Organic potato farming for industry

Author(s):
Reust, Werner; Hebeisen, Thomas

Publication Date:
2001

Permanent Link:
https://doi.org/10.3929/ethz-a-004283048

Rights / License:
In Copyright - Non-Commercial Use Permitted
Organic potato farming for industry

2nd European Potato Processing Conference
November 14 - 16, 2001 Lausanne, Switzerland

Werner Reust
Swiss Federal Research Station for Plant Production, Changins,
Case postale 254, CH-1260 Nyon 1
www.changins.ch
werner.reust@rac.admin.ch

Thomas Hebeisen
Swiss Federal Research Station for Agroecology and Agriculture,
Postfach 412, CH-8046 Zürich
www.reckenholz.ch
thomas.hebeisen@fal.admin.ch
Historic of organic production

♦ 1924 Rudolf Steiner developed the organic-dynamic farming and anthroposophy

♦ 1940 Dr Hans Müller and H.-P. Rusch founded (biologisch-organischen Landbau) organic farming

♦ 1946 Foundation of SGBL, Swiss society for organic production / Bioterra

♦ 1954 Registration DEMETER brand (trademark)

♦ 1974 Foundation of the Research Institute for organic farming in Oberwil (today Frick), Switzerland

♦ 1976 First conference of IFOAM - International Federation of Organic Agriculture Movements - in Ebenrain, Switzerland

♦ 1983 EU-order 2092/91 concerning organic farming came into force

♦ 1987 Swiss organic-order came into force

♦ 1999 Third conference of IFOAM in Basel
Reasons for organic farming

♦ General: not exclusively materialistic and scientifical based farming

♦ Ecology: maintain of natural resources, sustainabilaty and protection of environment
- soil protection and fertility
- species adapted cattle rearing and feeding
- alternatives in animal medicine

♦ Economy: market's demand
- economical alternatives for farmers
- political economy, favourable farming system (no overproduction and less environmental pollution)

♦ Politics: reduce of dependency on industrial companies

♦ Nutritional-physiology: high nutritive value of the product
What does organic farming mean?

♦ Moderate use of resources
♦ As closed fertilisation cycle as possible
♦ A high rate of ecological compensation areas
♦ **Maintain and increase of soil fertility**
♦ Prevention in spite of direct plant protection
♦ Species adapted cattle rearing
♦ Production and maintain of quality
♦ No GMO’s
♦ **Behaviour in the consumers’ interest**
♦ High value production
♦ Farming with future
♦ **Use of market niches as the following labels or brands in Switzerland: the Bud, Demeter and Migros Bio**

(FiBL, 2001)
Swiss labels or brands of organic farming
Organic production

The area devoted to organic farming is now approaching 5% across Europe and is predicted to reach 10% by 2007.

In Sweden, Germany, Denmark, Austria and Switzerland a 10% figure has already (or will soon) been reached.

The EU organic retail market reaches about 2% of the total food market.

(The Irish Agriculture and Food Development Authority)
Agricultural Policy in Switzerland

Article 104 of the Swiss Constitution:
The Confederation shall ensure that agriculture contributes substantially by way of sustainable and market-oriented production:

♦ to secure the supply of food for the population;
♦ to the conservation of national resources and the upkeep of rural landscapes;
♦ to a decentralised settlement of the country;

♦ It shall promote, by way of economic incentives, forms of production which are particularly close to nature and friendly to the environment and animals.

♦ It shall complement agricultural revenues by direct payments, to secure a fair and adequate remuneration for the services rendered, provided that compliance with ecological requirements is proven.
Agricultural Policy in Switzerland

Ecological requirements for direct payments:

♦ Animals kept under animal-friendly conditions

♦ Equitable use of fertilisers

♦ Suitable proportion of ecological compensation areas

♦ Regular crop rotation

♦ Suitable soil protection

♦ Selection and targeted use of chemicals on plants
## Development of organic farming in Switzerland

<table>
<thead>
<tr>
<th></th>
<th>1993</th>
<th>2001*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of farms</td>
<td>1'228</td>
<td>5'852</td>
</tr>
<tr>
<td>Part of all farms (%)</td>
<td>1.8</td>
<td>~ 9.5</td>
</tr>
<tr>
<td>Surface (ha)</td>
<td>28'908</td>
<td>~ 95'000</td>
</tr>
<tr>
<td>Part of surface (%)</td>
<td>1.8</td>
<td>~ 9</td>
</tr>
</tbody>
</table>

*FiBL*
The principle aims of organic production and processing

- Produce food of high quality
- Interact in a constructive and life-enhancing way with natural systems and cycles
- Encourage and enhance biological cycles within the farming system
- Maintain and increase long-term fertility of soils
- Maintain the genetic diversity of the production system and its surroundings
- Promote healthy use and proper care of water
- Create a harmonious balance between crop production and animal husbandry
- Minimise all forms of pollution
- Process organic products using renewable resources

IFOAM Basic Standards
Potato production

The potato is a traditional and important crop of organic farming.

