on where the soil absorbs the water from underneath. It is generally beneficial to water the plants from underneath, as the roots will seek their way down, and many plants can be sensitive to water around the root collar and pressure from water from above.

The important thing is that the irrigation is even. If you water too much, the plants will lose an unnecessary amount of nutrients through drainage, and the overly humid environment encourages sciaridae, which are dark-winged fungus gnats that cause problems during propagation, as they lay their eggs in the moist soil, which develop into larvae that live on the roots of the plants. For this reason as well, it is good to water from underneath as the surface in the pots will be drier. There are also biological pesticides to counteract the fungus gnats.

The appearance of the leaves can indicate how the plant is doing; if the leaves are very light in colour, this could mean that you have watered too much, whereas if they are dark green, they may have received too little water.

The plants may need extra nutrients during the pre-cultivation phase depending on how long you leave them in their pots and trays. The nutrients can be applied in

the form of pellets or nutrient water. Once the plants have grown their first seed leaves, you can give them a weak dose of nutrients and then repeat once a week.

## Replanting

A plant in its plug or pot should be thoroughly rooted when it is time to plant it out in the open. If there is a lot of soil and not many roots, you should leave the plant in the plug, if the roots are growing out of the sides, it has spent too long in the plug. Once the plant has finished growing in the plug, it is generally time to replant it outdoors. However, sometimes you may need to transfer them into larger pots with new soil, which mainly applies to crops with a long cultivation time. Replant the plants once they have grown their first seed leaves; the older the plant, the more difficult it can be to recover after replanting.

Replanting takes a lot of time, and you typically try to avoid this phase by sowing directly into the planting soil at the right time before planting out and then provide extra nutrients wherever needed.

## Weaning

Eventually, the plants will be planted out in the open. They typically need to be weaned first. The sun and the wind are their biggest threat. If you place sensitive plants directly out in the sun, they may droop and their leaves can burn. The wind can break stalks easily if they have never been exposed to it. Acclimatise the plants slowly. Shade them to begin with outdoors, and gradually expose them to sun and wind for a little longer for each day.

Think about how the weaning process should be done. You can move the plants in and out daily for a week before planting out or give the plants a temporary place where they can acclimatise, in a plant tunnel or other weaning area. In some cases, it will be sufficient to simply cover the plants you have planted out with non-woven fabric without weaning.

## Prepare arable land

In order to create a favourable growing bed for your vegetables, you need to prepare arable land. If you have old grassland, it must be broken up, using machinery like a tractor or cultivator. If the grassland has been untouched for a long time, it may contain root propagated weeds such as couch grass. Couch grass propagates if divided and can therefore cause major problems if you break it up into many parts. If you have a lot of weeds, you may need black fallow. This means that you keep the soil open, without any vegetation, and regularly turn the soil mechanically to reduce weeds. Another method, which is suitable for smaller plots of land, is a covering of plastic. If you leave the plastic on the ground for an entire season, most weeds die from the lack of sunlight.

If you break up old grassland, after a year or so you could experience problems with click beetle larvae, which can damage potatoes and lettuce plants. Click beetle larvae usually disappear once the grass is gone.

Once you have a cultivated plot, you need to shape the beds, either manually or with the help of a machine.

The arable land must be drained and fertilized. Learn more under the sections on manure and drainage.

Starting a crop can take time, just as it takes time to prepare good arable land.

## Seedbeds

Prepare equally wide beds with an even surface where the clods of earth have been relatively finely broken down before sowing. This is to ensure that the seeds grow evenly in the soil. The smaller the seeds, the more finely broken down the soil in the seedbed. If you are going to burn the weeds in a seedbed, it is important that the clods of earth are not too large and protect the weeds. However, soil that is too fine-grained can create a hard crust in heavy rain or in dry weather. Leaving the seedbed with an uneven structure is especially important when growing on structurally weak soils, such as clay and silt. When planting seedlings, it can therefore be the best policy to leave the soil slightly uneven.

Sowing in rows has its advantages in that you can clearly see where your crops are growing in relation to the weeds. The distance between your rows is determined by how you deal with the weeds. If you use machinery, the size of the equipment determines the distance, while weeding by hand often requires less space between the rows.

It can be worthwhile growing vegetables in a drill, which is a small, raised row that can be set up using a potato hiller.

When sowing, it is sometimes necessary to thin out once the plant has grown 2–5 herb leaves, depending on the crop.

## False seedbeds

A false seedbed tricks the weeds into germinating before you sow your crop. By preparing your seedbed in this way a few weeks before sowing and watering, the soil's seed bank comes to life and germinates. Then you cut, clear or burn off these small weeds, before repeating the same procedure again by sowing the crop you are going to grow.

## Non-woven fabric

If you plan to grow plants when it is still cold or there is a risk of frost, a non-woven fabric can come in handy, as it provides protection during the early frosty nights of autumn and can also be used to combat pests. You can place the cloth directly over the crops or make small tunnels with the help of arches in the non-woven cloth, which stand above the rows of vegetables.

## Weeds

When sowing or planting outdoors, your soil should be free of weeds. You can create a false seedbed as described above, or another method is to flame the cultivation bed immediately before the seed for the crop you are growing germinates. You apply a thousand-degree gas flame quickly over the weeds, which should preferably not

have grown beyond the seed leaf stage. Carrots and onions are examples of crops that are particularly sensitive to competition from weeds.

You will need to clear both between the plants and between the rows.

Use a row hoe between the rows as this works well in most soils, even stony ones. The best policy is to hoe when the weeds are small and in dry conditions. If it rains after hoeing, the weeds may grow back, in which case you can use long-finger harrow tines and rib rollers. A row cutter is better suited if the weeds have had time to grow larger. Intensive cultivation of the soil also breaks it down, so this method is best suited for sandy soils without stones and not for structurally weak soils. The row brush rotates powerfully and brushes up the weeds, leaving them on the surface. It is suitable for most soils, especially those rich in humus and stony soils.

