SWISS FUTURE FARM

Annual Report 2025

AGCO
Your Agriculture Company

arenenberg

GVS Agrar

The Farm

Farm size

81 ha agricultural land
55 ha arable crops
20 ha permanent grassland
6 ha biodiversity area

Dairy barn

Cattle herd Tänikon:
65 dairy cows
2/3 Brown Swiss, 1/3 Red Holstein and Holstein Frisian

Cow husbandry:
The farm makes the trial barns available for trials by Agroscope and the Swiss Future Farm.

Two sites with dairy cattle barns: Emission research barn Waldegg & dairy barn Tänikon
Cows are milked with an automatic milking system (milking robot)
Free stall barn with permanently accessible outdoor paddock

Calf rearing:
Individual housing in igloos
Milk for free disposal
Rearing calves leave the farm after 3 weeks and spend the time until 4 weeks before the first calving on two partnership farms and on the alpine pasture

Pigpen

120 fattening pigs

The Aim

The Swiss Future Farm makes modern Precision Farming technologies for sustainable and competitive agriculture visible, tangible and understandable:

- Highlight the benefits and opportunities of digitalization, connectivity, data acquisition and documentation, and as a decision-making aid in everyday life.
- Demonstrate how Smart Farming technologies can be used to redesign farming processes and thus significantly improve Sustainability (ecological and economic) of food production.
- Support and implement research and development activities of the partners as well as Agroscope and other third parties.
- Set an example in the innovative interaction between companies in the agricultural sector and public research, education and advisory services.
- Permanent experimental farm with visiting opportunities and further training opportunities for employees as well as knowledge transfer to farmers, the public and other stakeholders. To establish Tänikon as an agricultural meeting point.
- Continuously implement innovations and developments in production processes on a farm. The Swiss Future Farm offers a platform for the use and testing of new technologies. In order to continuously stay up to date, Swiss Future Farm conducts targeted re-search on new solutions (Innovation Survey and Scouting) and integrates them into operational processes.

The Partners

AGCO International GmbH

Leading manufacturer of high-tech solutions for farmers. Brands: Fendt, Valtra, Massey Ferguson, Precision Planting.

Arenenberg

Agricultural education and extension center of the Canton of Thurgau with three school and experimental farms.

GVS Agrar AG

Market-leading importer of agricultural machinery in Switzerland. Import, sales and service for all AGCO brands.

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1 Field Trials

1.1 Effective Microorganisms, Biostimulants, and Water Application at planting in Sugar Beets

STUDY CONTACT:

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BACKGROUND:

The use of biostimulants and effective microorganism (EM) products have been increasingly promoted as part of sustainable agricultural practices. Liquid biostimulant products include natural compounds such as seaweed extracts and humic acids, but do not represent conventional fertilizers, instead they are intended to trigger beneficial plant responses for biomass accumulation and stress response. Effective microorganisms are mixtures of beneficial bacteria, microbes, and yeast that stimulate biological activity in soils to benefit plant growth by improved nutrient cycling. As the main difference, fertilizers are supplying essential macro- and micronutrients (e.g., nitrogen, phosphorus, potassium, manganese, zinc) to enable plant nutrition, whereas biostimulants stimulate the plant's internal metabolic processes, which in a complementary application during the crop cycle shall contribute to improved crop growth and yield and higher abiotic stress resistance (e.g., drought, heat, salinity). PTx Precision Planting equipment can apply such products precisely as liquid application. However, growers are lacking information on yield impact and profitability when applying these products at planting.

OBJECTIVE:

The objective of this study was to investigate the impact of water, biostimulants, and effective microorganism applications at planting on beet yield and sugar content, and the resulting sugar yield. The underlying hypothesis was that water application improves seed-to-soil contact, resulting in faster and more uniform field emergence, and that biostimulants improve chlorophyll production and biomass accumulation, and effective microorganisms may improve nutrient cycling to enable yield increase.

STUDY DESIGN:

The trial was carried out at the Swiss Future Farm in 2025 as a side-by-side strip trial with three replications per treatment. Water application (100 l/ha), biostimulant product application (Timac Agro Irys 7-9-13, 5 l/ha, applied with 95 l/ha water), and effective microorganisms application at planting (Dr- Higa's Original Boden-FIT, 200 l/ha) was applied in the seed furrow on top of the placed seed by using the Precision Planting Keeton with FlowSense system in a comparative trial with no liquid application as the control treatment in a Strip-Till tillage regime. The date of planting was April 4. Weed control was done in a hybrid approach with a combination of band spraying and mechanical weeding in all trial strips. The treatments compared are shown in Table 1.

Table 1. Treatments of the Biostimulant and Water Application Study in sugar beets.

Trial Strip	Liquid application
1	Control (no liquid application)
2	Water application (100 l/ha)
3	Biostimulant Timac Agro Irys 7-9-13 (5 l/ha), applied with water (95 l/ha)
4	Effective microorganisms Higa Boden-FIT (200 l/ha)

RESULTS:

The trial was harvested on October 17, 2025. The average beet yield across all treatments was 89.3 t/ha (Figure 1).

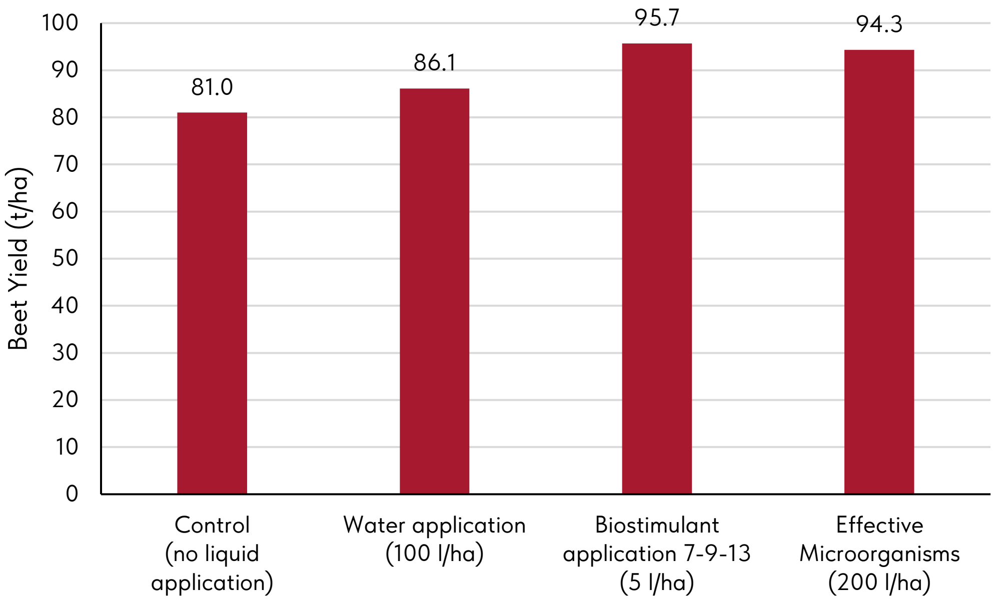

Figure 1. Beet yield results of Effective Microorganisms, Biostimulant and Water Application Study in sugar beets.

A detailed results comparison is contained in Table 2. These results show that all liquid application treatments at planting resulted in significant beet and sugar yield increases, whereas sugar content was lower. So, the increase in sugar yield per hectare is majorly resulting from the increase in beet yield (biomass), while differences in sugar content had a minor influence between the treatments of this study.

Table 2. Results overview of the Effective Microorganisms, Biostimulant and Water Application Study in sugar beets.

	Control (no liquid application)	Water application (100 l/ha)	Biostimulant application 7-9-13 (5 l/ha)	Effective Microorganisms (200 l/ha)
Beet yield (t/ha)	**81.0**	**86.1**	**95.7**	**94.3**
Difference to control (%)	0	6.3	18.2	16.4
Sugar content (%)	**15.6**	**14.6**	**15.2**	**14.9**
Difference to control (%)	0	-1.0	-0.4	-0.7
Sugar yield (t/ha)	**10.9**	**10.9**	**12.5**	**12.0**
Difference to control (%)	0	0	14.7	10.1

ADDITIONAL OBSERVATIONS:

Results of crop measurements in mid May (42 days after planting) showed a high emergence rate of ≥90% for all treatments, being lowest for the Control treatment with no liquid application (90%), highest for water application (95%), biostimulant and effective microorganisms application both with 92% field emergence. The growth stage and crop canopy development was equal across treatments (20% reached 4-leaves stage). The water application treatment showed a noticeably lower share of beets in 4-leaves stage (17%), this being a result of inconsistent (deeper) planting depth due to recurrent adjustment of planter downforce being required in this part of the field, where otherwise the share of further developed beets might have been similar to the other treatments (Figure 2). Noticeably, sugar beets planted with biostimulant product containing macronutrients (nitrogen, phosphorus, potassium) had a faster early season growth than all other treatments, as indicated by the higher share of beets further developed than 6-leaves stage.

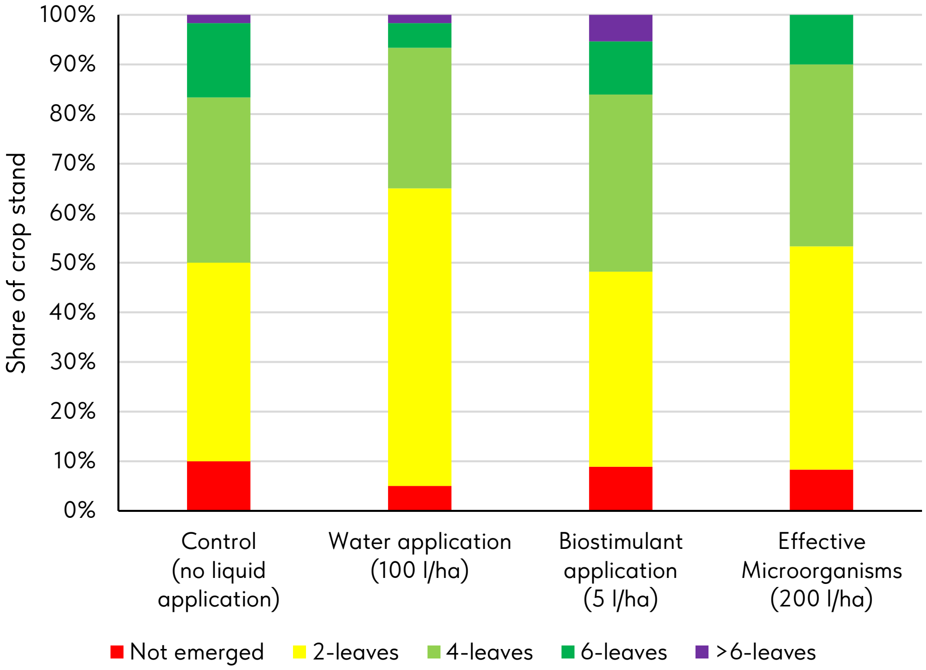

Figure 2. Crop measurements result for emergence and growth stage (average of 6 x 2 meters row length per treatment) obtained 16th May 2025 (42 days after planting).

