Farmer's possibilities to prepare for climate change

EAFRD

Centre for Economic Development, Transport and the Environment

Luke
NATURAL RESOURCES INSTITUTE FINLAND

mmm.fi
MINISTRY OF AGRICULTURE AND FORESTRY

You can develop your own skills by discussing matters on the edge of the field. Photo: Tyynelä Farm.

The only thing constant in a farmer's life is change. Signs of substantial climate change have already been seen in recent years. Furthermore, in a world dependent on oil, the social conditions do not remain constant either. However, farming can adapt to changes and solve many problems. The decisions are up to a farmer to make and there are several measures to choose from.

Step 1: Consider the premise

For you as a farmer, it is worthwhile to consider what is the premise of your operations, such as what are you managing and in what kind of an environment: fields, forests, animals, competences? What are your values and goals, and who has set them in the first place? Who makes the decisions on matters related to the farm; is it you as a farmer with your wife/husband or agricultural dealer, or is it the new investment made, such as a dryer or a cowshed?

In what kind of a relationship with its environment does the farm operate, both ecologically and socially? Is money everything, or does also your own well-being or that of your loved ones or the environment matter? What are the weak links of your operations? In other words, you should be able to take overall control of your farming activities and life in general.

Step 2: Be prepared for instability

It is good to be prepared for changes and insecurity. If for some reason or another, your access to the basic needs and inputs is limited, how do you cope? What if the farmer falls seriously ill? Critical self-sufficiency means having the basic skills of life and agricultural production so that you will cope in case of emergency. This includes ensuring the availability of food, shelter and energy.

In farming, you also need such things as seeds, machinery and spare parts, but, first and foremost, you need skills for the planning of production and adaptation. Community spirit and co-operation function as reserve resources, when the farm has insufficient human resources. If necessary, a neighbour can stand in for the farmer if he or she or his/her wife/husband is taken ill – and one can also share machines and skills.

Step 3: Strive for efficiency

When operating a farm, you should address the basic reasons of problems in the long term and not treat the symptoms only. For example, the reason behind weak crops is often poor soil structure and growth

Ecosystem processes can be made more efficient for the purpose of improving soil structure, for example. In biological-mechanical deep loosening of soil, a subsoiler is used to help plants with deep roots push their roots through compacted subsoil. Photo: Tyynelä Farm.

conditions, not insufficient fertilisation or plant protection; weak work motivation may derive from poor family relations, not that the tractor is old; or the reason for low profitability may be lack of planning, not that the farm is too small. By remedying the actual causes of problems, it is possible to build up buffer and adaptation capacity for the farm's production and finances against any changes.

In production, you should strive for maximum efficiency, measuring your success in terms of nutrient balance, energy balance and carbon balance, and profit margin. Measuring efficiency by quantities produced is reasonable only in a socialist planned economy. Taking care of the vitality and competitiveness of crops is the most economic and environmentally friendly form of farming. Farmers cannot increase the growth of the plants, they can only remove factors that restrict growth. Actual intensive farming is based on such agroecological methods as versatile crop rotation, green manure ley, green fallow, varietal mixture cultivation, cover crops, organic fertilisation, mechanical weed control, and perennial crop cover.

Step 4: Acquire skills, consider and discuss things

It is advisable that you acquire support for farming and its planning from several different sources. It is good to study literature and revise and deepen your understanding of the basics of farming, such as soil functions, crop growth stages, or planning of grazing.

There are several courses available for farmers on such topics as financial and crop planning, decision-making, holistic management, and individual farming methods. Advisers and farmer colleagues will provide you with detailed information and experience on practical measures. If you know foreign languages, it is easy to find new international ideas and influences through the Internet or download radio programmes etc.

Step 5: Observe your environment and make experiments

Experiments with different production and cultivation methods increase your experience and knowledge. By observing nature, you can learn about how it works and then strive to reconcile your own activities with this overall process. In most cases, you do better by imitating nature than by struggling against it.

You can take advantage of ecosystem processes in multiple ways and strive to strengthen them, by such means as

It is easy to provide shelter and food for insects, birds and small mammals by preserving bushes, trees and groups of trees along roads and main drainage ditches. Photo: Tyynelä Farm.

biological-mechanical deep loosening of soil, for example, where a subsoiler is used for helping plant roots penetrate into a larger area. Another good example of an ecosystem process is ground frost, the lack of which manifests itself in the poor overwintering capacity of autumn plants and low soil workability in spring on heavy soils in particular.

Step 6: Maintain and improve soil growth conditions and structure

Arable soil is the farmer's most important and valuable production factor and it should be treated accordingly. The basic measures required for the maintenance of good soil growth conditions include ensuring good water economy, avoiding soil compaction, and correct timing of cultivation measures. Depending on the soil type, 20–50 % of soil volume should be water and 10 % air. In other words, soil should be porous enough to allow exchange of gases, water and nutrient intake, and unobstructed growth of the roots.

Continuous observation of the soil structure and remedying it as necessary enable keeping the soil productivity stable and high at a lower environmental load. The crumb structure of soil can be maintained by means of, for example, plants with deep roots, organic fertilisers, promoting microbial activity, and liming. The most effective solution for improving soil structure is deep loosening of grasslands for green manure leys during the first year of grass growth.

