Farmer at his organically managed field

Organic agriculture (Slovenia)

Ekološko kmetijstvo

DESCRIPTION

It is based on 5 years crop rotation, full absence of artificial plant protection products and mineral nitrogen and the circulation of nitrogen via organic manure, crops and residues.

1.The technology is applied in the flatlands of Ljubljana with an average altitude of 350 m.a.s.l. The average annual precipitation is 1400 mm. The area is characterized with often stormy precipitation events and occasional droughts. Silty loam soils in the area are moderately deep to deep with medium soil organic matter. Area has good availability of surface water and groundwater of good drinking quality. Area has medium biodiversity without salinity and flooding problems. Sedentary agriculture with mixed or commercial agriculture is practiced with less than 10 percemt from off-farm activities. The examined farm household has an average wealth and is mechanized/motorized. The farm is run by middle aged and elderly mens. The farm household has good access to all services and infrastructure. Farm is of medium scale with land partly owned by the land users and partly leased from other private owners.

2. Main characteristics are
(1) full 5 year crop rotation
(2) at least 0.5 livestock units
(3) circulation of nitrogen via organic manure
(4) cycle of other nutrients closed as much as possible
(5) absence of artificial plant protection products and mineral nitrogen.
(6) nitrogen fixation leguminous in crop rotation
(7) production of local traditional species (buckwheat)

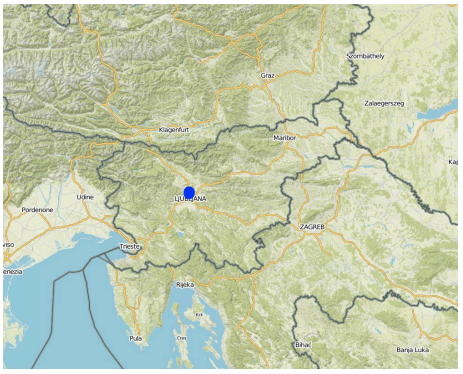
3. Purpose of the technology is to manage the land in a sustainable way with closed nutrient cycles and to increase the biodiversity. Organic matter increases organic matter and fertility of the soils. Reduced soil acidificatino, pollution, salinization and alkalinization. Reduced soil compaction, slaking and crusting of soils. Increased bio-productive function of soils. Increased vegetation cover, biomass and improves habitats with better quantity of species and its composition and diversity. The purpose is also to offer customers food of local and well known products without any use of chemically based plant protection.

4. Major activities:
(1) keeping of farm animals in stables for closing the N-balance
(2) a lot of further manual farm and cultivation work. Some of it is replaced by new machinery. This causes additional costs at the moment of establishment
(3) regular manual checking for pests, diseases.

5. Benefits are the closed N cycle and the CO2 sequestration - high organic matter content, lower loss of nutrients, higher biodiversity.

6. Farm users dislike lots of costs connected with the new machinery, lots of paper work for the certification, the pressure on productivity, a great deal of work with planning crop rotations and nutrient management, coping with pests and diseases. But they like the better price on the market.

LOCATION



Location: Municipality of Ljubljana, Slovenia

No. of Technology sites analysed: 2-10 sites

Geo-reference of selected sites
- 14.4955, 46.09757
- 14.49407, 46.10476
- 14.49573, 46.09389

Spread of the Technology: applied at specific points/ concentrated on a small area

In a permanently protected area?:

Date of implementation: 2008; less than 10 years ago (recently)

Type of introduction
- [x] through land users' innovation
- [ ] as part of a traditional system (> 50 years)
- [ ] during experiments/ research
- [ ] through projects/ external interventions
- [x] Common agricultural policy

Open stall for the dairy cows (Filip Čemažar)

Dairy cows (Matjaž Glavan)

CLASSIFICATION OF THE TECHNOLOGY

Main purpose

- [ ] improve production
- [x] reduce, prevent, restore land degradation
- [x] conserve ecosystem
- [ ] protect a watershed/ downstream areas – in combination with other Technologies
- [x] preserve/ improve biodiversity
- [ ] reduce risk of disasters
- [ ] adapt to climate change/ extremes and its impacts
- [ ] mitigate climate change and its impacts
- [x] create beneficial economic impact
- [x] create beneficial social impact

Land use

Land use mixed within the same land unit: No

Cropland

- Annual cropping: cereals - barley, cereals - maize, cereals - other, cereals - wheat (winter), fodder crops - alfalfa, legumes and pulses - peas, root/tuber crops - potatoes, vegetables - other, buckwheat

Number of growing seasons per year: 1

Grazing land

- Cut-and-carry/ zero grazing

Animal type: cattle - dairy
Products and services: milk

Water supply

- [x] rainfed
- [ ] mixed rainfed-irrigated
- [ ] full irrigation

Purpose related to land degradation

- [x] prevent land degradation
- [x] reduce land degradation
- [ ] restore/ rehabilitate severely degraded land
- [ ] adapt to land degradation
- [ ] not applicable