FINANCIALS:

Table 3 shows a comparison of the financial results. Revenue is based on paid out sugar beet price as an index of beet yield, soil contamination, sugar content and extractability according to lab analysis after delivery to sugar factory. Operating costs include all machine, labor, and input costs including the purchase price of the effective microorganisms (2.73 CHF/l = 546 CHF/ha) and biostimulant product (25.70 CHF/l = 128.50 CHF/ha) and water costs (0.002 CHF/l = 0.20 CHF/ha). Results show that the increase in gross margin was higher for all liquid applications and with an increase of up to 773 CHF/ha (biostimulant application) in comparison to the control treatment without liquid application. Including subsidies, which are comprised of crop-specific direct payments for sugar beets (2100 CHF/ha) and bonus payments for reduced tillage (250 CHF/ha) for all treatments, the highest gross margin was obtained for Biostimulant application, followed by effective microorganisms and water application**Figure 1**.

Table 3. Financial results of the Effective Microorganisms, Biostimulant and Water Application Study in sugar beets.

	Control (no liquid application)	Water application (100 l/ha)	Biostimulant application 7-9-13 (5 l/ha)	Effective Microorganisms (200 l/ha)
Revenue (CHF/ha)	4941	5136	5843	5699
Operating Costs (CHF/ha)	3794	3794	3922	4340
Gross Margin (CHF/ha)	1147	1342	1920	1360
Gross Margin + Subsidies (CHF/ha)	3747	3942	4520	3960

CONCLUSIONS:

- Effective microorganisms, biostimulant and water applications at planting have shown to be a promising approach to improve yields in sugar beet production.
- Water application at planting enabled the increase of beet yield (6%) but no sugar yield increase due to lower sugar content in comparison to the control treatment with standard planting.
- Biostimulant application at planting enabled the increase of beet yield (18%), and sugar yield (15%), but lower sugar content in comparison to the control treatment with standard planting.
- Effective microorganisms application at planting enabled the increase of beet yield (16%) and sugar yield (10%), but lower sugar content in comparison to the control treatment with standard planting.
- Water application represents a favorable option on profitability level due to very low input costs (0.20 CHF/ha) and at the same time noticeable yield increase.

1.2 Herbicide Reduction Study in Sugar Beets

STUDY CONTACT:

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OBJECTIVE:

The objective of this study was to evaluate yield in sugar beets grown with a herbicide-reduced weed control regime. The comparison was made between conventional herbicide broadcast spraying and a hybrid approach with band spraying in combination with mechanical weeding.

STUDY DESIGN:

The trial was carried out at the Swiss Future Farm in 2025 as a side-by-side strip trial with three replications per treatment. The planting date was on April 4, 2025, with 100,000 seeds/ha and 50 cm row spacing. The treatments that were compared are shown in Table 4. As for band spraying, the target area for application was only 50% of the broadcast application, i.e., only crop rows sprayed, and inter-row weed control via mechanical weeding (Figure 3). It was therefore possible to reduce the applied herbicide amount by 50%.

Table 4. Treatments of the herbicide reduction study in sugar beets.

Treatment	Weed Control Treatment	Weed Control Field Operations
1	Broadcast spraying (2 Splits, Bayer Conviso One, 2x 0.5 l/ha)	– Chemical weeding w/ broadcast spraying 2x (= 100% herbicide amount)
2	Band spraying (50% target area, 2 Splits Bayer Conviso One, 2x 0.25 l/ha) + Mechanical Weeding	– Chemical weeding w/ band spraying 2x (= 50% herbicide amount) – Mechanical weeding w/ camera-steered hoe 3x

The sprayer for herbicide application was a 3-point mounted Horsch Leeb 1.4 CS with 21 m boom width and 25 cm nozzle spacing (Agrotop RowFan 40-02 nozzles), and ultrasonic sensor-based boom height control for 25 cm target distance (Horsch BoomControl Pro). These features are needed to allow for band spraying application on a 25 cm wide band in the crop row instead of 50 cm wide target area with broadcast application, thus reducing the applied herbicide amount by 50% compared to broadcast application. The mechanical weeder was a 3-point mounted 6-row (6 meter) hoeing implement with sideshift frame (Schmotzer K HR 6X 50) and camera-based row guidance system (Claas CULTI CAM). The camera of the row guidance system recognizes the plant rows and allows for automatic compensation of deviations and inaccuracies for precise positioning of the weeding tools via the sideshift frame to eliminate weeds between the crop rows within up to 2 cm distance to the crop row. The combination of band spraying and mechanical weeding represents a complementary approach to enable both high weed elimination success and significant reduction of chemical inputs for weed control.

Figure 3. Band spraying on 25 cm wide target area (left) and inter-row mechanical weeding (right) for herbicide reduction.

RESULTS:

The trial was harvested on October 17, 2025. The average beet yield across treatments was 81.5 t/ha (Figure 4).

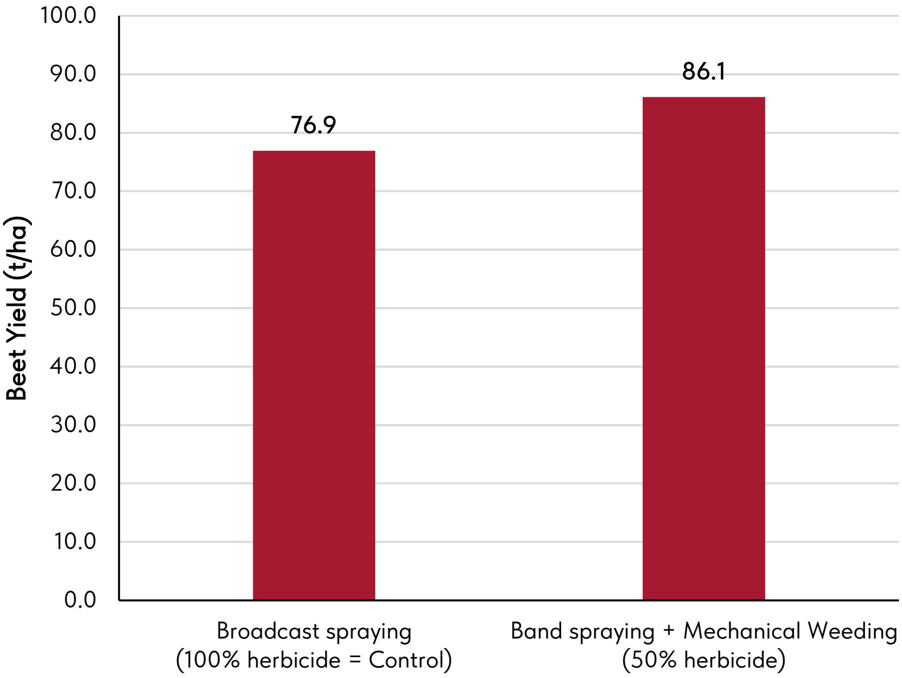

Figure 4. Beet yield results of the herbicide reduction study in sugar beets.

A detailed results comparison is contained in Table 5. These findings show that a 12% beet yield increase was obtained for the band spraying treatment, which may be partially explained by the 6% field emergence rate found in this trial strip (cf. Figure 5). Higher late season weed infestation the trial strip with band spraying, and therefore nutrient and water competition may have caused lower sugar content for the herbicide-reduced treatment. However, there was a sugar yield advantage of 9% for the herbicide-reduced treatment with band spraying and mechanical weeding.

Table 5. Results overview of the herbicide reduction study in sugar beets.

	Broadcast spraying (100% herbicide = Control)	Band spraying + Mechanical Weeding (50% herbicide)
Beet yield (t/ha)	**76.9**	**86.1**
Difference to control (%)	0	12.0
Sugar content (%)	**15.2**	**14.6**
Difference to control (%)	0	-0.6
Sugar yield (t/ha)	**10.0**	**10.9**
Difference to control (%)	0	9

ADDITIONAL OBSERVATIONS:

Crop measurements taken in mid May (42 days after planting) show a slighter higher emergence rate for sugar beets in the herbicide-reduced treatment (95%) compared to broadcast spraying (92%). Sugar beets under broadcast herbicide application may first have benefitted from faster crop development due to less weed competition in early growth stages, as the higher share of further developed beets (4-leaves stage and beyond) is indicating in the comparison of growth stages in Figure 5. However, better aeration of the soil and higher nitrogen mineralization due to mechanical weeding passes are factors that may have contributed to the later yield advantage of the herbicide-reduced treatment.

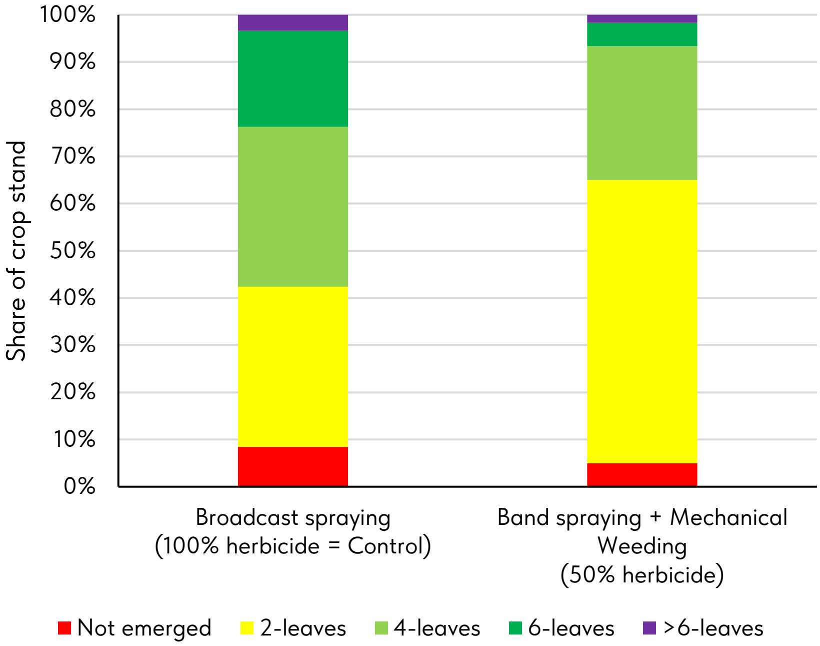

Figure 5. Results for growth stage measurements on 16th May 2025.

FINANCIALS:

Table 6 shows a comparison of the financial results. Revenue is based on paid out sugar beet price as an index of beet yield, soil contamination, sugar content and extractability according to lab analysis after delivery to the sugar factory. Operating costs include all machine, labor, and input costs. Results show that the revenue differences between treatments matched the trend found with yield measurements. Higher operating costs for the band spraying treatments are due to the mechanical weeding passes (3x), which could not be mitigated by 50% savings in herbicide costs (cf. Table 7).

Table 6. Financial results of the herbicide reduction study in sugar beets.

	Broadcast spraying (100% herbicide = Control)	Band spraying + Mechanical Weeding (50% herbicide)
Revenue (CHF/ha)	4684	5136
Operating Costs (CHF/ha)	3300	3794
Gross Margin (CHF/ha)	1384	1342
Gross Margin + Subsidies (CHF/ha)	3734	3942

Table 7 shows a comparison of the weed control costs for the treatments of the study. Significantly higher costs for the herbicide reduced treatment is due to higher machine cost rate per hour or hectare (6-row weeding tool w/ row guidance: 62 CHF/ha or 120 CHF/h vs. 21 m mounted sprayer: 22 CHF/ha or 90 CHF/h) particularly due to higher depreciation and wear for mechanical weeders, and lower field efficiency of mechanical weeding due to lower working width and driving speed (field trial 2025: 6-row weeding tool = 0.6-1.1 h/ha vs. 21 m sprayer = 0.3 h/ha), which also causes significantly higher labor costs for mechanical weeding field operations, and more field passes are required to achieve the same weed elimination rate as with chemical weeding.

Table 7. Weed Control cost comparison for the Herbicide Reduction Study in Sugar Beets 2025.