Clearing the rows, which can be time consuming if performed by hand, should kill the weeds but not damage the cultivated crop. Different crops have different resistance, which affects the growing stage. Many vegetables can be harrowed using a long-finger harrow or brushed with circular brushes. These tools can replace clearing by hand entirely.

The most important measures you can take to combat weeds are done before midsummer, when growth is at its most prolific and before the weeds have gone to seed and started to spread.

If you have a lot of root-propagated weeds, it may be necessary to black fallow it over one season and cultivate it mechanically. Many root propagated weeds cannot handle being cut down regularly. Couch grass is best eradicated when they have three to four leaves. Keep in mind that root-propagated weeds can spread with root stems, shoots and seeds. Another method is to cover your arable land with ground cloth or plastic foil. Covering is most beneficial early in the season when the growing effect is at its greatest, so there is no point in only covering during the winter. If you have an abundance of root-propagated weeds, the best policy is to cover for at least one growing season, or preferably several.

It is vital that you take the necessary measures immediately at the start of your cultivation phase in order to avoid major problems in the future.

A certain presence of weeds may be manageable, not least because it benefits biodiversity and can help maintain a good level of mycorrhiza culture in the soil.

If you would like to learn more about weeds and how to manage them, more information is available from:

the Swedish Board of Agriculture's folder, Organic cultivation in the open

Ogräs, känn igen och ta bort, Gunnel Ginsburg (*Recognising and removing weeds*)

Ogräs på åker och i trädgård, Bengt Weidow (*Weeds in the fields and in the garden*)

## Pests and biological control

To mitigate the risks of pests and diseases, it is important to apply crop rotation and other preventive measures. It is useful to learn about each crop, how it should be grown and what might affect it. For example, cabbage can be attacked by cabbage moth and as protection you can cover the plants with non-woven fabric or an insect net. It is advisable to grow cabbages and carrots in windy places where insects such as the cabbage fly, carrot fly and carrot leaf flea do not thrive.

It is important to fertilize each crop correctly, as too much or too little nutrition impairs the plant's ability to survive attacks. Watering is also key, where it is better to water in the morning than in the evening to avoid mould spores and slugs, which both thrive in humid environments.

If you still experience problems with pests, there are biological pesticides that are approved for organic farming. For biological control, it is often natural enemies that are used to combat pests, in the form of microorganisms such as bacteria, viruses and fungi, or macroorganisms such as nematodes (roundworms), insects and arachnids.

You can learn more about biological control at the Swedish Chemicals Agency's website, [kemi.se](http://kemi.se), and on the Swedish Environmental Protection Agency's website, [naturvardsverket.se](http://naturvardsverket.se)

## Slugs

If slugs attack your crop at an early stage, this can damage it to such an extent that your entire harvest is destroyed. Gnawing damage that can occur later, and mucus and excrement also significantly impair the quality. Vegetables that still have slugs on them after harvest are unsaleable.

The Spanish slug can cause major damage across a small vegetable farm if it is not constantly controlled, which can be done in several ways, such as by slug poison with ferrous sulphate, which is approved for organic farming, by biological control of nematodes, Nemaslug or traps. The Spanish slug is continually spreading further north, mainly by laying its eggs in the plants and soil. However, the Spanish slug is not typically the biggest problem in larger fields and farms, as it usually thrives best around the periphery. The grey field slug is a major problem in large fields and together with the common garden slug, these three slug species can cause major damage across different types of vegetable crops.

Some slugs occur in large numbers if the conditions that year are favourable. They thrive extra well during rainy summers. Mechanical control often helps, while turning the soil after sowing makes it more difficult for the slugs to find sheltered places in the crop. For the same reason, there are more slugs in lumpy, clay soil where there are many cavities to shelter in, than in sandy soil that collapses without cavities. Mechanical cultivation with shallow tillage after harvest also reduces the presence of slugs. The slugs often stay near the surface and lay their eggs about ten centimetres deep in the soil. Cultivation breaks down the materials and crop residues and dries out the soil. One study has shown that you reduce the occurrence of slugs by up to 75 per cent if you plough the soil compared to leaving it unploughed.

Slugs thrive in grass and therefore you can place an area of bare soil around the crop. Harrow the areas several times during the season to dry it out to make it difficult for the slugs to pass.

Ducks can also be useful to combat slugs.

Learn more about slug control in the Swedish Board of Agriculture's printed material Snigeln - en besvärlig skadegörare i yrkesmässig odling (*The slug – a troublesome pest for professional farmers*).

Learn about approved pesticides at [kemi.se](http://kemi.se) and [jordbruksverket.se/bekampningsrek](http://jordbruksverket.se/bekampningsrek).

## Harvest

You must harvest your vegetables at the right time. Sometimes the seed bags have instructions explaining the length of a crop's cultivation time, which is the time between sowing and harvesting. The weather conditions affect the cultivation time, so it is important that you keep a close eye on things and can see when it is time for harvest. Many vegetables need to reach a certain ripeness before they are harvested, but it is important not to harvest too late, as you do not want vegetables that are overripe. For example, cabbages are sensitive if they stand too long in the field, and the harvest will have a poorer shelf life. Summer cabbage and iceberg lettuce are examples of vegetables that split if they stand for too long. Once they mature you usually have four to five days before they split.

## Transporting around your farm

There can be a substantial volume of harvested vegetables to be transported on your farm. You can move them using hand-drawn carts, or for larger operations by tractor and trailer. You will soon discover that carrying all the harvest by hand will be unsustainable. Think about your movement on the farm. Where do you spend time each day and for how long? It is also good to plan a place for rest, toilet breaks and staff meals near the growing area to minimise unnecessarily long distances.