Degradation addressed

chemical soil deterioration - Cn: fertility decline and reduced organic matter content (not caused by erosion), Ca: acidification, Cp: soil pollution

physical soil deterioration - Pc: compaction, Pk: slaking and crusting, Pu: loss of bio-productive function due to other activities

biological degradation - Bc: reduction of vegetation cover, Bh: loss of habitats, Bq: quantity/ biomass decline, Bs: quality and species composition/ diversity decline, Bl: loss of soil life, Bp: increase of pests/ diseases, loss of predators

SLM group

- rotational systems (crop rotation, fallows, shifting cultivation)
- integrated soil fertility management
- integrated pest and disease management (incl. organic agriculture)

SLM measures

agronomic measures - A1: Vegetation/ soil cover, A2: Organic matter/ soil fertility

management measures - M2: Change of management/ intensity level

TECHNICAL DRAWING

Technical specifications

Infographic presents main activities taken place under organic farming technology (rotation, weed and pest control, animal welfare and use of organic fertilisers) . All of them finally result in benefits at the bottom of figure (local market, known origin of food, healthy food, food self-sufficiency).

Author: Matjaž Glavan

ESTABLISHMENT AND MAINTENANCE: ACTIVITIES, INPUTS AND COSTS

Calculation of inputs and costs

- Costs are calculated: per Technology area (size and area unit: **24 hectares**)
- Currency used for cost calculation: **EUR**
- Exchange rate (to USD): 1 USD = n.a EUR
- Average wage cost of hired labour per day: 50 EUR

Most important factors affecting the costs

Labour availability, price of organic plant protection products and fertilisers, price of the machinery

Establishment activities

1. Exclusion of artificial chemiclas (plant protection products) (Timing/ frequency: all year around)
2. Only organic N in use (Timing/ frequency: all year around)
3. 5 year rotation (Timing/ frequency: all year arround)
4. Winter cover crops (Timing/ frequency: in autumn, winter)
5. Working with papers, records (Timing/ frequency: all year around)
6. Animal stall reconstruction (Timing/ frequency: first year)
7. machinery (cultivator, grubber, harrows) (Timing/ frequency: first three years)
8. Plant protection preparations (for diseases and pests) (Timing/ frequency: First year)
9. Further cost for diverse supplement activities (50% more work) (Timing/ frequency: all year around)

Establishment inputs and costs (per 24 hectares)

Specify input	Unit	Quantity	Costs per Unit (EUR)	Total costs per input (EUR)	% of costs borne by land users
Labour					
Working with papers, records	hour	20.0	6.25	125.0	20.0
Further cost for diverse supplement activities	hour	700.0	6.25	4375.0	100.0
Equipment					
machinery (cultivator, grubber, harrows)	pcs	3.0	4000.0	12000.0	100.0
Fertilizers and biocides					
Copper preparations (diseases)	ml	100.0	0.2	20.0	100.0
Naturalis (potato, vegetable) (Beauveria bassiana)	ml	100.0	0.2	20.0	100.0
Neemezal (potato, vegetable)	ml	100.0	0.2	20.0	100.0
Construction material					
Animal stall reconstruction	pcs	1.0	60000.0	60000.0	100.0
Other					

Regular certifiaction control for organic production	pcs	1.0	400.0	400.0	
Total costs for establishment of the Technology				**76'960.0**	
Total costs for establishment of the Technology in USD				*76'960.0*	

Maintenance activities

1. Working with papers, records (Timing/ frequency: all year around)
2. Equipment maintenance (Timing/ frequency: all year around)
3. Only organic N in use (Timing/ frequency: all year around)
4. Winter cover crops (Timing/ frequency: autumn, winter)
5. 5 year rotation (Timing/ frequency: all year around)
6. Buying plant protection products (Timing/ frequency: all year around)
7. Further cost for diverse supplement activities (35% more work) (Timing/ frequency: all year aroud)

Maintenance inputs and costs (per 24 hectares)

Specify input	Unit	Quantity	Costs per Unit (EUR)	Total costs per input (EUR)	% of costs borne by land users
Labour					
Working with papers, records	hour	20.0	6.25	125.0	100.0
Further cost for diverse supplement activities	hour	490.0	6.25	3062.5	100.0
Equipment					
regular maintenance of machinery	hour	1.0	50.0	50.0	100.0
Fertilizers and biocides					
Copper preparations (diseases)	ml	100.0	0.2	20.0	100.0
Naturalis (potato, vegetable) (Beauveria bassiana)	ml	100.0	0.2	20.0	100.0
Neemazal (potato, vegetable)	ml	100.0	0.2	20.0	100.0
Other					
Regular certifiaction control for organic production	pcs	1.0	400.0	400.0	
Total costs for maintenance of the Technology				**3'697.5**	
Total costs for maintenance of the Technology in USD				*3'697.5*	