	Broadcast spraying (100% herbicide = Control)	Band spraying + Mechanical Weeding (50% herbicide)
Herbicide Application (2x)		
Machinery costs (CHF/ha)	90	90
Herbicide costs (CHF/ha)	94	47
Labor costs (CHF/ha)	19	19
Mechanical Weeding (3x)		
Machinery costs (CHF/ha)	-	460
Labor costs (CHF/ha)	-	81
Total Weed Control Costs (CHF/ha)	**203**	**697**

When considering subsidies, which comprise bonus payments for reduced tillage both treatments (250 CHF/ha), and herbicide reduction bonus payments for band spraying application (250 CHF/ha), the herbicide-reduced treatment turns out to be the more profitable treatment, as in addition to the yield advantage, the subsidies help to offset higher operating costs. Based on a national subsidy scheme, Swiss sugar beet growers are compensated with 2100 CHF/ha crop-specific subsidies independent on the tillage or weed control regime applied, which is additionally supporting profitability of sugar beet production (**Figure 1**Figure 6).

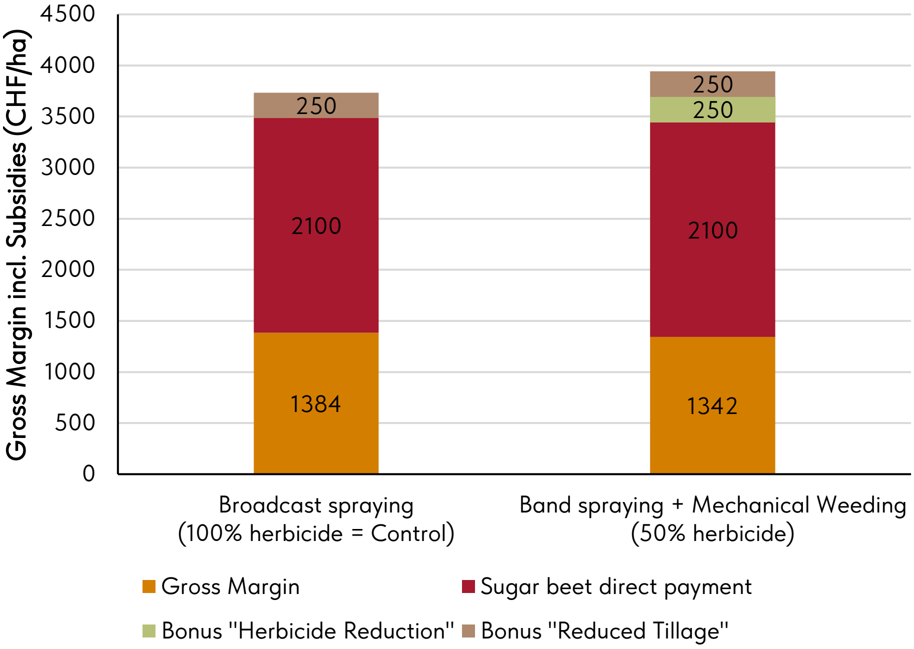

Figure 6. Gross margin including subsidies for the treatments of the herbicide reduction study in sugar beets.

CONCLUSIONS:

- Results of this study show that competitive yield levels can also be achieved in herbicide reduced weed control regimes.
- Although 50% savings for herbicide costs can be realized with band spraying, the addition of mechanical weeding still represents a disadvantageous solution from a profitability standpoint due to higher operating and labor costs (higher fuel and wear costs, higher work time requirements due to lower field efficiency) in comparison to conventional broadcast herbicide application.
- Future studies on herbicide reduced weed control are required to determine the exact crop damage rate associated to mechanical weeding, and potential yield improvement and higher field efficiency with advanced row guidance systems such as the AI-based PTx RowPilot solution.

1.3 Strip-Till Timing of Tillage Study in Sugar Beets

STUDY CONTACT:

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BACKGROUND:

Strip-Till is a reduced tillage practice where the soil is only tilled in narrow strips where seeds will be planted, whereas the remaining part of the soil surface is left untilled and covered with residue of the previous crop. Strip-Till combines the benefits of conventional tillage and no-till with the aim of creating a loosened seedbed while maintaining soil structure and avoiding erosion and moisture losses. However, timing of Strip-Till operations is challenging, as the right conditions in terms of soil moisture need to be met, and seedbed requirements to enable optimum germination and crop development may vary significantly for different crops. Therefore, growers need to decide on the proper timing (fall, spring) and number of passes (one vs. multiple passes) being required to enable best planting conditions.

OBJECTIVE:

The objective of this study was to evaluate yield in sugar beets grown with different approaches for timing and number of tillage passes in a Strip-Till tillage system.

STUDY DESIGN:

The trial was carried out at the Swiss Future Farm in 2025 as a side-by-side strip trial. Strip-Tillage was done with a Horizon Ag SPX Strip-Till toolbar (Figure 7). The planting date was 4th April 2025 with 100,000 seeds/ha at 50 cm row spacing. Weed control and fertilization was identical across all trial strips with a hybrid approach of band spraying and mechanical weeding and two in-season mineral fertilizer applications. The treatments that were compared are shown in Table 8.

Table 8. Treatments of the timing of tillage study in sugar beets.

Treatment	Tillage Operations
ST Spring (Control)	03/08/2025: Strip-Till pass w/ wing tine (12 cm depth)
ST Fall + Spring	09/22/2024: Strip-Till pass w/ straight tine (25 cm depth) 03/08/2025: Strip-Till pass w/ wing tine (12 cm depth)
ST Fall + Pre-planting	09/22/2024: Strip-Till pass w/ straight tine (25 cm depth) 04/03/2025: Strip-Till pass w/ wing tine (12 cm depth)

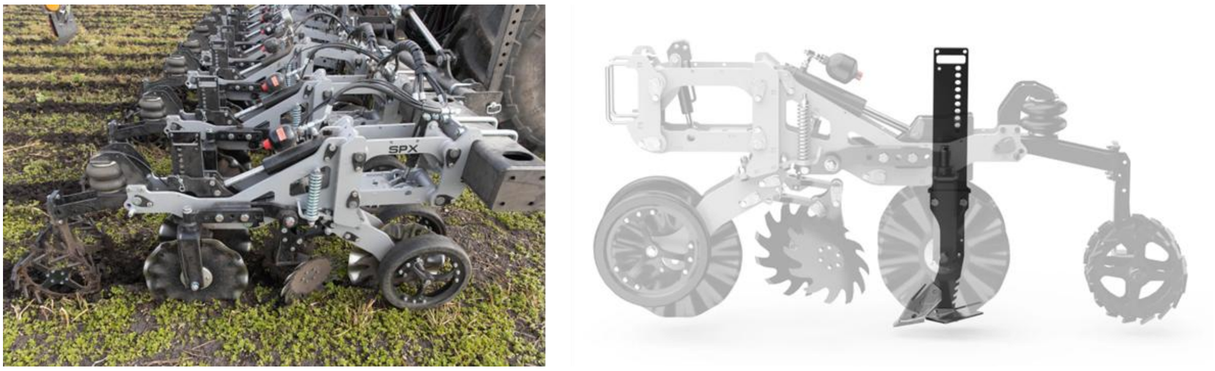

Figure 7. Horizon SPX Strip-Till implement during field operation (left), wing tine with depth adjustment to create strips for later planting (right).

RESULTS:

The trial was harvested on October 17, 2024. The average yield level across all treatments was very low compared to the historic average of the location with an average dry matter yield of 77.9 t/ha (Figure 8).

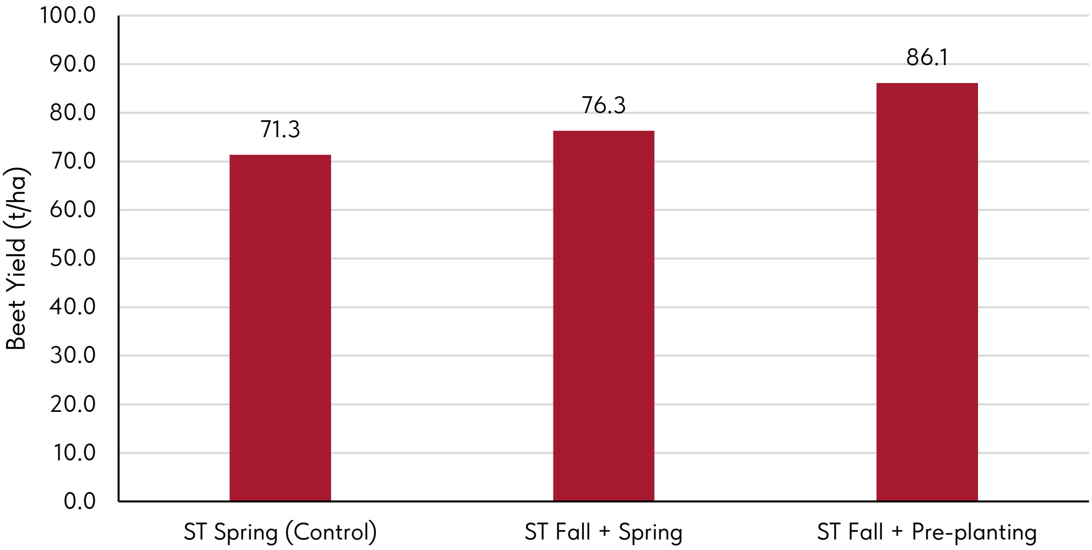

Figure 8. Beet yield results of the timing of tillage study in sugar beets.

A detailed results comparison is contained in Table 9. These results show that creating Strip-Till strips already in fall resulted in significant beet and sugar yield increases, whereas changes in sugar content were less evident. Noticeably, there was a significant yield increase when strips were created just before planting, which is plausible due to finer seedbed that facilitated better seed-to-soil contact and root development. The increase in sugar yield per hectare is majorly resulting from the increase in beet yield (biomass), while differences in sugar content had a minor influence between the treatments of this study.

Table 9. Results overview of the timing of tillage study in sugar beets.

	ST Spring (Control)	ST Fall + Spring	ST Fall + Pre-planting
Beet yield (t/ha)	**71.3**	**76.3**	**86.1**
Difference to control (%)	0	7.0	20.8
Sugar content (%)	**15.2**	**15.0**	**14.6**
Difference to control (%)	0	-0.2	-0.6
Sugar yield (t/ha)	**9.3**	**9.8**	**10.9**
Difference to control (%)	0	5.4	17.2

ADDITIONAL OBSERVATIONS:

Results of crop measurements in mid May (42 days after planting) showed that field emergence was significantly lower with 78% when only on Strip-Till pass was applied (ST Spring), which indicates less favorable seedbed conditions for seed-to-soil-contact and root development, where two-pass treatments had comparable high field emergence with 97% for ST Fall + Spring and 95% for ST Fall + Pre-planting. Measurements of growth stage show that faster crop development occurred in the ST Fall + Spring trial strip, as indicated by the high share of beets in 6-leaves stage (Figure 9).