## Rinsing station, packing and loading

Washed vegetables often sell better. When washing, you also need a rinsing station. Try to think of a good location for the rinsing station and also the packing station on your farm, where the distances are as short as possible, preferably located in a central position on your farm. If you have a larger farm, you may need several locations.

If you have the opportunity to load your vegetables directly for sale, you avoid wasting any time on unnecessary transportation around your farm. Maybe you can construct a track to the centre of your farm where you have everything in one place.

If you have existing buildings and logistics you have to deal with, there may still be smart solutions as to how you can shorten unnecessarily long transport distances. All places are unique, as your solutions will be; think creatively.

If you sell in larger batches where the vegetables are to be picked up by lorry, you will need a loading dock. Design the area to ensure that you have plenty of space, and consider all the risks, for example, a loading dock can become dangerously slippery in winter, so a heating loop built into the loading dock is a good solution.

## Aids and work environment

Vegetables are heavy, so it is sensible to improve each work operation to minimise wear and tear and heavy lifting injuries. Use the aids available to you on the market, such as pallet trucks. Remember to adopt the correct working position, use a table or suchlike at a reasonable height, and do not carry with a bent back or perform actions with an incorrect posture. This is important in the long run to avoid physical injury.

If you have employees, you are responsible for their occupational health and safety.

## Machinery and tool requirements

Regardless of the size of your farm, you will need certain machinery and equipment.

For a medium-sized farm, you will probably need a four-wheeled tractor with various accessories. There are a range of seed drills, planting machines, potato planters, harvesters and much more on the market.

Think about what you need most when first starting up. You can acquire certain tools and machinery at a later stage. Maybe you can rent machinery from a neighbour and employ someone to plough the land. If there are several growers and farmers in the same area, it may be an option to buy machinery and accessories as a

group. There is a thriving second-hand market for machinery and tools that you can first consider when you need to buy.

Be wary about making major investments in the beginning before you know you will get a return on the outlay.

If you have a small vegetable farm, it is not a given that you will need any large-scale machinery, as you can go a long way with hand-operated implements. Today, there is a large market for smaller machinery that are ideal for a farm with fixed beds, such as two-wheeled tractors.

## Storing vegetables

Will you be able to sell all your produce on the same day as you harvest, or will you need to store vegetables for varying amounts of time? A good storage area is vital to maintain good quality vegetables. Building a cold room on your farm can be a wise investment. An alternative to a cold room is refrigerated trailers if you sell mostly at markets. Cellars or other cooler spaces can also work well as storage rooms; check the temperature and humidity here. The temperature when storing is the most important factor in terms of the shelf life of the vegetables. The warmer it is, the faster the vegetables break down. It is therefore essential that the vegetables cool down quickly after harvest. Sensitive crops such as lettuce should be cooled within 30 minutes of harvest, preferably at zero degrees Celsius. The majority of outdoor vegetables survive best when cooled to zero degrees, but some are subject to cold damage if the temperatures are too low. Tomatoes should not be stored in temperatures lower than eight to ten degrees, while for cucumbers this figure is ten to thirteen degrees. A simple rule is that vegetables that originate from warmer climates fare poorly in the cold, while vegetables that are grown outdoors in our latitudes are adapted to withstand colder temperatures.

When storing vegetables over time, it is important that they are of a good quality from the very beginning. The growing conditions are of the utmost importance when it comes to quality, such as the soil they grew in, the temperatures in the growing season, exposure to sunlight, access to water, possible infestation by bacteria, fungi and insects and more. The nutrient content is also important. Calcium strengthens

the cells in the walls of the vegetables, which delays ripening and ageing, while a nitrogen content that is too high makes the crops watery and reduces the shelf life. Potassium is necessary for photosynthesis to work, even after harvest.

The phase the crop is in when harvested is important in terms of storage. Harvesting in the middle of the plant's growth will have an adverse effect on its storage capacity. This applies in particular to early vegetables and also varieties that are described as summer carrots, summer cabbage, fresh onions and others. You should also avoid harvesting too late where the crop overripens.

How the crop is harvested and handled after harvest is important for its shelf life during storage. A vegetable with crop damage will have a poorer shelf life, as it quickly loses water due to the damage and therefore ages. The same will apply if you trim the vegetables. Cauliflower, for example, needs to retain its protective leaves to prevent them from drying out. The same also applies when you wash the vegetables. The soil can act as a protective layer against dehydration. Even the actual washing can cause minor damage to the vegetables.

To help the vegetables retain their moisture, you can use plastic that will serve as a protective barrier. Growing fruits for the same reason has a long tradition.

Ethylene accelerates the ageing process of vegetables. All vegetables and plants produce ethylene, although mostly in small amounts, unlike apples, pears, tomatoes and bananas, known as climacteric fruits, which produce large amounts that can affect other vegetables if stored together. Problems with ethylene can occur even without having climacteric fruits nearby. If a vegetable has been damaged, it begins to produce ethylene as a healing process, but this will also cause it to age much faster. Ethylene also affects the taste negatively as it creates a bitter substance in the surrounding vegetables, a taste reminiscent of diesel.

You can learn more about storage in the Swedish Board of Agriculture's brochure: *Kvalitet och lagring*, by Kristina Mattsson (*Quality and Storage*).

## Logistics

If you plan to sell to wholesalers and supermarkets, you need to think about the logistics for this. Many growers and vegetable farms are far away from the cities and

wholesalers. If you drive the produce yourself, you need to factor in the time it takes. It may therefore be worthwhile engaging help with the distribution, but which will then be an extra cost to consider. Discover the options available to you and what they might cost.

## Communication on your farm

If there are several people involved in vegetable farming, this requires communication between employees, trainees and other workers. Between the person who received the order, the person who harvests, trainees who are given work tasks or employees who are to manage the day's activities. A good approach is to start every working day as a group with a brief meeting. There may also be things, orders or other instructions that need to be communicated over the course of the day.

