Direct seeding machine at work (Thomas Streit (Zimmerwald, Switzerland))

Direct seeding ( )

Direktsaat (German)

A cropping system which allows to plant the seeds directly into the soil without ploughing. The soil is covered with plant remainders.

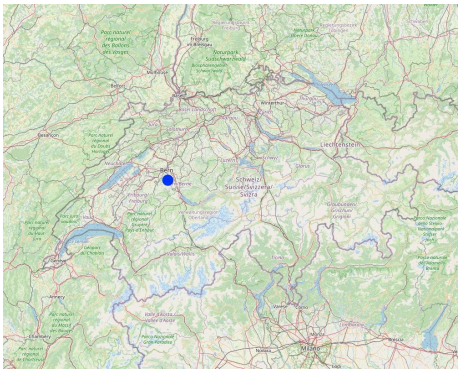
The farm portaited is located in a hilly area near Bern. It is cooperating with an other farm of the village so that in total 32 ha of arable land are cultivated. All crops except for potatoes and sugar beets are produced within the no-tillage system. So the area cultivated with the no-tillage system is about 26 ha. The farm is producing mainly fodder (maize, wheat) for pigs. Beside this potatoes and sugar beets are produced to be sold. A typical crop rotation consists of a root crop, followed by a winter grain and a green manure. There are major meadows, too.

No-tillage characterizes a cultivation system without ploughing or any other reworking of the soil. After the previous crop (Maize, grain) has been harvested, a total herbicide is applied and the seeds are brought directly into the soil with a special machine. A metal disk carves a narrow slit into the surface. Then the seeds are brought into the soil pneumatically. Finally, the slit is closed again by two wheels pressing on the surface.

The no-tillage system is used to reduce soil degradation, especially erosion. It enables a permanent cover of the soil surface, which reduces sealing and crusting. Since they are not disturbed by ploughing anymore, there are more earthworms in the soil. Their activity can slowly reduce compaction and improve the soil structure. This leads to better infiltration rates and also to a higher water storage capacity. Less water remains on the soil surface, so soil loss can be reduced.

The no-tillage system requires a special direct seeding machine. This machine is very expensive, so most farmers don't buy it on their own but task a contractor with the seeding. On the other hand, certain machines from conventional agriculture are not needed anymore (plough, harrow, rotary tiller etc.). Furthermore, working hours and fuel can be saved. In some cantons of switzerland no-tillage agriculture is also subsidised. For this reason, the method holds economic advantages, too.

In the beginning crop yield may be reduced by up to 10%. The rebuilding of the soil structure requires a certain time, depending on the state of the soil at the time of transition. However, this was not the case for the farm portaited here: Already in the first year there were very good crop yields, although the probability for crop loss is higher in the no-tillage system. Competition between the crops and weeds can be too strong if the total herbicide is applied under wet conditions. In addition drying of the soil in spring is often delayed. Thus the plants may face too wet conditions.



: Kanton Bern, Gemeinde Wald,

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- 7.4667, 46.8667

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: 10-50

(> 50)

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Direct seeding machine (Thomas Streit (Zimmerwald, Switzerland))

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SLM

SLM

Swiss Franc
( ) 1 USD = 1.08 Swiss Franc

The most important factor is whether a direct seeding machine can be rented in locally, because this represents a major investment.

1. Buy a direct seeding machine (/ : None)

			(Swiss Franc)	(Swiss Franc)	%
Direct seeding machine	Machine	1,0	278000,0	278000,0	100,0
				278'000.0	
				257'407.41	

1. Appliance of total herbicide (glyphosat) (/ : 1 per growing period)
2. Seeding (/ : 1 per growing period)
3. spreading of snail poison (/ : 1-3 per growing period)

			(Swiss Franc)	(Swiss Franc)	%
Seeding	ha	1,0	185,0	185,0	100,0
Spreading of snail poison	ha	1,0	46,0	46,0	100,0
Biocides	ha	1,0	56,0	56,0	100,0
Appliance of herbicide	ha	1,0	93,0	93,0	100,0
				380.0	
				351.85	

< 250
251-500
501-750
751-1,000
✓ 1,001-1,500
1,501-2,000
2,001-3,000
3,001-4,000
> 4,000