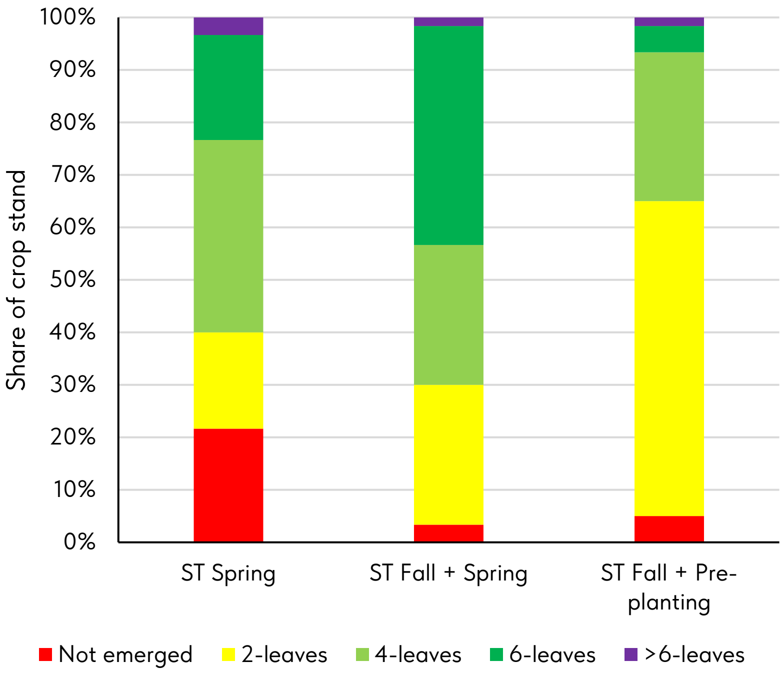

Figure 9. Results for growth stage measurements on 16th May 2025 (42 days after planting).

FINANCIALS:

Table 10 shows a comparison of the financial results. Revenue is based on paid out sugar beet price as an index of beet yield, soil contamination, sugar content and extractability according to lab analysis after delivery to sugar factory. Operating costs include all machine, labor, and input costs. For the two-pass treatments, operating costs were higher for the ST Fall + Pre-planting treatment because of lower field efficiency (0.94 h/ha) for the second Strip-Till pass due to reduced driving speed to create a proper seedbed in comparison to the ST Fall + Spring treatment (0.72 h/ha).

Including subsidies, which are comprised of crop-specific direct payments for sugar beets (2100 CHF/ha) and bonus payments for reduced tillage (250 CHF/ha) and herbicide reduction (250 CHF/ha) for all treatments, the highest gross margin was obtained for the treatments with two Strip-Till passes, which is 190 CHF/ha (ST Fall+Spring) and 621 CHF/ha (ST Fall+Pre-planting) than the control treatment with only one Strip-Till pass in spring**Figure 1**.

Table 10. Financial results of the timing of tillage study in sugar beets.

	ST Spring (Control)	ST Fall + Spring	ST Fall + Pre-planting
Revenue (CHF/ha)	4353	4655	5136
Operating Costs (CHF/ha)	3632	3744	3794
Gross Margin (CHF/ha)	721	911	1342
Gross Margin + Subsidies (CHF/ha)	3321	3511	3942
Difference to Control (CHF/ha)	0	190	621

CONCLUSIONS:

- Strip-Till with a two-pass regime that comprises the first pass to create strips already in fall and a second pass in spring instead of a one-pass regime with creating strips just before the planter pass in spring has shown as a preferential practice to enable higher yield in sugar beets. Additional operating costs for a second Strip-Till pass did not outweigh the higher revenue from yield under the conditions of our study.
- Fall tillage in addition to spring tillage on the day before planting enabled an increase of beet yield by up to 21% and of sugar yield by up to 17% in comparison to the control treatment with only one Strip-Till pass in spring.

Further information

Strip-Till toolbar Horizon Ag SPX:
https://www.horizonagriculture.com/spx

1.4 Sorghum as alternative forage feed for silage corn

STUDY CONTACT:

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BACKGROUND:

The Sorghum crop (*Sorghum bicolor*), also known as milo, which originates from Africa, is still a relatively unknown crop in Europe. Like corn, sorghum is a C4 plant and is adapted to arid and semi-arid conditions. Sorghum can be an interesting alternative to corn in certain situations:

- Yield security in dry locations and years
- Diversification of crop rotation
- Lower susceptibility to diseases and pests (e.g., corn borer, corn rootworm, crows, and wild boars)
- Short growing season
- Low nutrient and soil requirements

On the other hand, disadvantages associated with the Sorghum crop are:

- Poor growth during periods of bad weather
- Lower nutritional value than corn
- Plant length (up to 4 m) and tendency to lodge
- Hydrocyanic acid content

The generic term “sorghum” covers all types of milo. On the one hand, there is grain milo, which is grown for grain production, and milo varieties for animal feed. Forage sorghum is classified according to its potential for cutting. A distinction is made here between single-cut *Sorghum bicolor* and *Sorghum saccaracum* and multi-cut Sudan grasses (*Sorghum sudanese*).

OBJECTIVE:

The objective of this study was to investigate the suitability of sorghum as an alternative to silage corn in the crop rotation by assessing yield and feed quality obtained from three different single-cut sorghum hybrids.

STUDY DESIGN:

The study was carried out on the Swiss Future Farm in 2025 as a side-by-side strip trial using a Precision Planting test planter in a field with reduced tillage regime (rototiller + Strip-Till) after 3-

cut temporary grassland. Planting date was 17th June 2025 for all sorghum hybrids compared (Table 11). Seed rate and planting depth were selected according to the seed supplier's recommendation for the planting date and climate of the trial location. Weed control and fertilization were identical across all trial strips with one herbicide application (Banvel 4S, 0.6 l/ha) and one fertilizer application (55.2 kg N/ha, applied as Urea 46% with 120 kg/ha).

Table 11. Hybrids and planter settings applied for Sorghum Study 2025.

Hybrid	Genetics	Row spacing (cm)	Seed rate (seeds/ha)	Planting depth (cm)
ES Arigato	Sorghum bicolor x Sorghum bicolor (BMR[1] type)	50	240,000	4.0
KWS Kallisto	Sorghum bicolor x Sorghum sudanese (Sudan grass crossbreed)	50	200,000	4.0
ES Willy	Sorghum bicolor (grain type)	50	300,000	3.0

[1] Brown Midrib (BMR) hybrid sorghum developed through traditional breeding characterized by low lignin content and a brown midrib on the leaves (due to BMR-6 gene), resulting in higher digestibility, increased palatability, and better energy utilization for livestock to increase milk and meat production.

The specific hybrids were selected to evaluate potential advantages by high yield potential combined with high feed quality (ES Arigato), high yields and good ensilability due to high dry matter content (KWS Kallisto), and short stature for easier harvesting combined with high drought tolerance (ES Willy).

Figure 10. Maturing sorghum crop mid of September (left) and boundary between sorghum hybrids KWS Kallisto and ES Willy mid of August (right) on the trial plot.

RESULTS:

The trial was harvested for silage on 6th November 2025 with a forage harvester and silage corn header. Figure 11 summarizes the results of yield measurements and as a reference also contains silage corn yield data from the same location and harvest year. Fresh mass yield ranged between 25-42 t/ha, with only one hybrid (KWS Kallisto) having comparable fresh mass yield level as silage corn. The dry matter content of sorghum ranged between 22-27% and was significantly lower than the targeted dry matter content of approx. 35% for silage corn. Therefore, the obtained sorghum dry matter yield ranged between 6-11 t/ha, which is one third to half of the expected dry matter yield of silage corn in the average of the study location. Despite the late harvest date, the targeted dry matter content of approx. 28–32% for optimum silage quality in sorghum could not be achieved during 142 growing days under the temperate climate and clayey, colder soil conditions of the study location. Overall, there was a clear advantage for the Sudan grass crossbreed type (KWS Kallisto) for yield and dry matter over the BMR-type (ES Arigato) and grain type (ES Willy) of sorghum.

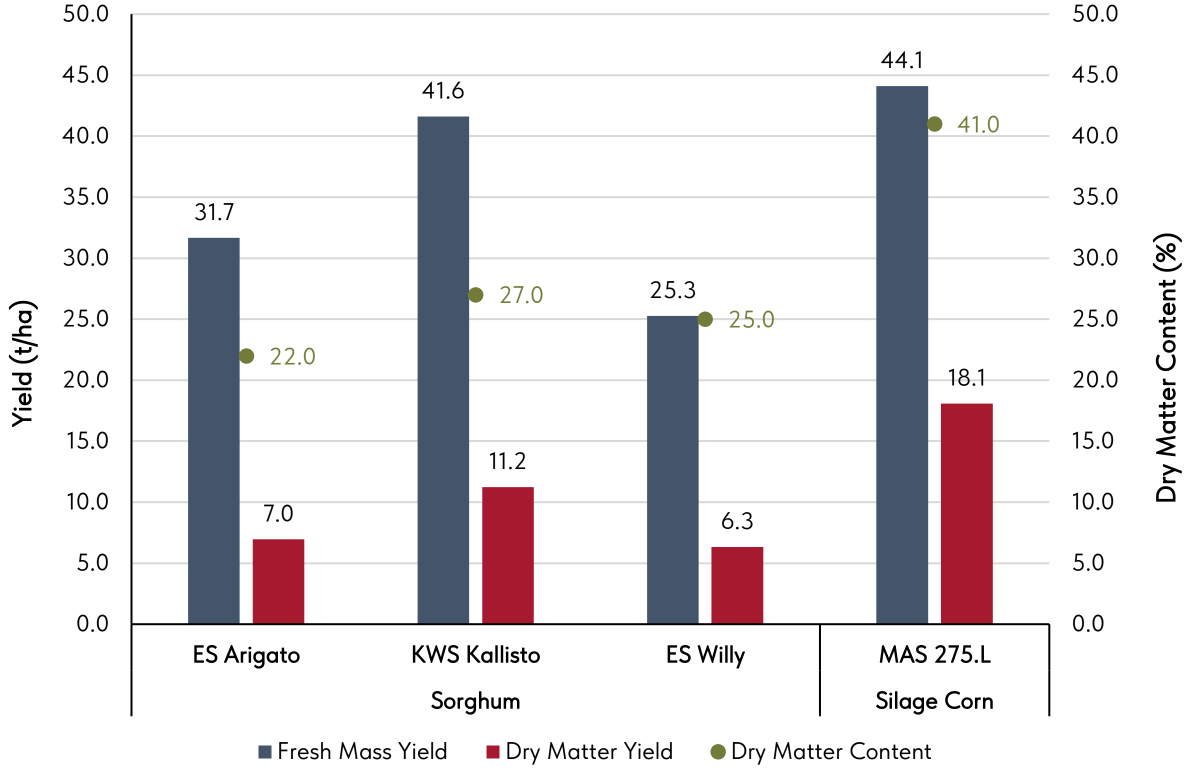

Figure 11. Yield data overview of the Sorghum Study 2025.

ADDITIONAL OBSERVATIONS:

After harvest with forage harvester, sorghum was stationary baled as round bale silage using an Orkel MP2000 corn baler individually for each trial strip. Samples for lab analysis of feed value parameters were taken from the silage bales of each hybrid after a fermentation period of 9 weeks on 12th January 2026 and compared to silage corn analysis values from the same farm (Table 12).

Results show that sorghum hybrids ES Arigato and ES Willi deliver the best Net Energy for Lactation (NEL) and therefore have the highest feed value for milk production. ES Arigato as Brown Midrib type benefits from a very low lignin content (ADL 17 g/kg DM), which greatly increases fiber digestibility. KWS Kallisto as Sudan grass crossbreed falls significantly behind due to its high ADF (423 g/kg DM) and ADL (35 g/kg DM) values, which inhibit the digestibility of cell walls. The grain-type sorghum ES Willy compensates for its slightly higher fiber content with a very high crude protein content (133 g/kg DM), which supports the overall feed value. The comparison reveals clear differences: silage corn has a significantly higher energy value than the sorghum samples with 6.6 MJ NEL/kg DM. This is mainly due to the extremely low ADF content of 196 g/kg DM in corn compared to the sorghum varieties (352–423 g/kg DM).