The most common and perhaps easiest way is to have a whiteboard or noticeboard in a place where most people pass naturally during the day, for example in the rinsing room. Here, the person in charge can post the orders such as what is to be harvested along with other work tasks. Once a work task is complete, the person who performed it can cross it off and enter their signature to clearly show who has done what.

One major advantage can be to give names to your beds or fields using simple systems, making it easy to communicate where the work is to take place.

These are simple proposals that could be of the utmost importance for your workflow and also the well-being of those working on your farm.

## Anna Wilén, Ängbäck Trädgård (*Garden Farm*)

Under a couple of large oaks on the Ängbäck Trädgård garden farm there are two insect and bird watchers looking down at the grass looking for insects. Then they look outwards, upwards, looking for birds. At the same time, a large excavator is working further down in the fields. It is early autumn, and tranquillity has returned to the farm following the summer's intensive period that saw 45,000 visitors. The excavator is currently working to restore five hectares of wetland.

“It is vital that we do what we can to delay and prevent climate change for future generations who will also have to live and work on this planet.”

I have come to the Ängbäck Trädgård garden farm. A conventional strawberry grower that has been Sigill-certified (*certification standard*) for many years, which offers self-picking of strawberries as well as new potatoes, vegetables and cut flowers. Anna Wilén has just poured me a glass of aronia juice. The drink is dry, reasonably sweet from the berries, and I immediately want a top up.

“It’s a health drink. If you are aware of all of the health properties of aronia, it’s hard not to become addicted to it.”

The aronia juice that Anna developed together with her partner Sune is the latest addition to the farm. The berries are picked from the hedge that runs along all the farm buildings and has recently been supplemented with 115 new plants. Another new addition is buckwheat, which is grown on almost eight hectares of arable land. Looking ahead and being open to change and new initiatives has been the company’s policy from the very beginning.

“This has been updated several times and you never know what the future will hold. It will not continue as it is now.”

But the changes have not always been planned. Like the summer when they had a hailstorm straight over the strawberries that were just about to be harvested. They were damaged by the hail and therefore unsaleable. A disaster. They quickly put together some brochures and set up signs that they placed along the roadside. Out of the blue the farm had a self-picking operation, which today is one of the most important parts of the business.

In addition to Anna herself and her partner Sune, around 60 seasonal employees work on the farm between April and August. Many of those who work on the farm return every season and have become experts in their fields.

“You might think that you can just engage anyone for this work. This is not the case at all. We employ experts.”

Others who work there are young people for whom this may be their first job. They too are trained when they arrive at the farm and Anna has great confidence in her employees.

“You shouldn’t be afraid of employing people who are better than you. There are many talented young people.”

After a second glass of aronia juice, we go out to look at the aronia hedge. The berries produce a black sheen in the sunlight. On the other side are the buildings that were previously used for packing. Anna worked here for ten years, and before that her main occupation was in the greenhouses where they grew many thousands of plants. Moving from the bright greenhouse to the dark potato store was not the easiest, but once they had painted the walls pale yellow and installed good lighting, she really enjoyed that work. She is now a manager, where it is mostly office tasks and a little work out in the open air for Anna, after they decided to stop producing winter potatoes and the packing operation in 2016.

“Other people switch workplaces, but I switch jobs on the farm.”

Anna plans strategically five years in advance which she uses to base different decisions for the business. She thinks it is important that you prepare an analysis of the situation you are facing, what you are aiming to achieve and that you start from the position you are in right now. The decision to phase out the winter potato operation was made together with her crisis group which was a sounding board she had set up earlier. The idea behind the crisis group was that it would be called upon if something were to happen to her and her then husband. A group consisting of one person from the bank, Anna’s auditor and two people from other businesses. A group that was now also supportive during her divorce.

“I asked them to ask pertinent questions, which helped me make decisions which then led to the end of winter potato growing and to the dismissal of the year-round staff. It was one of the most difficult decisions I have ever made. Reorganisations are tricky. Everyone who has been through one knows that, but it can also be a good thing.”

Anna believes that having a good education in the locker is vital if you plan to run a business. She is educated as a preschool teacher and in agricultural economics, marketing, rhetoric and writing. Growing is the core of the business, but the most important thing in the working environment has been the people.

“We enjoy growing, but it is still people we work with the most.”

The scale of the business has been in the plan from the very beginning. They started on a large scale that required staff, and that was exactly how they planned.

“Do not start too small, as you may lack the motivation to manage it properly and it will become a spare time occupation. You have to start big enough to feel it when things go badly, but also you get to feel good when things go well.”

Outside the potato packing plant, which is today used as a staff canteen, rental of space for vehicles and flea markets, there is a market stall to sell the farm's produce. Potatoes, vegetables and flower bouquets, currently featuring all the colours of autumn. Here you can also buy honey from the local bee-keeper, and bread from the local bakery. A large percentage of sales is made outside of supermarkets in the immediate area in Värmland, as well as inside the stores. But sales on the farm with the self-picking of strawberries and new potatoes is the most important sales point for the Ängbäck Trädgård garden farm. They have stopped selling vegetables to wholesalers, as profitability was too low.

A little further away you can see a stretch of purple flowers, which is the landscaped game field with honey herbs. This is one way of keeping deer outside of the farming area rather than inside it, and it also attracts honeybees and bumblebees.

“Wild game is good for biodiversity, as is wetland.”

In the 19th century, Sweden experienced a famine, and every effort was made to increase the amount of arable land and access to food, including draining many wetlands and lakes.

“I am grateful to those who took up the spade, as it is thanks to them that we can grow here today. But this does not prevent us from making efforts to restore the wetland.”