✓

precipitation during the whole year. The maximum lies in summer.
Thermal climate class: temperate

(0-2%)
(3-5%)
✓ (6-10%)
✓ (11-15%)
(16-30%)
(31-60%)
(>60%)

✓

0-100
101-500
✓ 501-1,000
1,001-1,500
1,501-2,000
2,001-2,500
2,501-3,000
3,001-4,000
> 4,000

(0-20)
✓ (21-50)
✓ (51-80)
(81-120)
(> 120)

( )
/ ( )
✓ (,)
/ ( )

(> 20)
/ ( )
(,)
/ ( )

✓ (>3%)
✓ (1-3%)
(<1%)

< 5
✓ 5-50
> 50

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( )
/

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/
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SLM

10%
10-50%
50%

< 0.5
0.5-1
1-2
2-5
5-15
15-50
50-100
100-500
500-1,000
1,000-10,000
> 10,000

not in general, but can occur in the beginning

reduced risk for production failure due to erosion but the technology is sensitive to wet conditions in spring. Risk of crop failure due to snails is enhanced

no reworking of the soil but major initial investment if no direct seeding machine is available for rent.

due to reduced expenses

no reworking of the soil

ploughing is a major part of rural identity. Farmer become more dependent on others if work is outsourced to contractors.

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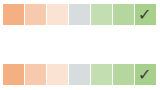
Hazard towards adverse events

reduced improved

better soil cover leads to higher tolerance against intense rain. Increased soil moisture leads to higher tolerance against droughts



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erosion is almost negligible

In this case study, the farmer bought a direct seeding machine on his own. This is why short-term returns are negative.

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/
1-10%
11-50%
> 50%

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0-10%
11-50%
51-90%
91-100%

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?

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- Soil erosion is greatly reduced.

  How can they be sustained / enhanced? For crops which are not tolerant to direct seeding, other soil conservation techniques should be applied.
- The risk of soil compaction is reduced.

/ / :

- Direct seeding machines are very expensive and the second hand market is not well developed yet. Contractors can be tasked with the seeding or the investments can be shared.
- The risk of crop failure is enhanced. Very good planning of crop rotation. The date of sowings should be chosen carefully. Crops should be checked for snails regularly.

How can they be sustained / enhanced? Heavy machinery should only be used under dry conditions.

- Soil structure is improved due to more earthworms.

  How can they be sustained / enhanced? Enough organic material needs to be available.
- Working hours and fuel consumption is highly reduced, since no reworking of the soil is needed anymore.

  How can they be sustained / enhanced? The time saved should be used to enhance production.

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/ / :

- Worldwide application of glyphosate could possibly lead to resistant weeds. With an adequate crop rotation and good timing of the worksteps glyphosate is not needed sometimes.
- The public is very sensitive towards the application of chemical substances. In contrast, the broader public is not familiar with the advantages of conservation agriculture. Scientific knowledge should be adressed to a broader public.

Editors

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https://qcat.wocat.net/km/wocat/technologies/view/technologies_1007/

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Approaches: Subsidies for conservation agriculture https://qcat.wocat.net/km/wocat/approaches/view/approaches_2632/
Approaches: Soil support program for conservation agriculture https://qcat.wocat.net/km/wocat/approaches/view/approaches_2525/
Approaches: Direktzahlungssystem https://qcat.wocat.net/km/wocat/approaches/view/approaches_2601/
Approaches: Förderprogramm Boden https://qcat.wocat.net/km/wocat/approaches/view/approaches_2527/

- CDE Centre for Development and Environment (CDE Centre for Development and Environment) -
- OPtimal strategies to retAIN and re-use water and nutrients in small agricultural catchments across different soil-climatic regions in Europe (OPTAIN)

- Wirz Handbuch. Betrieb und Familie. Für das landwirtschaftliche Unternehmen. LBL Lindau. 112 Jahrgang. Wirz Verlag Basel.2006.: Tel: +41 61 264 64 50CHF 22.-
- Sturny et al. Direktsaat und Pflug im Systemvergleich – Eine Synthese. AGRARForschung 14 (8): 332-337. 2007.: http://www.vol.be.ch/site/lanat-3155-syntheseartikel.pdf