NATURAL ENVIRONMENT

Average annual rainfall

- [ ] < 250 mm
- [x] 251-500 mm
- [ ] 501-750 mm
- [ ] 751-1,000 mm
- [ ] 1,001-1,500 mm
- [ ] 1,501-2,000 mm
- [ ] 2,001-3,000 mm
- [ ] 3,001-4,000 mm
- [ ] > 4,000 mm

Agro-climatic zone

- [ ] humid
- [x] sub-humid
- [ ] semi-arid
- [ ] arid

Specifications on climate

Average annual rainfall in mm: 1352.0
Average annual period (1991-2000)
Majority of rainfall in autumn, followed by summer, spring and winter.
Name of the meteorological station: Ljubljana - Bežigrad
Strong summer tunder storms, showers, local precipitation.

Slope

- [x] flat (0-2%)
- [ ] gentle (3-5%)
- [ ] moderate (6-10%)
- [ ] rolling (11-15%)
- [ ] hilly (16-30%)
- [ ] steep (31-60%)
- [ ] very steep (>60%)

Landforms

- [ ] plateau/plains
- [ ] ridges
- [ ] mountain slopes
- [ ] hill slopes
- [ ] footslopes
- [x] valley floors

Altitude

- [ ] 0-100 m a.s.l.
- [x] 101-500 m a.s.l.
- [ ] 501-1,000 m a.s.l.
- [ ] 1,001-1,500 m a.s.l.
- [ ] 1,501-2,000 m a.s.l.
- [ ] 2,001-2,500 m a.s.l.
- [ ] 2,501-3,000 m a.s.l.
- [ ] 3,001-4,000 m a.s.l.
- [ ] > 4,000 m a.s.l.

Technology is applied in

- [ ] convex situations
- [ ] concave situations
- [x] not relevant

Soil depth

- [ ] very shallow (0-20 cm)
- [ ] shallow (21-50 cm)
- [x] moderately deep (51-80 cm)
- [ ] deep (81-120 cm)
- [ ] very deep (> 120 cm)

Soil texture (topsoil)

- [x] coarse/ light (sandy)
- [x] medium (loamy, silty)
- [ ] fine/ heavy (clay)

Soil texture (> 20 cm below surface)

- [x] coarse/ light (sandy)
- [ ] medium (loamy, silty)
- [ ] fine/ heavy (clay)

Topsoil organic matter content

- [ ] high (>3%)
- [x] medium (1-3%)
- [ ] low (<1%)

Groundwater table

- [ ] on surface
- [ ] < 5 m
- [x] 5-50 m
- [ ] > 50 m

Availability of surface water

- [ ] excess
- [x] good
- [ ] medium
- [ ] poor/ none

Water quality (untreated)

- [x] good drinking water
- [ ] poor drinking water (treatment required)
- [ ] for agricultural use only (irrigation)
- [ ] unusable

Water quality refers to:

Is salinity a problem?

- [ ] Yes
- [x] No

Occurrence of flooding

- [ ] Yes
- [x] No

Species diversity

- [ ] high
- [x] medium

Habitat diversity

- [ ] high
- [x] medium

- [ ] low
- [ ] low

CHARACTERISTICS OF LAND USERS APPLYING THE TECHNOLOGY

Market orientation
- [ ] subsistence (self-supply)
- [x] mixed (subsistence/ commercial)
- [ ] commercial/ market

Off-farm income
- [x] less than 10% of all income
- [ ] 10-50% of all income
- [ ] > 50% of all income

Relative level of wealth
- [ ] very poor
- [ ] poor
- [x] average
- [ ] rich
- [ ] very rich

Level of mechanization
- [ ] manual work
- [ ] animal traction
- [x] mechanized/ motorized

Sedentary or nomadic
- [x] Sedentary
- [ ] Semi-nomadic
- [ ] Nomadic

Individuals or groups
- [x] individual/ household
- [ ] groups/ community
- [ ] cooperative
- [ ] employee (company, government)

Gender
- [x] women
- [x] men

Age
- [ ] children
- [ ] youth
- [x] middle-aged
- [x] elderly

Area used per household
- [ ] < 0.5 ha
- [ ] 0.5-1 ha
- [ ] 1-2 ha
- [ ] 2-5 ha
- [x] 5-15 ha
- [ ] 15-50 ha
- [ ] 50-100 ha
- [ ] 100-500 ha
- [ ] 500-1,000 ha
- [ ] 1,000-10,000 ha
- [ ] > 10,000 ha

Scale
- [ ] small-scale
- [x] medium-scale
- [ ] large-scale

Land ownership
- [ ] state
- [ ] company
- [ ] communal/ village
- [ ] group
- [ ] individual, not titled
- [x] individual, titled