The excavator continues to dig beyond the fields. The wetland is a vital watering place for the birds and where unusual bird species nest. It will also even out the differences in the environment here, ensuring that water flows slowly through the landscape, trapping nitrogen and phosphorus. It will mean that the farm will be able to better withstand floods and drought that the impending climate change will cause. A restoration of something from the past, for a new future going forward.

“If you simply do as you always did, then you will not only stand still, you’ll go backwards. Try new things, be brave.”

## Rules for documentation and registration

### Documentation

In order to improve cultivation, work operations and sales, you really need to document. Keep a record of what you do, how you perform your work operations, experiments you try when cultivating, what your harvest yield levels are, and what you sell – your income. Use this documentation when planning for future seasons. You will probably need to make adjustments over time, once you have learned what your customers want to buy and the time in the season they pay the highest price. Over time, you will notice what works best in terms of cultivation on your particular farm and what takes up too much time.

### Rules for documentation

There is some documentation you need to perform. There are requirements placed on producers to keep a record of manure, even if you are not connected to KRAV or any other certification body. A log where you enter when and how much you have fertilized your crops.

You need to achieve plant nutrient balances if you are affiliated with KRAV, to ensure that your crops do not leak nutrients into the local area and environment.

A spray log must be kept for conventional cultivation. When, what and how much pesticide you have used on your farm.

Biological control must also be documented and be presented at inspections.

### Registration for primary production

You are classed as a primary producer if you grow vegetables, sell or give them away on a small scale. As a primary producer, you must comply with food legislation.

You must register as a primary producer with the County Administrative Board in the county in which your produce is sold. You must register no later than two weeks before the start of operations, otherwise a penalty fee may be levied. The easiest way to report is by using the County Administrative Board's e-service. The County Administrative Board can also perform inspections of your production facilities. Primary production includes activities such as cultivation, packing, transport and harvesting of plant products such as grain, fruit, vegetables, herbs, mushrooms and sprouts. Storage, washing and trimming (although without changing the nature of the produce) also fall within the scope of primary production.

## Registration for food production

If you grow for sale more than 0.25 hectares in the open air, or in greenhouses of at least 200 square metres, you need to contact the County Administrative Board as you may need to be registered as a food producer. The same applies if you grow on a smaller area but still sell on a regular basis. There are rules in food legislation that apply to food producers to guarantee food safety from the producer to the consumer, i.e. from farm to fork. If you also run a food-related business in addition to farming – for example, a café, farm shop, market sales or some type of processing, such as jam, freezing or a mixing vegetables – this must be reported to your municipality. The municipality decides whether your business is considered a food-related business or not. Learn more about the rules pertaining to food-related businesses at [livsmedelsverket.se](http://livsmedelsverket.se). It is important that you report your food-related business no later than two weeks before start-up. A penalty fee of between SEK 2,500 and 75,000 may otherwise be levied.

## Public food inspection

As a food producer, it is mandatory to undergo inspections by a range of authorities, which are designed to ensure that the food the consumer buys is safe and includes the correct information. These inspections can be announced or unannounced. Different authorities are responsible for different inspections.

The County Administrative Board inspects primary production. The municipal Environment and Health Protection Committee inspects restaurants, supermarkets and food enterprises. The Swedish Food Agency inspects the majority of establishments engaged in animal foods as well as wine and spirit producers.

The inspections are funded through fees. It is therefore the producers who have to pay for the inspections, both announced and unannounced. The cost of such an inspection varies depending on the County Administrative Board and municipality you belong to, as the authorities themselves set the hourly rate. This applies to the inspection of food production. The inspection of primary production is paid for through taxes.

The Inspection authorities are also tasked with providing you with advice and information and making life easier for you.

The inspectors check factors such as:

That the premises are suitable for the business.

That hygienic procedures are observed.

That all foods are traceable.

That you provide the right food information and labelling.

Primary producers must be able to present documentation for medicinal products for animals and pesticides for cultivation.

## Other rules

It the business operators that are obliged to find out and observe the applicable rules and laws. There are also industry guidelines relating to the different types of business, including vegetable farming. These list the procedures and laws that producers must observe. It is advisable to read these before you start your business.

Learn more at [livsmedelsverket.se](http://livsmedelsverket.se)

National industry guidelines brochure, Frilandsodling grönsaker och bär, LRF Trädgård (*Open field cultivation of vegetables and berries*)

National guidelines for organic production

Försäljning av små mängder brochure, The Swedish Food Agency. (*Small volume sales*)

The County Administrative Board, lanstyrelsen.se

## Erland Persson, Värmlandspotatis (*Värmland Potatoes*)

There is a hint of spring under the patches of snow when I travel to meet up with Erland Persson at the end of the working day. A new growing season is just around the corner, and I plan to talk to Erland about his farmland; he is the farmer with the most arable land in the area. We have arranged a meeting at the local bakery where we sit, he on a stool and I on an elevated bread crate.

“I don’t know if there will be any farming this year.” Erland shrugs as he stares at me. “You never know. This has been the case for 30 years. I don’t know if I will be able to afford the seed.”

It is the last day of March and Erland has just ordered the seed for the coming season. But he does not know if he will be able to accept the delivery. Cash flow is tight and when all expenses arrive in the spring, income is virtually non-existent.

He looks tired as he sits perched on the stool, with the large windows facing the road and the river behind him. The bakery has closed for the day, but the aroma of bread hangs heavy in the air.

Erland still has goods in his warehouse in Ekshärad. So far, the chilly nights are helping to keep them in good quality. It is a major benefit having a warehouse in Ekshärad in the north, he says, as the cold lasts into the spring.

Erland’s arable land of 60 hectares lies between Ekshärad and Olsäter. Here he primarily grows potatoes, but also a lot of carrots and some turnips and parsnips. Every year he buys seeds for about SEK 80,000 to be able to cultivate his land. That’s the money he needs to find right now, as well as funds to buy fertilizer and for all the ongoing maintenance of machinery.