Step 7: Turn your field into a carbon sink

Combined with poor soil structure, low concentration of soil organic matter (carbon) is a factor that limits yields. With a view to plant growth, the concentration of soil organic matter should be at least 3.5 %, and attention should be paid to organic matter balance of the soil when planning crop rotation and fertilisation. For example, cultivation of root vegetables that requires heavy tilling accelerates the decomposition of organic matter, and therefore the organic matter concentration of the field should be balanced using perennial grasses and organic fertilisers.

Organic matter increases microbial activity, for example, thus preventing plant diseases, retaining nutrients, preventing acidification, improving water retention and transmission, preventing crust formation, and improving the crumb structure. In other words, it is possible to improve yield capacity and yield

Perennial crop cover can be used for managing nutrients and erosion outside the growing season in particular. In the photo, cultivated white clover cover at the end of October. Photo: Tyynelä Farm.

reliability, reduce emissions into air and water from farming, and slow down climate change by adding organic matter to the soil. In the future, it may also be possible that farmers be compensated for storing carbon in soils.

Step 8: Recycle nutrients and carbon

Reconciling animal husbandry based on grazing and forage or decentralised bioenergy production with crop cultivation enables perennial grass rotation and efficient recycling of nutrients within the farm. In the treatment of manure and organic fertilisers, attention should be paid to loss of nutrients and the quality of manure or the product. Manure should be spread evenly on the fields in the whole farm area during the growing season in accordance with the nutrient needs of the plants, and, if necessary, manure should be given to arable farms.

Risk-free recycling of nutrients transported to communities with food into primary production would require remedying of the chemicalised consumption culture and development of sewage treatment systems. By using cover crops and catch crops and adding organic matter low in nutrients, it is possible to store the nutrients left unused by the crop plants during growing season, released outside the growing season, and bound by nitrogen-fixing plants for the next crops.

Step 9: Nurture diversity

Diversity of the farming environment maintains many natural resources and functions as protection against sudden environmental changes. Diversity is based on such measures as versatile crop rotation, varietal mixture cultivation, cover crops, and discretionary use of chemical pesticides and herbicides.

Abundance of living organisms both underground and above the ground, including soil microbes, pollinators, and natural enemies of insect pests, takes care of, for example, plant disease control, soil crumb structure, release of nutrients, pest control, and pollination. Tree alleys and grass and bush borders along roads are buzzing with life and act as protection against wind as well, which may significantly increase yields by affecting the temperature and humidity conditions.

Diversity of the farming environment is based on versatile crop rotation. In photo *Brassica rapa* subsp. *oleifera*. Photo: Luke.

Step 10: Cooperate and diversify your operations

The meaningfulness of farming, and the efficiency, value and flexibility of production can be increased by means of cooperation between farmers and various lines of production and parts of the upgrading chain. As examples we could mention farmers' marketing and procurement cooperatives, feed and manure cooperation between animal husbandry farms and crop farms, or contract production of plants.

Diversifying farming activities within farms to cultivation of root crops, vegetables and fruits and animal production would significantly enhance the efficiency, buffer capacity, security and safety of food production. Involving people in food production in a communal scale would boost the use of farm resources through, for example, high-productivity use of acreage, and it would also improve people's nature relationship and appreciation of food production.

Steps towards flexible farming

1. **Consider the premise**
2. **Be prepared for instability**
3. **Strive for efficiency**
4. **Acquire skills, consider and discuss things**
5. **Observe your environment and make experiments**
6. **Maintain and improve soil growth conditions and structure**
7. **Turn your field into a carbon sink**
8. **Recycle nutrients and carbon**
9. **Nurture diversity**
10. **Cooperate and diversify your operations**

ILMASE

ILMASTONMUUTOS JA MAASEUTU

TYYNELÄ FARM:

The Tyynelä Farm in Joutseno cultivates a wide variety of field crops with agroecological methods and experiments with different methods, thus preparing for climate change in various ways. The farm rotates crops including cereals, oilseed crops and protein plants as well as perennial grasses. In addition, cover crops are sown for all annual plants. The soil structure is amended by means of soil improving fibres and deep loosening of grasslands for green manure leys. The farm aims at critical self-sufficiency as regards inputs and basic needs, and collaborates extensively with other farmers. It constantly develops its competences, and information is one of the farm's main products. It is disseminated through lectures, newspaper articles, and the farm's website at www.tyynelantila.fi.

The farmer in a buckwheat field. Photo: Arttu Muukkonen.

Author:
Juuso Joona, farmer, agronomist
Tyynelä Farm, Joutseno

This material has been produced in project "Climate Change and Countryside". More information on website www.ilmase.fi.
Brochure is funded by Finnish Ministry of Agriculture and Forestry.

Teksti ja kuvat: Juuso Joona. Etukannen kuva: Tapio Tuomela/Luken arkisto. Takakannen valokuva: Arttu Muukkonen. Graafinen suunnittelu: Dataseed Oy.