It is a useful previous crop (soil structure, no tillage) with high fertilisation requirements.

The crop needs expensive mechanisation costs and much handwork, but it brings high income (cash crop).

However, organic farming needs very resistant cultivars to fungi and other pests.
Choice of varieties

Varieties should have a high resistance to late blight and other pests and diseases. Late blight caused by *Phytophthora infestans* is the most serious disease in potatoes. And organic farmers have no effective alternatives to copper.

Genetic diversity should be taken into consideration. The requested qualities for the different kind of utilisation are also very important.

Two very high resistant cultivars against late blight have been introduced in the Swiss recommended variety list 2001 and 2002.

**APPELL**

**NATURELLA**
Seed

Seed should be produced in an organic farm and certified. When certified organic seed and plant materials are not available, chemically untreated conventional seed tubers shall be used.

The use of genetically engineered seeds is not allowed.
Crop rotation

Crop rotation should be well balanced with at least a three year break between two potato crops.

Soil coverage should be appropriate for as much of the year as possible with diverse plant species. Favourable preceding crops are:

- 1-2 year meadow
- cereals followed with a green crop
- leguminous plant
Fertilisation

The fertilisation requirements of the crop must be correctly estimated in accordance with expected tuber yield.

The management should minimise nutrient losses. Solid and liquid manure are appropriate. Mineral fertilisers shall only be used in a supplementary role to carbon based material.

Manure

- Composted (rotted)
- Uncomposted
Weed control

Weed cure should be managed by a number of preventive cultural techniques which limit their development. Shallow soil tillage before planting favours germination of weed seeds. Thermic weed control is permitted.
Healthy certified seed tubers with an optimal growth vigour (presprouted seed) should be used to promote a rapid emergence and therefore less disease attacks like black scurf. This should also favour early tuberisation and crop maturity.
Late blight

*Phytophthora infestans* is one of the most severe potato disease and causes enormous losses. The projected banning of copper in organic farming may considerably increase the blight risk. Production of blight resistant cultivars becomes more and more important.
Late blight

Adapted decision support system as PhytoPré in Switzerland

Late blight epidemics in Switzerland from 1990, 1997-2001, assessed in small, untreated control plots, distributed over the production area

Forrer & Steenblock, FAL
Development of new tools for blight prognosis

- Germany
  - Simphyt I // III
  - blight model of Weihenstephan
  - ProPlant
- Netherlands
  - ProPhy
  - Plant PLUS
  - “don’t call us, we call you”
- France
  - gunz-divoux
  - milsol
- UK
  - Blightwatch
- Denmark
  - negfry
  - web-blight
- Italy
  - IPI
- Switzerland
  - PhytoPRE
Late blight susceptibility of new processing varieties
(experimental period 1999, untreated)

Late blight
Phytophthora infestans

Late blight susceptibility of new processing varieties
(experimental period 1999, untreated)

Day of the year

Blight infection (note)

Fontane
L. Olympia
Erntestolz
Sempra
Innovator

Graph showing the progression of blight infection over the year for different varieties.
Colorado potato beetle

Colorado beetle occurs in most European countries and economical damages are observed from 10 larvae per plant or 20% defoliation. The most effective control is possible with *Bacillus thuringiensis* spraying on very young larvae. The mechanical technique of beetle collection is a non selective method and therefore not recommended.
Haulm destruction

No chemical haulm destruction is allowed, mechanical methods are preferred to thermic methods (100 kg propane gas/ha) considering their more favourable life cycle assessment (LCA).
Soil tillage after harvest

Only surface tillage and no ploughing is recommended after potato harvest (for limitation of volunteer plant). If harvesting is carried out before the end of August, a green crop has to be installed before the next Spring crop.
Storage of the tubers

Long-time storage at 8°C for processing is only possible with a natural sprout inhibitor as for example Carvone as active ingredient.

Varieties with long dormancy can be stored without any sprout inhibitor during several months (depending on site and growing conditions).

Organic potatoes have to be stored separately and clearly identified to assure an unbiased traceability of all the steps during the production process.
Total yield of different cropping systems
D = organic-dynamic, O = organic, K = integrated farming

DOK - long-term field experiment for the comparison of 3 farming systems and different cropping rotations - marketable yield of potatoes
(Mean values of three potato crops per period, var. Ostara, Désirée)
Cold storage tolerant cultivars and crisp colour

Crisp-colour of different varieties in relation to storage temperature
(mean values over 4 years experimentation, 3 locations and 3 processing dates per year)
Storage temperatures and crisp colour for different cultivars
Crisp for the future?

Blue Chips
Bibliography


www.greenmount.ac.uk/organic/potato.htm
www.potatonews.com/directory/organic.htm
www.fibl.ch
www.ifoam.org
www.phytopre.ch