“I must be able to produce SEK 100,000 per hectare at least to make ends meet. Sometimes it works, sometimes it’s a fine line.”

Like last autumn, when a plot of three hectares with really healthy carrots were eaten by deer.

For another plot, he noticed that the harvest was deteriorating and took a soil sample and sent it for analysis. It turned out that there was a major deficiency of both potassium and phosphorus, and the soil's pH value was too high. Potassium deficiency is a common problem in sandy soils that are permeable, and cause severe quality problems, especially for potatoes, which turn dark in colour when cooked.

The fields are fertilized using cow manure before the grass is sown to create grassland. This is done in partnership with Hedås farm, where together they implement a four-year crop rotation schedule. The grassland is cut several times before it is time to grow vegetables and potatoes again. Then the nutrient supply is over, says Erland, who fertilizes using pelleted chicken manure.

Erland grows on sand, and couch grass is the weed that causes the biggest problems, which is also typical for sandy soils. "Sometimes we face such immense problems that it is difficult for the harvesters to operate effectively" he says.

It's starting to get dark outside. The traffic thunders past on highway 62 outside. The light from headlights glitters in Erland's glasses as he smiles cheekily.

"It's exciting to see how things pan out. It is intriguing to see if we will go bankrupt this year." He looks at me again with that look. "You never know for sure."

These have been tough times. The competition from Öland, Västergötland and Skåne with their enormous areas of arable land has not made life easier. Price increases for the crops have only benefited the grocery trade. Farmers have not been paid any extra. But times have been different.

It was on Hedås farm that it all started for Erland, where he began growing grain and hay in the 1980s. Potato growing expanded year on year until he became the largest producer in Värmland. With the help of the surpluses, he was able to invest in new machinery and expand the business even more.

"One hundred thousand was not considered a problem back then."

Erland finds it difficult acquiring used machinery and when he buys, it will be new. He has two tractors, a John Deere and most recently a Valmet. He tells me that he is pleased with his latest purchase, as the tractor has also given him the opportunity to raise extra income in the winter through snow removal.

The crops must not remain for too long in the storage area, for as long as they are there, he makes no money. Once they have been sorted and washed, they should preferably be moved on as soon as possible to the peeling operation in Kil, to Skåne or to a wholesaler. The peeling operation is run by Värmlandspotatis, a company in which Erland is a partner. Every week he supplies them with between 300 and 700 kg of potatoes. Erland delivers them using his own vehicle, and for the return trip he brings back empty boxes.

“You can’t drive an empty load for 200 km.”

Time is against us. There is so much to talk about. Crops that are successful, crops that fail. And everything concerning sales. The core of the business. To ensure their goods are sold and paid for. But what do you do then?

Erland believes that the most important factor is communication. Between grower, wholesaler and customer.

“Some people understand the business. The fact that potatoes can come in different sizes.” Others demand that potatoes have a certain appearance. Schools must have washed, peeled potatoes of the same size, otherwise there will be problems with different cooking times.

Erland believes that there is a demand for locally grown produce. The new procurement arrangement between the municipalities in northern Värmland and the locally based wholesaler Värmlands Skafferi has boosted sales. Good communication is the key.

“You must come and visit me in the summer growing season.”

It’s almost completely dark now. We should turn on a light. When the headlights land on his face, I can see that he looks happy.

Maybe there is hope after all.

On the way home I drive through the mosaic fields along the Klarälven river. Villages, forests and plots of land that farmers like Erland keep in use. We still do not know if there will be another season growing potatoes on the plots between Ekshärad and Olsäter.

But we can hope.

## Finances and Budget

In order to be able to run a vegetable farm in the long term, it must turn a profit. Keeping track of your accounts and documentation in order is important for you to achieve this.

You need to know the sales channels that work best, as well as the ones that make a loss, and you need to know what your expenses are. By clearly documenting everything, you can also see where your expenses can be reduced.

It is wise to prepare a budget and business plan before starting. If you are going to contact a bank, this is a must.

Certification to, for example, KRAV costs money, but can pay a lot better when selling your produce.

If you run an organic operation, you may be eligible for support from the rural development programme.

### Calculations

The best record you have when it comes to the profitability of your vegetable growing is your own calculations, which can be more accurate for each year as you learn about your conditions over time. You should therefore create your own spreadsheets. How much to grow, what you can charge and the sales value of the planned harvest. Here is an example of how you can make a calculation for your farm. Feel free to enter your own numbers.

## Starting a business

Selling vegetables to a customer requires that you have some form of business operation. This could be a sole proprietorship, limited liability company or an economic association. Learn more about the form that suits you best.

Being self-employed means that you deal with all aspects of the business yourself. You are your own boss. It is you who decides how to do things and can put your own ideas into practice. It also means that you manage all parts of the company yourself, such as dealing with customers, making business plans, keeping the accounts and communicating with the authorities. You can outsource certain parts, such as accounting, but you are fully responsible for the business.

You will need to have contact with the Swedish Tax Agency, which handles your tax returns, VAT reporting and employer contributions, among other things. If you want to sell your goods for cash, you will need an approved cash register. You report this to the Swedish Tax Agency.

To be able to start a company in Sweden, you must have a Swedish social security number.

If you need to employ more people in your company, this makes you an employer, which must also be reported to the Swedish Tax Agency. You will need to pay and report taxes on your employees' salaries as well as pay employer contributions. You also need to be aware of the various laws in place to protect the conditions and health and safety of your employees, such as the Work Environment Act.

You can contact your municipality for business advice. See also:

[verksamt.se](http://verksamt.se)

[coompanion.se](http://coompanion.se) for advice.