Land use rights
- [ ] open access (unorganized)
- [ ] communal (organized)
- [x] leased
- [x] individual

Water use rights
- [ ] open access (unorganized)
- [ ] communal (organized)
- [ ] leased
- [x] individual

Access to services and infrastructure

health	poor ✓ good
education	poor ✓ good
technical assistance	poor ✓ good
employment (e.g. off-farm)	poor ✓ good
markets	poor ✓ good
energy	poor ✓ good
roads and transport	poor ✓ good
drinking water and sanitation	poor ✓ good
financial services	poor ✓ good

IMPACTS

Socio-economic impacts

Crop production

decreased ✓ increased

Production in comparison with conventional production is lower by at least 20 percent. As chemical plant protection is not applied the production can not be raised. And the cows eat only fodder coming directly from farm production without buying concentraded feed.

crop quality

decreased ✓ increased

fodder production

decreased ✓ increased

They do not use mineral fertilizers. Thus, fodder quantity decreased slightly

fodder quality

decreased ✓ increased

animal production

decreased ✓ increased

Organic technology requires the dairy cows stall reconstruction. On the same area only half can be kept compared to the conventional dairy.

risk of production failure

increased ✓ decreased

Plant diseases or pests can develop very rapidly and if it can't be addressed in its early stage it can destroy the yield. Sometime it happens, when nothing succeeds.

product diversity

decreased ✓ increased

land management

hindered ✓ simplified

Farmer is saying that every technology has its pluses and minuses and on general he doesn't observe differences. It is never simple.

drinking water quality

decreased ✓ increased

expenses on agricultural inputs

increased ✓ decreased

The plant protection products and organic fertilisers and organic seeds are more expensive.

farm income

decreased — increased

Due to regular customers, the location near the capital city and good prices income increases for 50% . Three persons are fully employed.

diversity of income sources

decreased — increased

When they started with organic farming they started to produce dairy products (yogurt, cheese), flour and bread and vegetable. Before they produced only raw milk.

workload

increased — decreased

A lot of hand/manual work in the field or at production of dairy product or bread.

Socio-cultural impacts

food security/ self-sufficiency: reduced — improved

health situation: worsened — improved

Ecological impacts

water quality: decreased — increased

soil accumulation: decreased — increased

soil organic matter/ below ground C: decreased — increased

plant diversity: decreased — increased

beneficial species (predators, earthworms, pollinators): decreased — increased

habitat diversity: decreased — increased

pest/ disease control: decreased — increased

drought impacts: increased — decreased

emission of carbon and greenhouse gases: increased — decreased

Off-site impacts

groundwater/ river pollution: increased — reduced

COST-BENEFIT ANALYSIS

Benefits compared with establishment costs

Short-term returns: very negative — very positive

Long-term returns: very negative — very positive

Benefits compared with maintenance costs

Short-term returns: very negative — very positive

Long-term returns: very negative — very positive

It is important that land user is engaged on market with self-promotion and good quality of product.

CLIMATE CHANGE

Gradual climate change

annual temperature increase: not well at all — very well — Answer: not known

seasonal temperature increase: not well at all — very well — Season: summer Answer: not known

ADOPTION AND ADAPTATION

Percentage of land users in the area who have adopted the Technology

- [x] single cases/ experimental
- [ ] 1-10%
- [ ] 11-50%
- [ ] > 50%

Of all those who have adopted the Technology, how many have done so without receiving material incentives?

- [ ] 0-10%
- [ ] 11-50%
- [ ] 51-90%
- [x] 91-100%

Has the Technology been modified recently to adapt to changing conditions?

- [ ] Yes
- [x] No

To which changing conditions?

- [ ] climatic change/ extremes
- [ ] changing markets
- [ ] labour availability (e.g. due to migration)

CONCLUSIONS AND LESSONS LEARNT

Strengths: land user's view

- Lower use of plant protection products - less impact on bidiversity and water sources.
- Quality of products.
- Demand over organic food on the market is high, Farm is close (1 km) to capital city market.

Strengths: compiler's or other key resource person's view

- Food produced without chemicals is of better quality and more interesting for the market.

Weaknesses/ disadvantages/ risks: land user's viewhow to overcome

- Working force, especialy in vegetable production New machinery, rotation
- Shortage of nitrogen fabaceae (legumes) as part of crop rotation

Weaknesses/ disadvantages/ risks: compiler's or other key resource person's viewhow to overcome

- A lot of work force and expensive specialized machinery needed. This is part of this technology. This can be overcome with higher prices of products.

REFERENCES

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Editors

Reviewer
Ursula Gaemperli
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Resource persons
Matjaz Glavan - land user

Full description in the WOCAT database
https://qcat.wocat.net/en/wocat/technologies/view/technologies_2795/

Linked SLM data
n.a.

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