Farming practices and yield variation of buckwheat in Finland

Buckwheat in Europe; History, Culture, Gastronomy and Nutrition.

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Buckwheat as part of slash-and-burn cropping system (1)

- Slash-and-burn cultivation was a common technique in Finland before the end of the 19th century.

- The idea was to destroy the trees from a suitable type of forest to make some kind of field for crop production.

- The threes were cut down and the above ground materials were burned.

- The crops were sown to the soil/ash either on the same year or next year.

- The area was used for cultivation 2 – 8 years, and was thereafter left for reforestation (15 – 30 years, or more)
Buckwheat as part of slash-and-burn cropping system (2)

Eero Järnefelt
1863 – 1937

‘Raatajat rahanalaiset’
‘Farmworkers’
(1893)
Buckwheat as part of slash-and-burn cropping system (3)

- A common crop rotation was:
- Year 1-2: rye (*Secale cereale*)
- Year 3: barley (*Hordeum vulgare*)
- Year 4-5: oat (*Avena Sativa*)
- Year 6-7: **buckwheat** (*Fagopyrum esculentum*) or turnip (*Brassica rapa*)

Eero Järnefelt, ’Raatajat rahanalaiset’ (1893)
The area of slash-and-burn cultivation in Finland before the end of 19th century

Possible area where buckwheat was included to the slash-and-burn cultivation system

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Buckwheat pollen grain found from the lake sediment, dated to 4200 – 5200 B.C.


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The major problems of buckwheat production in Finland

- Yield variation between years, from 0 to 2500 kg/ha.
- Empty seeds, even in fields which ’looks’ good.
- No tolerancy against frost.
What we have studied (1)

• **Importance of pollinators**
  
  -> More pollinators were observed on buckwheat flowers of high yielding varieties compared to low yielding ones
  
  -> Flying pollinators may increase the yield by 30 %.

• **Sowing methods**
  
  -> Direct sowing is a possible method in soils containing high amounts of organic matter.
  
  -> Untilled soils have better moisture conditions, especially in dry seasons, may increase the yields by 75 %.

• **Varieties** (4 variety tests 2003 – 2012, totally> 25 varieties tested)
  
  -> Right variety may increase the yield by 100 %
What we have studied (2)

- **Importance of nutrients**
  - Nitrogen fertilization depends on the soil organic matter content
  - The amount of mobilizing nitrogen from the soil may be 40 – 60 kg/ha
  - K, P, Mg, Cl, pH and seed yield?
- Buckwheat is able to utilise nutrients effectively from the soil.

- **Seed rate**
  - The seed rate between 35 – 75 kg/ha did not affect much to the yield
What we have studied (3)

- **Structure of the farms, crop rotation practices, number of farms, etc.**
- -> Field parcel and farm statistics, collected by MAVI (Agency for Rural Affairs) and TIKE (Information Centre of the Ministry of Agriculture and Forestry, after 1.1.2015 Natural Resources Institute Finland, Luke)


Current cultivation areas of buckwheat

www.luke.fi/tilastot

Major cultivating areas

Previous cultivating area
Growing season starts (Daily mean temp > + 5C):
Between 27.4 – 2.5

The effective temperature sum (>+5C) of the growing season: 1100 C

Current cultivation areas of buckwheat
www.luke.fi/tilastot

Major cultivating areas

HELSTINKI

Temperature sum > 1400 C)

Growing season starts before 22.4

Previous cultivating area
Minimum Temperatures (°C)

1 < -46
2 -45,5 – -40,1
3 -40 – -34,5
4 -34,4 – -28,9
5 – 28,8 – -23
6 – 23,3 – -17
7 – 17,7 – -12
8 – 12,2 – -6,7
9 - 6,8 – 1,2
10 1,1 – 4,4
11 > 4,4

Latitudes suitable for buckwheat cultivation

Keskitalo, M. 2015
**Fig 1.** Cultivation areas (ha) of buckwheat in Finland 1920 – 2015 ([www.luke.fi/statistics](http://www.luke.fi/statistics)).
Fig 1. **Cultivation areas (ha)** of buckwheat and the **number buckwheat farms** in Finland 1920 – 2015 ([www.luke.fi/statistics.](http://www.luke.fi/statistics))
Fig 2. The average size of the farm (ha) cultivating buckwheat or spring wheat in Finland in 1995 – 2011 (www.luke.fi/statistics).
Fig 3. The average cultivation area (ha) of buckwheat or spring wheat at a farm in Finland in 1995 – 2011 (www.luke.fi/statistics).
Crop rotation practices of buckwheat

MAVI - Agency for Rural Affairs & TIKE-Information Centre of the Ministry of Agriculture and Forestry & Luke - Natural Resources Institute Finland, Statistics

<table>
<thead>
<tr>
<th>CROP</th>
<th>% of the buckwheat area</th>
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<tbody>
<tr>
<td>Buckwheat</td>
<td>38.7</td>
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<tr>
<td>Oat</td>
<td>10.5</td>
</tr>
<tr>
<td>Hay</td>
<td>7.8</td>
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<tr>
<td>Spring rapeseed</td>
<td>5.2</td>
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<tr>
<td>Barley (for feed)</td>
<td>4.4</td>
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<td>Green manure</td>
<td>4.4</td>
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<td>Spring wheat</td>
<td>3.8</td>
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<tr>
<td>Caraway</td>
<td>3.7</td>
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<tr>
<td>Barley (for malt)</td>
<td>3.3</td>
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<tr>
<td>Natural management field</td>
<td>2.0</td>
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<tr>
<td>Spring rapeseed</td>
<td>5.1</td>
</tr>
<tr>
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<td>4.9</td>
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<tr>
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<tr>
<td>Hay</td>
<td>2.1</td>
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<tr>
<td>Faba bean</td>
<td>1.9</td>
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In a rainy season (2015) buckwheat is not growing well.
In a moderate warm season buckwheat grows very well
Acknowledgements

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Thank you!