Table 12. Feed quality results after lab analysis for the Sorghum Study 2025.

Parameter	ES Arigato (BMR type)	KWS Kallisto (Sudan grass crossbreed)	ES Willy (grain type)	MAS 275.L (Silage Corn)
DM[1] content (%)	24.6	24.5	24.7	40.5
pH value	4.1	4.7	4.3	3.9
Crude Protein (g/kg DM)	102	84	133	67
NDF[2] (g/kg DM)	663	686	624	358
ADF[3] (g/kg DM)	357	423	352	196
ADL[4] (g/kg DM)	17	35	30	11
Crude Ash (g/kg DM)	65	63	81	32
Crude Fat (g/kg DM)	32	24	26	29
NEL[5] (MJ/kg DM)	5.5	4.7	5.4	6.6

[1] DM = Dry matter
[2] NDF = Neutral Detergent Fiber is a measure of the total content of indigestible cell wall components (cellulose, hemicellulose, lignin) in forage feed. A lower NDF value indicates higher feed quality and energy concentration.
[3] ADF = Acid Detergent Fiber describes the proportion of the most indigestible cell wall components (lignin and cellulose) in feed. A high ADF value indicates lower digestibility and energy yield.
[4] ADL = Acid Detergent Lignin describes the lignin content in feed samples. Lignin is the most indigestible component of the plant cell wall, a high ADL value indicates lower digestibility.
[5] NEL = Net Energy Lactation; the amount of energy in Mega Joule in a feed which is available for milk production.

Figure 12 shows the milk production potential (kg milk/ha) in a calculational consideration based on the dry matter yield and energy density (Net Energy Lactation; requirement: 3.28 MJ NEL/kg milk) found in this study.

Within the range of hybrids compared, the milk production potential on a per hectare basis was significantly lower for sorghum with only 28.6-44.2% of the potential that can be expected from silage corn.

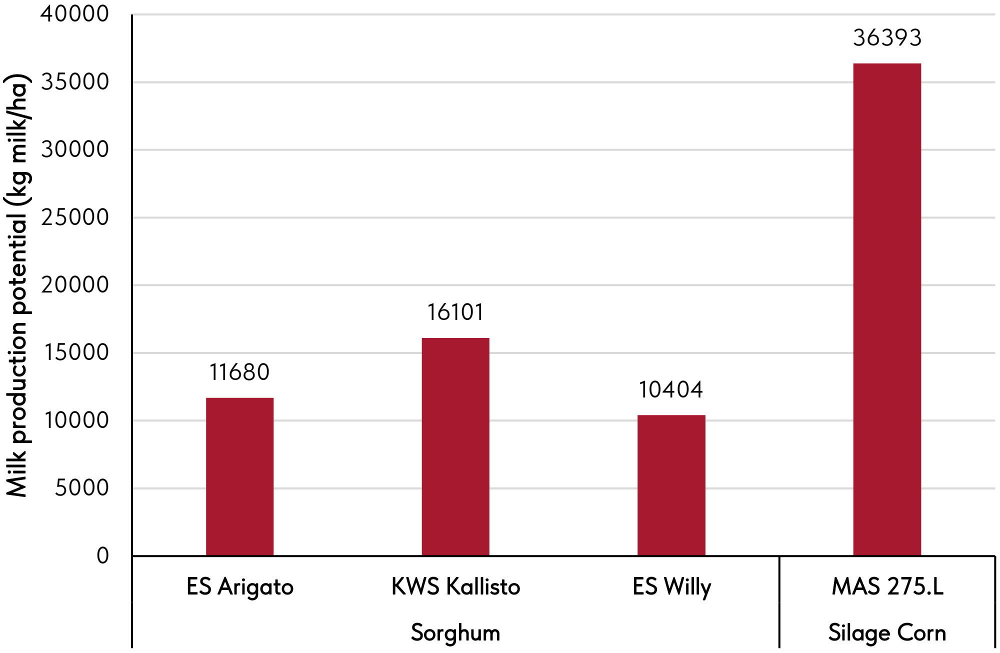

Figure 12. Milk production potential (kg/ha) based on energy content (Net Energy Lactation) in the Sorghum Study 2025.

FINANCIAL:

Table 13 shows the financial analysis for the yield obtained from the different trial strips, incl. an on-farm comparison with silage corn with similar tillage and crop care regime. Revenue of sorghum is based on a price of 43.50 CHF/ton fresh mass derived from assumptions for silage corn harvested with ≤30% DM content. Operating costs include all machine, labor, and input costs. Subsidies, which comprise bonus payments for the reduced tillage practice (Strip-Till) on the trial plot amount to 250 CHF/ha for all treatments compared.

Based on these assumptions, the calculations show that from a profitability standpoint the most advantageous alternative to silage corn was growing the Sudan grass crossbreed sorghum KWS Kallisto that had the lowest yield reduction in comparison to silage corn.

Table 13. Financial results of the Sorghum Study 2025.

	ES Arigato	KWS Kallisto	ES Willy	Silage Corn MAS 275.L (Reference)
Revenue (CHF/ha)	1377	1810	1100	2558
Operating Costs (CHF/ha)	1396	1355	1441	2008
Gross Margin (CHF/ha)	-19	455	-341	550
Gross Margin + Subsidies (CHF/ha)	231	705	-91	800
Difference to Reference (CHF/ha)	-596	-95	-891	0

Based on the specific yields for the sorghum varieties and the reference corn silage (67 g/kg DM crude protein, 18.1 t/ha DM yield), a comparison of net protein yield per hectare was made based on the following calculation basis:

- Reference corn: 1,212.7 kg crude protein per hectare (18,100 kg DM x 0.067).
- Price of protein concentrate: approx. 0.79 CHF/kg (based on soybean meal 44% protein, corrected to pure protein approx. 1.80 CHF/kg protein equivalent). This value represents the savings (or additional costs) when protein concentrate is removed from or added to the ration.

Results show that sorghum varieties do not offer an advantage in terms of protein yield per hectare over silage corn despite their higher protein content (Table 14).

Table 14. Comparison of net protein yield per hectare for the Sorghum Study 2025.

Hybrid	Dry Matter yield (t/ha)	Crude Protein (g/kg DM)	Protein yield (kg/ha)	Difference to silage corn (kg/ha)	Difference to silage corn (CHF/ha)
Silage Corn (Reference)	18.1	67	1212.7	0	0
Sorghum ES Arigato	7.0	102	714.0	-498.7	-898
Sorghum KWS Kallisto	11.2	84	940.8	-271.9	-489
Sorghum ES Willy	6.3	133	837.9	-374.8	-675

Due to the very high dry matter yield per hectare (18.1 t/ha), silage corn provides more protein per hectare than the sorghum varieties with their lower yields (6.3–11.2 t/ha), despite its lower protein concentration per kg of feed. In a differentiation of the sorghum hybrids, KWS Kallisto performs best of the three varieties, as its higher dry matter yield partially compensates for its lower protein content. Although sorghum ES Willy has the highest protein concentration (133 g/kg DM), it cannot compensate for its yield deficit of almost 12 t/ha DM compared to silage corn. Under the given yield conditions, dairy farmers would have to spend between CHF 489 and CHF 898 per hectare of sorghum on additional protein concentrates to achieve the same protein level as with silage corn.

CONCLUSION:

The comparison of the three sorghum hybrids with silage corn in this study shows the following consequences for growing and feeding:

- All sorghum hybrids fall behind silage corn in terms of energy content, silage corn (6.6 MJ NEL/kg DM) provides approx. 15–30% more energy than the sorghum hybrids (4.7–5.4 MJ NEL). To maintain stable milk yield, it is essential to supplement sorghum with more grain or grain corn as energy feed.
- The feed value of sorghum may differ significantly between the hybrid types: a variety such as Sudan grass crossbreed KWS Kallisto (high lignin content) is so low in energy that it is almost only suitable as “structural feed” for dry cows or young cattle, whereas the Brown Midrib type ES Arigato (low lignin content) is closest to silage corn in terms of energy and is the better choice for high-performance cows but does not achieve the same yield per hectare due to lower DM yields. A grain type hybrid such as ES Willy contains almost twice as much crude protein as silage corn and has potential to replace expensive protein feed (e.g., soybeans, canola) in the ration, however the expected lower dry matter yield per hectare must then be compensated with more crop area.
- From a growing strategy standpoint, sorghum can secure the forage feed supply in dry drought years when corn yields can drop drastically (approx. -40%), while sorghum delivers more stable yields with 30% less water and can then be superior in terms of land use. Contrary, sorghum often has to be harvested later, which can affect the soil structure by increased soil compaction caused by harvesting traffic in wet autumns.

In an overall conclusion, growing sorghum might be a suitable approach for farms that have an increased drought risk with potentially high yield losses in silage corn. For farms targeting maximum energy density and milk production potential from small field area, silage corn is preferential, provided that the water supply is secure.

Further information on sorghum hybrids:

ES Arigato: https://lidea-seeds.com/products/arigato
KWS Kallisto: https://www.kws.com/de/de/produkte/sorghum/sortenuebersicht/kws-kallisto/
ES Willy: https://lidea-seeds.de/products/es-willy

1.5 Variable Rate Population Study in Silage Corn

STUDY CONTACT:

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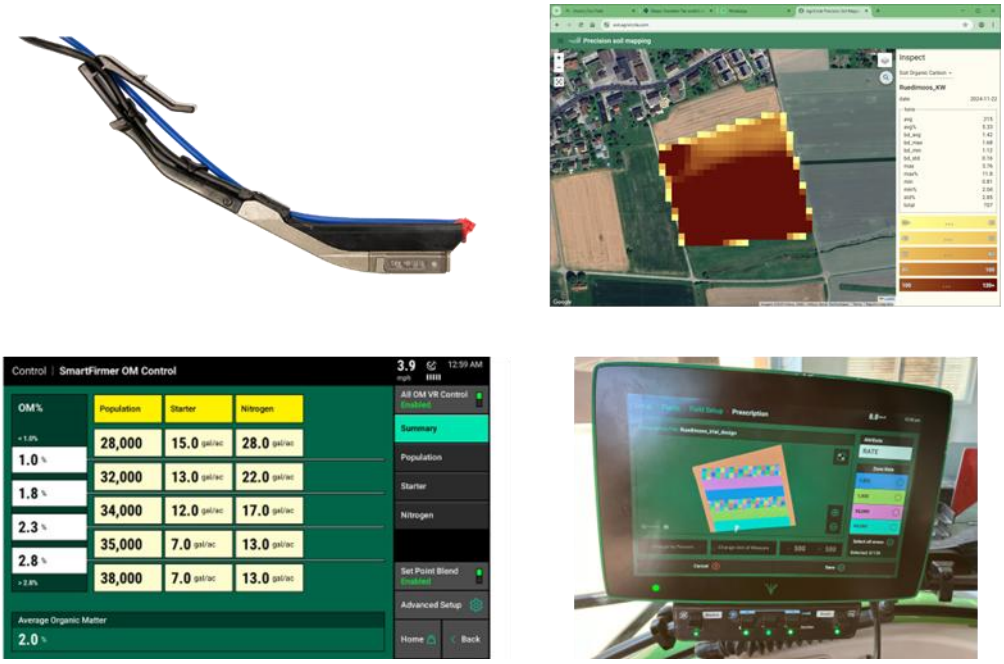
OBJECTIVE:

The objective of this study was to evaluate yield and operating costs in silage corn planted at flat rate compared to variable rate plant population planted with two different approaches: 1) Sensor-based in real time with Precision Planting vSet™ Organic Matter Control and SmartFirmer™ soil sensor readings and 2) Prescription map based on Agricircle DORA software with satellite-based soil organic carbon mapping[1] (Figure 13).