[skatteverket.se](http://skatteverket.se), open the 'Starting and running a Swedish business' tab. There are also information brochures available in a variety of languages.

## Applying for support

There are various support funds farmers can apply for as well as those working in rural areas, for example, support for young farmers and agricultural grants, which you apply for via [jordbruksverket.se](http://jordbruksverket.se). In order to receive support money, it is important that you apply on time, it is often the case that an application must be submitted between February and April.

You can also apply for a 'start your own business' grant at [arbetsförmedlingen.se](http://arbetsförmedlingen.se).

## Training and courses

There are several training courses at different levels around Sweden if you are interested in learning about cultivation and market gardening. These include universities and colleges, polytechnics and folk high schools. The training courses come in various lengths. Many of the study programmes and courses are eligible for study grants from CSN (Swedish Board of Student Finance), but not all. Sometimes the Swedish Board of Agriculture and LRF also arrange courses.

You will find study programmes and courses as follows:

College and university, [studera.nu](http://studera.nu).

Folk high school, [folkhogskola.nu](http://folkhogskola.nu).

Polytechnic, [yhutbildningar.se](http://yhutbildningar.se)

## Olle Göransson and Marica Möller, Torfolk Gård (*Torfolk Farm*)

Torfolk Gård farm, the organic vegetable farm, where they are thoroughly committed to providing good food for everyone and for a dynamic countryside. As a beacon in Klarälvdalen, they have inspired and engaged many people since they started in the 1970s. With 17 hectares of arable land around the cluster of buildings and the river that meanders alongside the entire farm, Olle and Marica are currently cultivating one hectare of vegetables, with two salaried employees doing the basic work.

The house Olle and Marica live in is located right in the middle of the farm. It is a sunny day in early summer, and we are sitting in their garden in the shade of the apple trees next to the peonies that are starting to bud. The jam factory is in full swing and occasionally we need to take a break from our conversation when the growers from the Green Dawn association have questions. Cars drive into the parking lot alongside, where the farm shop is open today selling items like strawberries, as it is the day before midsummer.

Olle and Marica are thinking a lot about how to deal with everything. Now and in the future, what the prospects are for their farm. When I ask what plans they have for the future, they sigh. They do not have the strength to continue as they once did, they tell me. At the same time, it is difficult to simply let go of everything, perhaps especially for Olle.

“I have strong feelings about the farm.”

In the initial years of organic vegetable farming at Torfolk, they carried out soil tests to see that the humus content was constantly increasing. At that time, Olle drove around on his tractor and fetched manure from local farmers. But this was time consuming and soon became financially unsustainable. This has led to them for the most part using pelleted chicken manure as fertilizer today, in addition to crop rotation, growing grassland and green manure.

“Once we were able to buy pelleted chicken manure, people said now you can grow organically in a conventional way.”

Olle thinks about this for a while.

“There’s a lot of truth to that. It’s gone full circle. A bit like it was at the beginning. Maybe it was wrong to think so big, that everyone would go organic.”

Maintaining the humus content in sandy soils is difficult as they are so permeable, and this spring they sent soil samples from Torfolk for analysis.

“The humus content has now dropped slightly. This is not good news. I think a lot about how to tackle this.”

Olle arrived at Torfolk in 1978, Marica in 1984, to a collective on the back of a real green wave spirit. They moved to a region where businesses were shutting down with plans to plant forests in the fields. Drawn from the environmental movement and a hope for a better world, the collective bought the farm and started various businesses. An obvious element was that the farm would be run non-toxically, what we today call organically.

From the beginning there was no profit at all, none of them had any family to support and they lived on what the farm provided. “We really had no knowledge either,” Olle and Marica laugh.

They acquired some goats and built up a cheese dairy. They bought an apple press at an auction and the neighbours joined forces to collect apples, the start of what would eventually be the jam factory at Torfolk.

The importance of the social interaction for the activities on the farm cannot be underestimated.

“We were a group that supported each other.”

They had a community both within the group and in the village that has been the core of the entire business.

“Things happened all the time, it was a hive of activity. Cluster formation means a lot, you encourage and inspire each other.”

Eventually, there were two families with children that lived on the farm running shared projects and eating shared meals. They helped each other with childcare and other practical things, and the company Torfolk Gård began to grow.

Torfolk started selling vegetables early on to Konsum Värmland, which had a warehouse and packing plant in Karlstad. The proximity and local handling for the supermarkets meant that taking this step was not particularly difficult at all.

“But the prices were pretty awful. They told us, ‘we cannot pay more for your produce than others.’”

Buyers back then saw no difference between organic and conventional growing. In Karlstad, the Matfront association was started at the same time, ordering vegetables directly from the producers. The association wanted to be able to buy non-toxic food in supermarkets and Konsum Värmland showed an interest. The new Samodlarna association which Torfolk started together with other growers in Värmland made it possible to solve the logistics.

“At its peak in the late 80’s, Samodlarna had about 40 growers, big and small scale. We had planning meetings in the winter, which was a lot of fun. There was a great vibe, and life was really enjoyable. People tested methods and presented their ideas.”

The vegetables were picked up by Konsum Värmland using their own vehicles directly from the growers, or alternatively growers could drop off their vegetables at the nearest supermarket.

“When you think about it, we had a very pleasant life then. You would open the letterbox to find an order that would need to be delivered in a week. Today, you have to confirm an order that arrives by email within two hours.”

The supermarkets were soon required to carry out inspections to ensure that the goods were really grown as stated. It fell upon the Rural Economy and Agricultural Societies to have to check that the growers were not using pesticides or mineral fertilizers.

In 1984, people from all over the country came to a meeting at Ransbergs Herrgård, where the Ekologiska Lantbrukarna (*Organic Farmers*), Alternativodlarnas riksförbund (*the National Association of Alternative Farmers*), was formed. The association then took part in and started KRAV, which took over the inspections of organic farms.