Control | SmartFirmer OM Control

OM%	Population	Starter	Nitrogen
< 1.0%	28,000	15.0 gal/ac	28.0 gal/ac
1.0 %			
	32,000	13.0 gal/ac	22.0 gal/ac
1.8 %			
	34,000	12.0 gal/ac	17.0 gal/ac
2.3 %			
	35,000	7.0 gal/ac	13.0 gal/ac
2.8 %			
> 2.8%	38,000	7.0 gal/ac	13.0 gal/ac

Average Organic Matter 2.0 %

All OM VR Control Enabled

Set Point Blend Enabled

Figure 13. Precision Planting SmartFirmer soil sensor for planter attachment and population setting based on organic matter measurements on the 20/20 Gen 3 planter terminal (left) and Prescription map creation based on satellite imagery in the Agricircle DORA software and trial treatments displayed on planter terminal (right).

STUDY DESIGN:

The study was carried out on the Swiss Future Farm in 2025 as a side-by-side strip trial in a field with heterogeneous soil conditions in texture, moisture, and organic matter. Planting date was 16th May 2025. The hybrid planted was MAS 275.L. The Precision Planting OM Control mode automatically adjusts planted population based on the organic matter content measured by the

SmartFirmer soil sensors according to user-defined thresholds. The planted population was set to 92,000 seeds/ha as base population (also used for flatrate population treatment) and adjusted based on organic matter content (OM%) measured by SmartFirmer soil sensors for the trial strip with Variable Rate planted population. The prescription map was created based on soil organic carbon values indicated by the Agricircle DORA software. The settings shown in Table 15 were compared.

Table 15. Planter settings applied for the variable rate population study in silage corn.

Treatment	Planting Depth	Planted Population
Flatrate	5.1 cm	92,000 seeds/ha
Prescription Map	5.1 cm	75,000-105,000 seeds/ha
SmartFirmer	5.1 cm	82,000-102,000 seeds/ha

RESULTS:

The trial was harvested on 17th October 2025. Figure 14 summarizes the results of yield measurements. Fresh mass yield was higher for the flat rate treatment, however for silage corn it is important to compare results on dry matter basis. The dry matter content is essential for calculating rations for dairy cattle, as it indicates the yield amount with actual nutritional value for feeding, regardless of the variable water content. Due to higher dry matter content, the Variable Rate population provided a dry matter yield advantage of 0.2 tons/ha for both variable treatments, which represents a yield increase by 1.1%.

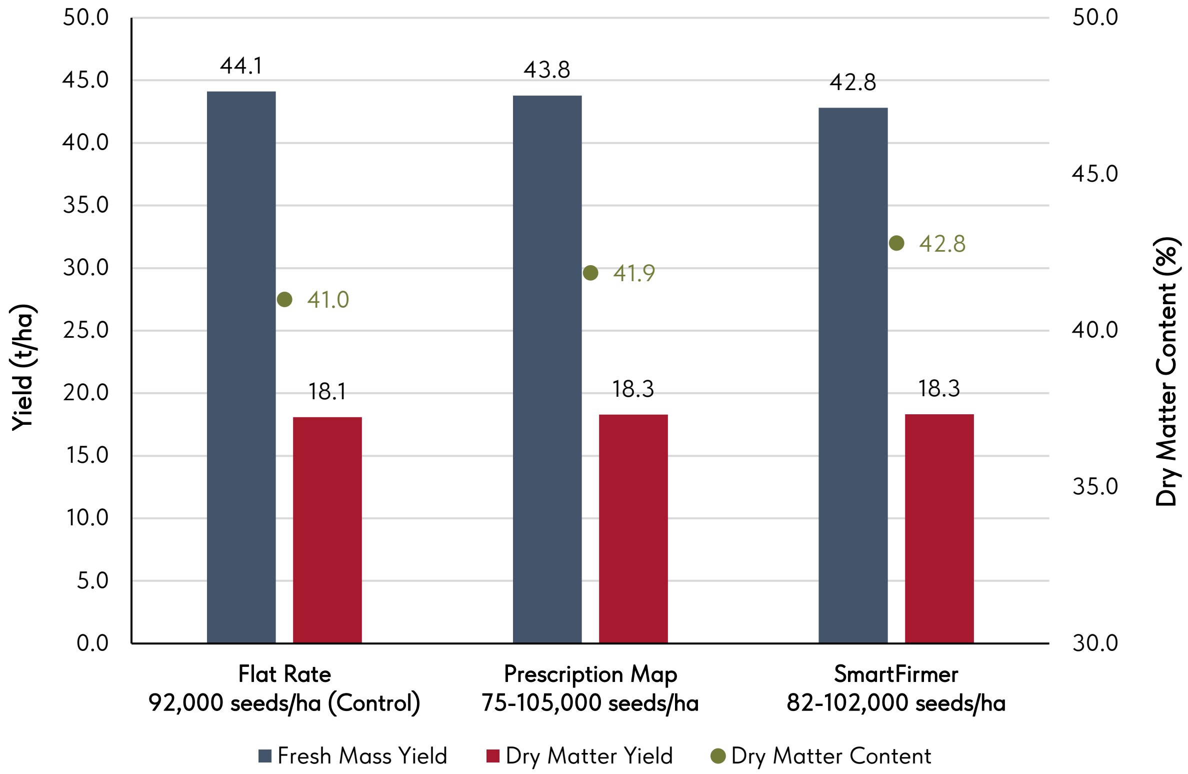


Figure 14. Results overview of variable rate population study in silage corn.

Based on as-applied planter data, seed cost savings of 29 CHF/ha were generated using the Prescription Map approach, whereas variable planting with SmartFirmer did not result in significant seed cost savings (Table 16).

Table 16. Planted population and seed costs for the treatments of the variable rate population study in silage corn.

Treatment	Seeds/ha (n)	Seed Costs (CHF/ha)	Difference to Control (CHF/ha)
Flatrate (Control)	93’804	272	0
Prescription Map	83’897	243	29
SmartFirmer	93’542	271	1

ADDITIONAL OBSERVATIONS:

Differences in nutritional value were analyzed via lab analysis of feed samples taken at harvest (Table 17). High feed value is indicated by a combination of high energy (NEL), high digestibility (ELOS), and good starch availability (CSPS). Results show that slightly higher feed value was found for silage corn planted with Precision Planting SmartFirmer, and that the Corn Silage Processing Score (CSPS) as an indicator for kernel processing by the forage harvester, was on a very satisfying level with >70% for all treatments.

Table 17. Feed quality results after lab analysis for the variable rate population study in silage corn.

Treatment	DM[1] content (%)	Starch (% of DM)	ELOS[2] (%)	CSPS[3] (%)	NEL[4] (MJ/kg DM)
Flatrate (Control)	41.0	39.6	74.3	74.2	6.8
Prescription Map	41.8	38.9	74.1	73.5	6.7
SmartFirmer	42.8	41.2	75.0	71.9	6.8

[1] DM = Dry matter
[2] ELOS = Enzyme soluble organic matter; parameter for digestibility of forage feed in ruminant nutrition.
[3] CSPS = Corn Silage Processing Score; the larger the CSPS, the better the corn kernels are processed in the silage and the better the animal can utilize the starch.
[4] NEL = Net Energy Lactation; the amount of energy in Mega Joule in a feed which is available for milk production.

FINANCIAL:

Table 18 shows the revenue obtained from the different trial strips, assuming a silage corn price of 58 CHF/ton fresh mass for silage corn harvested with >40% DM content. Operating costs include all machine, labor, and input costs. Technology costs were considered in a farm-specific approach for Swiss Future Farm (80 hectares agricultural land) for Prescription Map application (software subscription 5.00 CHF/ha + soil sampling 4.60 CHF/ha = 9.60 CHF/ha) and SmartFirmer soil sensors (depreciation 4.50 CHF/ha). Subsidies, which comprise bonus payments for the reduced tillage practice with Strip-Till on the trial plot amount to 250 CHF/ha for all treatments compared. Due to highest revenue based on fresh mass yield, the obtained gross margin was highest for planting with flat rate population. Revenue loss due lower fresh mass yield level could not be offset by seed savings for the Variable Rate population treatments, resulting in up to 81 CHF/ha lower gross margin.

Table 18. Financial results of the variable rate population study in silage corn.

	Flat Rate 92,000 seeds/ha (Control)	Prescription Map 75-105,000 seeds/ha	SmartFirmer 82-102,000 seeds/ha
Revenue (CHF/ha)	2558	2539	2482
Operating Costs (CHF/ha)	2008	1990	2013
Gross Margin (CHF/ha)	550	549	469
Gross Margin + Subsidies (CHF/ha)	800	799	719
Difference to Control (CHF/ha)	0	-1	-81

CONCLUSION:

Various research studies have long stated that Variable Rate population is most beneficial in fields with high variability in soil fertility, moisture, and slope, allowing for higher populations in productive areas and lower, safer rates in high-stress, low-productivity areas. However, under the conditions of the trial site—characterized by small, fragmented fields of ≤5 hectares—the advantages of Variable Rate population may not materialize because of limited in-field variability.

In this study, Variable Rate population produced a 1% yield increase over flat-rate planting, aligning with earlier research that likewise reported modest gains of 1–3%. Economically, there is a risk that the yield gain may be outweighed by the additional costs associated with Variable Rate technology. Therefore, depending on field conditions, growers may achieve better profitability by using a flat-rate population and relying on other technologies—such as systems that ensure consistent seed placement, uniform planting depth, and improved soil-moisture conservation—to optimize yield.

On-farm experimentation using test plots in selected fields can help farmers determine whether Variable Rate population provides a measurable benefit, provided that field zones are accurately defined using robust data such as historical yield maps and soil surveys to create reliable prescriptions.

References:

[1] Yuzugullu, O., Fajraoui, N., Don, A., & Liebisch, F. (2024). Satellite-based soil organic carbon mapping on European soils using available datasets and support sampling. *Science of Remote Sensing*, *9*, 100118. https://www.sciencedirect.com/science/article/pii/S2666017224000026

1.6 50cm Row Spacing in Corn

CONTACT

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BACKGROUND

In corn cultivation, a row spacing of 75 cm has become the standard. However, with the introduction of row-independent corn harvesters or corn harvesters designed for other row spacings, farmers are no longer limited to this standard spacing. The Bavarian State Research Center for Agriculture (LfL Bayern) and Kiel University of Applied Sciences have recently conducted comparisons of different row spacings. It is assumed that narrower row spacings, in particular, result in better nutrient utilization, greater root penetration, higher resistance to drought stress, and reduced soil erosion. Some measurable results included reduced evaporation due to earlier canopy closure, a 10% yield increase for silage corn in the hot year of 2022, lower dry matter content in silage corn, higher root penetration indices, and lower residual nitrate levels. The cited literature is listed at the end of this report.

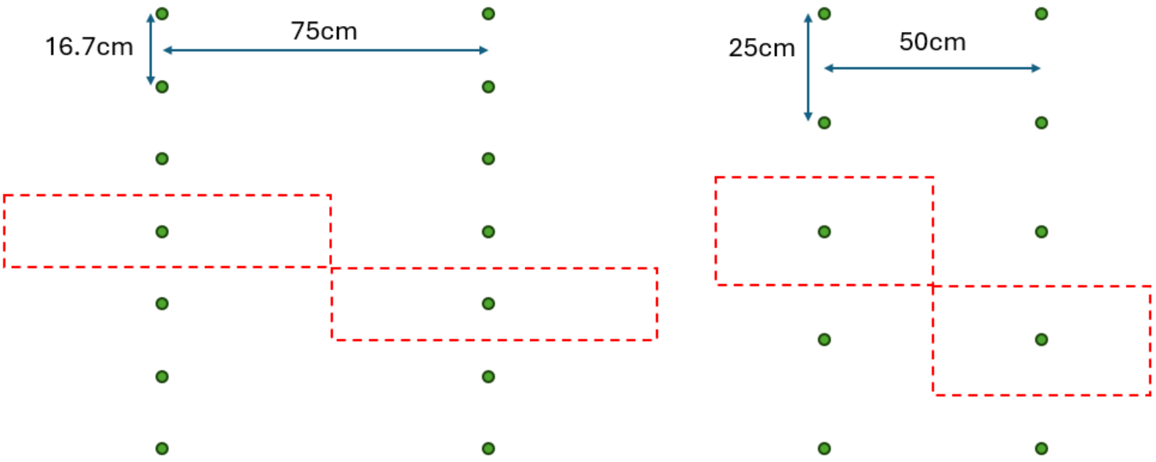


Figure 15. Visual representation of different row spacings

Figure 15 illustrates why it is reasonable to assume that (with an identical seeding rate of 80,000 plants/ha) individual plants have more soil available when row spacing is narrower. Within the row, the plants have more space and thus compete less with one another; between rows, they need to cover less distance to achieve full root penetration. Perfect distribution would be achieved with a row spacing of 35.4 cm; the plant population would then be arranged in a square pattern (at a population density of 80,000 plants/ha). A row spacing of 50 cm in corn would have another decisive advantage: the row spacing across various field crops would then be uniform. A 50 cm row spacing can be used for sugar beets, sunflowers, rapeseed, and, of course, corn. The same machinery (seeders and cultivators) can thus be used across multiple crops and over a larger area, allowing for better utilization of the equipment or enabling faster amortization of more expensive machinery (camera-equipped cultivators).

OBJECTIVES

The experiment examines the extent to which assumptions and findings from the literature can be replicated. Field emergence, canopy closure, soil nitrate content, weed pressure, and yield are evaluated.

TRIAL DESIGN

The experiment was initiated by Philipp Hanhart and conducted on one of his fields. The field covers 3.87 hectares and is located northeast of 8254 Basadingen at 47°40'30.6“N 8°45'20.2”E. The trial was set up as a strip trial, divided into 12 strips, each 12 m wide. At the southern edge of the field is a border strip approximately 6 m wide that is no longer part of the trial area. The following factors were compared: row spacing (75 cm vs. 50 cm), weed management (mechanical vs. chemical), and three different seeding rates (75,000, 85,000, and 95,000 seeds per hectare). These combinations resulted in the 12 variants. Figure 16 shows the field layout.

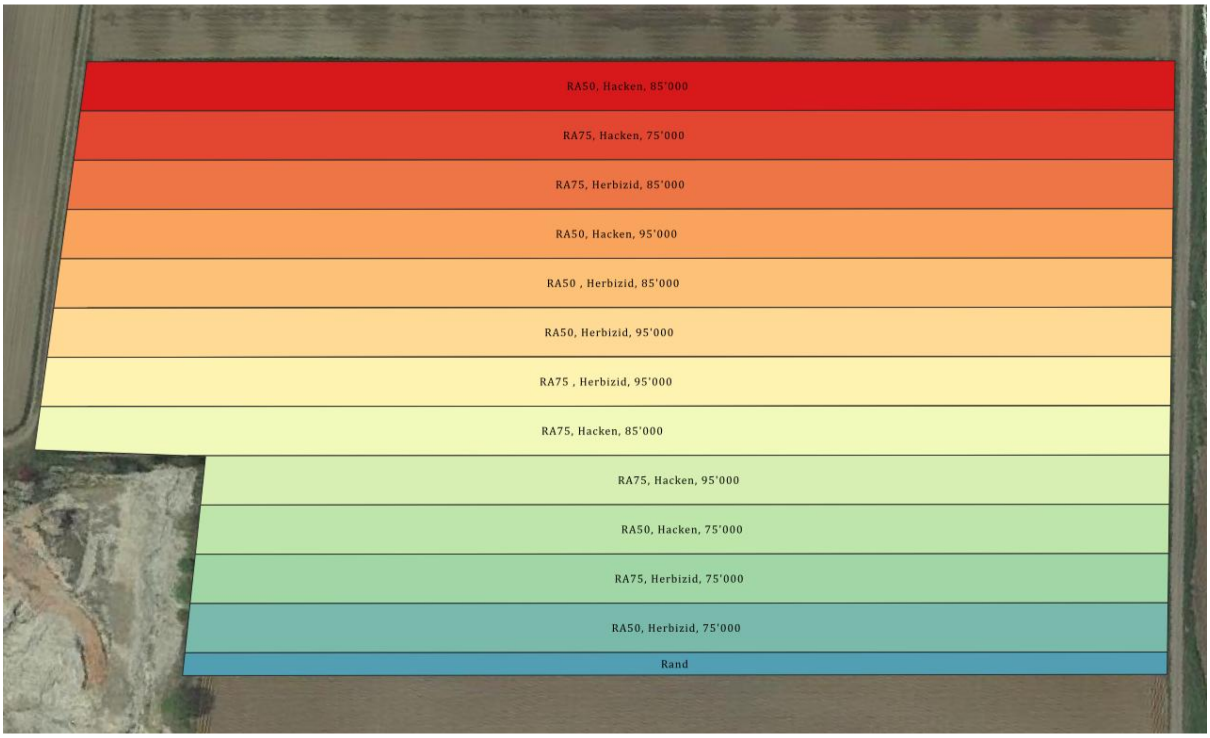


Figure 16. Trial design

The previous crop was sugar beets. The following cultivation measures were carried out:

- 04/23/25 41 m³ of swine manure
- 05/03/25 Harrowing
- 05/12–13/25 Seeding; Pioneer 9610
- May 13, 2025: Rolling
- May 17, 2025: Harrowing + 100 kg/ha urea
- May 20, 2025 First emergence
- June 6, 2025 Second harrowing, herbicide-free strips only
- June 12, 2025 Treatment of herbicide strips
- June 13, 2025 Weeding of herbicide-free strips
- November 13, 2025 Harvest

RESULTS

Field emergence:

The field survey was conducted twice because the actual plant densities recorded during the first count at the end of May were unexpectedly low.

Table 19. Field emergence

Row Spacing	Weed Control	Planted population	Measurement 05/28/2025	Measurement 09/20/2025	Measured population (avg.)	%	Group
50	mechanical	75'000	75'000	68'333	71'667	96%	green
50	mechanical	85'000	78'333	83'333	80'833	95%	red
50	mechanical	95'000	86'667	83'750	85'208	90%	-
50	chemical	75'000	75'000	71'667	73'333	98%	green
50	chemical	85'000	81'667	71'667	76'667	90%	-
50	chemical	95'000	85'000	86'667	85'833	90%	-
75	mechanical	75'000	61'110	58'889	59'999	80%	-
75	mechanical	85'000	76'665	71'111	73'888	87%	green
75	mechanical	95'000	89'998	71'111	80'554	85%	red
75	chemical	75'000	71'109	56'667	63'888	85%	-
75	chemical	85'000	65'554	58'889	62'221	73%	-
75	chemical	95'000	77'776	80'000	78'888	83%	red

Particularly at a row spacing of 75 cm, the number of plants that actually emerged was in some cases significantly lower than the target number. On average, field emergence was 93% at a row spacing of 50 cm and 82% at a row spacing of 75 cm. This difference makes it impossible to directly compare individual target seeding rates in the following analysis. Therefore, two groups with similar effective seeding rates are formed to compare the two row spacings. The cause of this difference is likely to be found in the seeding technique; the two machines were probably not set exactly the same.

Plant development at the end of May was very uniform overall—the developmental stage was predominantly between the first and second fully developed leaves. Isolated instances of feeding damage occurred only to a limited extent and were evenly distributed.

Weed pressure:

Surveys were conducted on June 27, 2025, and September 20, 2025. Weed pressure was rated on a scale from 0 (no or very few weeds) to 5 (high weed infestation).

Table 20. Weed pressure

	Treatment	**06/27/2025**	**09/20/2025**	**Average**
1	RA50, Mechanical, 85'000	1/5	0/5	0.5/5
2	RA75, Mechanical, 75'000	1/5	3/5	2/5
3	RA75, Chemical, 85'000	1/5	1/5	1/5
4	RA50, Mechanical, 95'000	2/5	3/5	2.5/5
5	RA50, Chemical, 85'000	0/5	2/5	1/5
6	RA50, Chemical, 95'000	0/5	0/5	0/5
7	RA75, Chemical, 95'000	0/5	0/5	0/5
8	RA75, Mechanical, 85'000	4/5	4/5	4/5
9	RA75, Mechanical, 95'000	4/5	4/5	4/5
10	RA50, Mechanical, 75'000	3/5	3/5	3/5
11	RA75, Chemical, 75'000	1/5	3/5	2/5
12	RA50, Chemical, 75'000	1/5	3/5	2/5

The hoed plots tended to show more weed growth (score of 2.7, compared to a score of 1 for chemical weed control), though the results were not consistent. In some test plots, weeding or hilling apparently did not work optimally. Overall, however, weed pressure was generally low. Averaged across row spacings, weed infestation was slightly lower at 50 cm (score 1.5 vs. 2.2).

Crop establishment and nutrient utilization:

To assess plant density and canopy cover, the field was surveyed manually using a drone, and the images were analyzed for their respective green and brown components (leaves and stems). However, this method did not yield usable results; in future trials, the field must be systematically flown over and a full-area orthomosaic created, which can then be evaluated.

To assess nutrient uptake, soil samples were collected at two time points for 4 of the 12 variants (at 5 random locations), and the nitrate content was analyzed using a Nitracheck 404. Here, too, no usable results were obtained; presumably, more sampling points and a more precise analytical method are needed to draw any conclusions.

Yield:

The corn was harvested on November 13, 2025. The harvest was carried out by Philipp Hanhart using a New Holland CR 8.80. Yield mapping was used during harvesting, and the analysis and differentiation of the individual test plots were performed using this same yield mapping. In the trailers, the corn was separated according to 50 cm and 75 cm row spacing, so the yield per row spacing and the total yield are known.

Table 21. Yields by weighing slip

Row spacing:	Trial area (all treatments):	Yield wet (Weighing slip):	Moisture:	Yield/ha dry:	Yield/ha in %
50 cm	1.69 ha	26'739 kg	33.5 %	10.5 t/ha	97.5 %
75 cm	1.67 ha	26'817 kg	32.8 %	10.8 t/ha	100%

Based on the weighing slips and adjusted for 100% dry matter, the yield at a row spacing of 50 cm was 2.5% lower compared to a row spacing of 75 cm.