One change that Olle and Marica have noticed in recent years is the increase of large-scale operations, as a result of centralisation, which makes it difficult for individual growers.

Konsum Värmland, today Coop Värmland, has become more difficult to sell to over the years:

“So much has happened on the trade side over the years. It has centralised and phased out pretty much everything and they have become very difficult to communicate with.”

The economy in Torfolk has seen ups and downs, some periods have been fairly buoyant, others flat. But the need for extra income, outside of vegetable production or the jam factory, has always been there.

“Without it, we would probably have gone under. But we agreed that it was important to persevere.”

In time, only Olle and Marica remained, the children moved away, and the farm entered a new era. They sold several buildings where new families live today. In this way, the village spirit lives on even if it is in a new guise. But they do not know what the future holds for vegetable farming, all they know is that they will not be able to keep going as it is now. At the same time, it is difficult to stop everything that you are committed to, it is not easy letting go.

“We have never wanted to isolate ourselves, always wanted to be outward-looking towards the world with different commitments. The village, the network, and the people have meant a great deal to us. To keep the community intact, and the dream of a better world. You can romanticise as much as you like, but it really means something.”

The community and the dream of a better world has perhaps always been the driving force for Olle and Marica, as well as doing something good for the planet. After all, there are other concepts and methods, perhaps microorganisms are the way forward, perhaps green manure between the vegetable rows. Olle laughs as he sits with Marica under the apple tree in the garden at Torfolk Gård farm, and as if in a fit of inspiration he exclaims, “Maybe I should cultivate the earth instead of vegetables.”

## MORE TO READ

There are many good regulations and books on the subject of organic farming in both the smaller and larger scale. There is also a lot of information to be found online. Here you will find all books and links that have been continuously in the text throughout the cultivation book.

### BOOKS AND WRITINGS

#### Andelsjordbruk Sverige

andelsjordbruksverige.se

#### Ekologiskt lantbruk

Artur Granstedt,  
Hans Bovin m.fl.

#### Ekologisk odling av spannmål

Thorsten Rahbek Pedersen, Jordbruksverket

#### Ekonomi i grönsaksodling på friland – kalkyler för olika grödor och typföretag, Jordbruksinformation 3 – 2020

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#### Försäljning av små mängder

Livsmedelsverket

#### Handbok för köksträdgården

Lena Israelsson  
Jordbruksverkets pärm  
– Ekologisk grönsaksodling på friland

#### Jord och kompost

Harald Kratschmer

#### Kvalitet och lagring

Kristina Mattson,  
Jordbruksverket

#### Känsla för jord

Karin Eliasson

#### Nationella branschriktlinjer, Frilandsodling grönsaker och bär

LRF Trädgård

#### Nationella riktlinjer för ekologisk produktion

LRF, KRAV, Ekologiska Lantbrukarna

#### Odla till försäljning

Jonas Ringqvist

#### Odla till försäljning.

#### Del 2 – våra bästa grönsaker

Ylva Lundin, Sanna Mattsson Ringqvist, Jonas Ringqvist

#### Ogräs, känn igen och ta bort

Gunnel Ginsburg

#### Ogräs på åker och i trädgård

Bengt Weidow

#### Runåbergs fröer

Johnny Andreasson

#### Snigeln – en besvärlig skadegörare i yrkesmässig odling

Jordbruksverket

#### Starta eko Grönsaker, Jordbruksinformation 7 – 2009 Reviderad 2017

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#### Så odlar du ekologisk spannmål i Värmland – och Dalarna

Daniel Hedeås, Ulrica Broström,  
Jordbruksverket

#### The Market gardener

Jean-Martin Fortier

#### The new organic grower

Eliot Coleman

### WEBSITE

#### Arbetsförmedlingen

arbetsformedlingen.se

#### Coompanion

coompanion.se

#### Demeter

demeter.se

#### Greppa näringen

greppa.nu

#### Hushållningssällskapet

hushallningssallskapet.se

#### Jordbruksverket

jordbruksverket.se

#### KRAV

krav.se

#### Lindbloms fröer

lindbloms.se

#### Livsmedelsverket

livsmedelsverket.se

#### Länsstyrelsen

lansstyrelsen.se

#### Länsstyrelsen värmland

lansstyrelsen.se/varmland

#### Naturvårdsverket

naturvardsverket.se

#### Olssons frö

olssonsfro.se

#### Runåbergs fröer

runabergsfroer.se

#### Semenco fröer

semenco.se

#### Skafferi Värmland

skafferivarmland.se

#### Skatteverket

skatteverket.se

#### SMHI

smhi.se

#### Sveriges folkhögskolor

folkhogskola.nu

#### Sveriges geologiska undersökning

sgu.se

#### Universitet och högskolerådet

studera.nu

#### Verksamt

verksamt.se

#### Yrkeshögskolan

yhutbildningar.se

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I have been growing vegetables on Torfolk Gård alongside the Klarälven river for over 40 years. If you wanted to grow in the late 1970s and early 1980s without using fertilizers or chemical preparations, there was hardly anyone to ask for advice. When I read this guide, I realise how much has happened and the developments that have taken place over the past 40 years with what we today call organic farming, and what we back then in the 1980s called “alternative cultivation”. How much knowledge is available from a range of sources and that there is actually advice and help to get whenever you need it. At the same time, everything that does not concern the actual cultivation process, such as rules, government regulations and sales channels, has become much more complicated. This guide covers a lot about what you need to think about before starting, where to find advice and help and contributes greatly in making life easier for those looking to become a vegetable grower.

What if I had access to such a practical guide when I started! It would have been a dream. Congratulations to those who now have a copy.

Olle Göransson

THE CULTIVATION HANDBOOK

Author LINNEA ÖJES



**MERA MÅNGFALD MED MATEN**