Individual yields for the variants are calculated from the yield mapping. To do this, the raw data from the yield mapping is compared with the weighing slips (corrected for the difference from the actual weight) and adjusted for area (interpolated using the measured distances of the separately harvested headland). This results in the following yield map (red zones with lower yield, blue zones with higher yield, parameter: yield/area, wet):

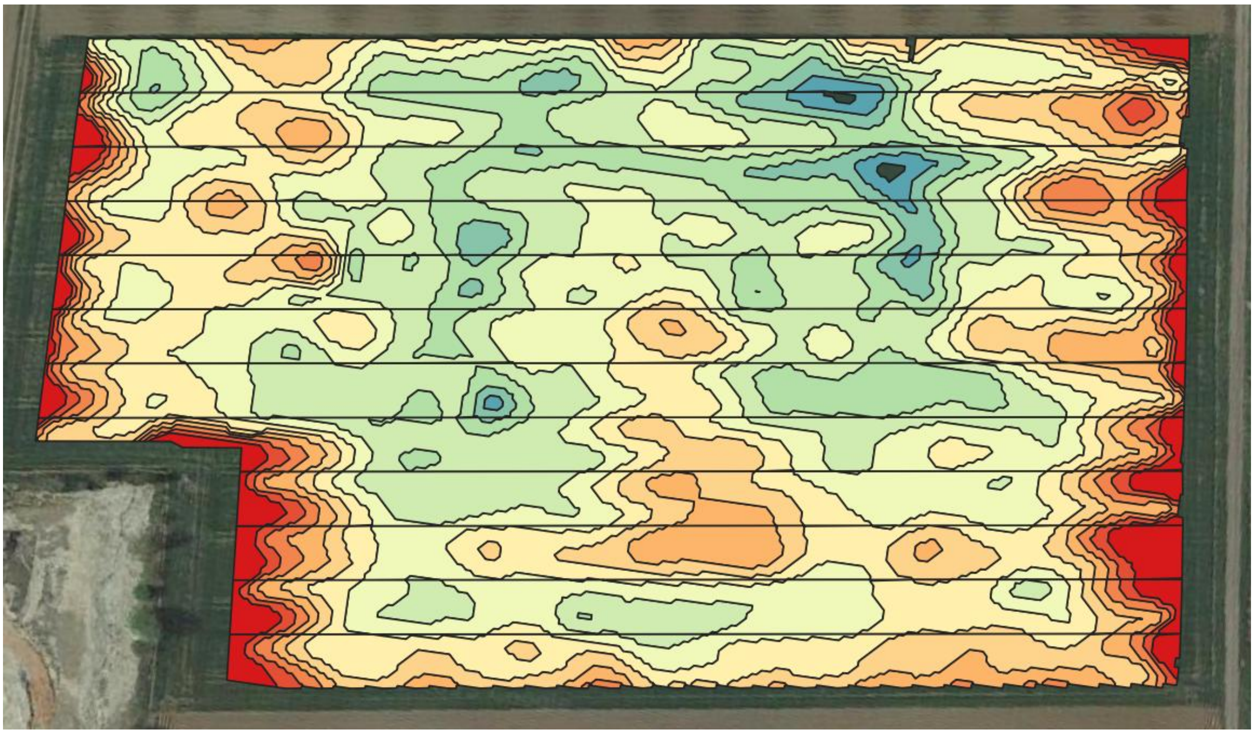


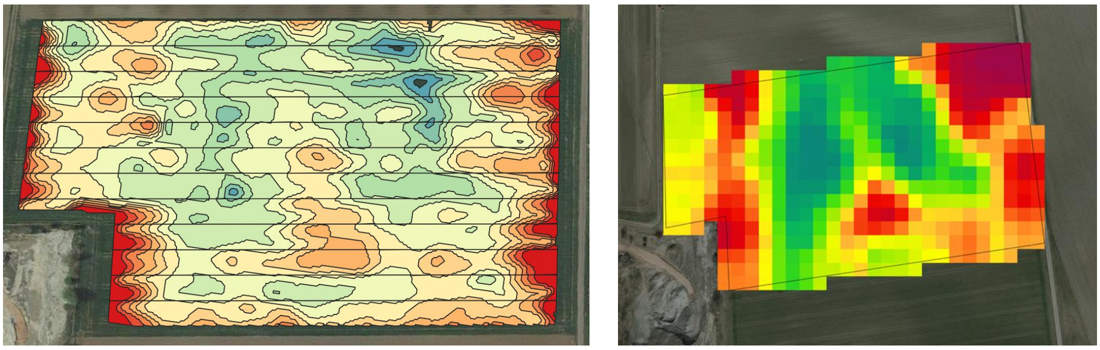
Figure 17. Yield map

Table 22. Yield, calculated per treatment

Treatment:	Name:	Yield [t/ha]:	Yield [%]:
1	RA50.85.HA	16.41	103.2%
2	RA75.75.HA	16.34	102.7%
3	RA75.85.HE	16.73	105.2%
4	RA50.95.HA	16.39	103.1%
5	RA50.85.HE	16.48	103.6%
6	RA50.95.HE	15.87	99.8%
7	RA75.95.HE	16.64	104.6%
8	RA75.85.HA	15.68	98.6%
9	RA75.95.HA	15.21	95.6%
10	RA50.75.HA	14.38	90.4%
11	RA75.75.HE	15.62	98.2%
12	RA50.75.HE	14.49	91.1%

Table 22 shows the yields for each treatment. RA stands for row spacing (50 cm vs. 75 cm), the second number for the target seeding rate (75,000, 85,000, and 95,000), and HA and HE stand for “hoeing” and “herbicide,” respectively. With two exceptions (RA50, 75, HA, and HE), there are no significant deviations. It is noticeable that there is more of a gradient across the field than clear differences between the individual variants. The yield mapping also correlates relatively well with the OneSoil productivity map. The zones with lower yields tend to be located in the southern part of the plot on both maps. Note: The OneSoil map does not have the same area as the yield map and covers the entire field edges and headlands, which is why significantly more "poor" zones are included. Furthermore, it has a much coarser resolution than the yield map.

Figure 18. Comparison of yield mapping (left) and the OneSoil productivity map (right)



The various experimental treatments do not always have the same level of "productivity" available to them. This would be impossible to implement experimentally, and the "productivity" factor must also be viewed critically, as calculating it is highly complex. For example, not all crops respond identically to soil properties or water availability. Where one crop performs above average in one location in the field, another crop may perform below average. Nevertheless, the extent to which the productivity map might have influenced the trial results was investigated.

Table 23. Distribution of productivity zones across row spacings

Zone	0.90	0.97	0.99	1.00	1.01	1.03	1.04
RA50	14.2%	9.4%	16.3%	11.1%	10.5%	14.6%	23.9%
RA75	11.4%	14.1%	14.6%	8.7%	17.4%	17.5%	16.3%

Table 23 shows the percentage of the total area allocated to each zone. RA50 has a significantly larger share of the area in the highest productivity zone (23.9%) than RA75, but a significantly smaller share in the second- and third-highest productivity zones. Overall, however, both variants had around 50% of the area in the top three productivity zones (RA50 49.0% and RA75 51.2%). This could explain part of the small yield increase associated with the 75 cm row spacing.

Even when the type of weed control is excluded and only variants with comparable plant density after emergence are compared, no significant differences can be observed.

Measurements of ear and plant weights:

Prior to harvest, measurements were taken of the number of ears per acre, ears per plant, kernels per ear, ear weight, and dry matter content. Although isolated differences were observed, the harvest ultimately showed that, overall, no significant difference between the two row spacings was detectable. Therefore, a detailed list of the results is not provided.

CONCLUSION AND OUTLOOK

Under the given conditions and based on the available data, no yield differences were observed between row spacings. The 2.5% increase in yield, as indicated by the weighing slip, at a row spacing of 75 cm may be explained by the fact that a marginally larger area was located in more productive zones. For the other parameters examined, differences and trends were occasionally observed, but none of these were ultimately relevant to yield. It would be worthwhile to repeat the experiment, especially in a dry year. This would allow for an investigation into whether better utilization of the soil or soil moisture results from narrower row spacing or more uniform distribution within the field. The experiment will be repeated in 2026, with fewer different variants but with replicates. Soil cover will be determined using an orthomosaic. This will allow any differences to be identified more reliably (Beyer, 2026).

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1.7 Peanut cultivation

CONTACT

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BACKGROUND AND PROJECT OBJECTIVES

The experimental cultivation of peanuts is intended to open up new opportunities for agricultural businesses. Given the growing demands for profitability, sustainability, and market adaptability, diversification offers an opportunity to meet these needs. New crops provide the chance to expand crop rotations in a targeted manner, spread risks, and at the same time capitalize on trends such as the rising demand for plant-based protein sources. Based on an idea by Nicolas Helmstetter (GVS Agrar AG), this project is testing a new approach to cultivation. The seeds come from Stephan Gysi of the Rinderbrunnen farm, who has been conducting his own variety trials for some time and is thus laying an important foundation for this initiative. Initial experiences show that even in Thurgau and western Switzerland, a few farms are testing peanut cultivation and are thus doing pioneering work. However, the focus of this experimental cultivation is not solely on the peanut crop itself, but rather on the idea of consciously breaking new ground. The goal is to sharpen awareness of alternative possibilities and to demonstrate that innovation often begins beyond the familiar. Farms should be encouraged to identify their own interests and potential niches and actively pursue them - regardless of whether this ultimately involves peanuts or entirely different crops.

TRIAL DESIGN

For the first cultivation trial, just under 10 acres of artificial grassland on the Mühlewies plot were plowed on May 14, 2025, and then harrowed. The Kalina variety was sown at a seeding rate of 200,000 plants/ha. With a measured thousand-seed weight (TSW) of 568.2 g, this corresponds to a seed rate of 114 kg/ha. The seed was from the year 2022. The first sowing took place on June 14, 2025. On the day of sowing, the seed was treated with a liquid rhizobium inoculant, which was organized by 3folium GmbH (Simon Bolli) and is specifically suitable for peanuts. The product used was rhizo power® nitrogen fixer for peanuts from nadicom GmbH. The active substance here consists of bacteria of the genus Bradyrhizobium (species not further specified). The inoculated seeds were then sown using a planter equipped with Precision Planting SpeedTubes.

On June 26, 2025, due to insufficient field emergence, a large portion of the area was reworked (harrowed) and resown. The same seeder was used, but with a standard seed tube instead of the SpeedTubes. Since no peanut-specific inoculum was available, the powdered inoculant Hi-Stick for soybeans (UFA Samen) was used for the second planting. Here, too, the active ingredient belongs to the genus Bradyrhizobium, species japonicum. No nitrogen fertilization was applied, as peanuts, being legumes, meet their nitrogen requirements through symbiosis with rhizobia. A sample harvest was conducted on October 30, 2025.

CROP DEVELOPMENT AND OBSERVATIONS

The thousand-kernel weight of peanuts can vary greatly depending on the variety. Generally, a distinction is made between Virginia, Spanish, Runner, and Valencia types, which differ in size and use (e.g., snacks, oil production, peanut butter) (Virginia Peanut Growers Association, 2026). This must be taken into account when selecting the variety and calculating the seeding rate. Inoculating the seed with the liquid rhizobium preparation proved to be challenging. When mixing the moistened peanuts, the seed coat (episperm), which holds the two cotyledon halves together, was sometimes damaged. Such damage can impair or completely prevent germination. Over the following two weeks, field emergence was very uneven and generally weak. It was suspected that, in addition to the inoculation, the Precision Planting SpeedTubes used may have contributed to the damage to the sensitive seeds. These devices facilitate seed transport via rubberized wheels, which can cause additional mechanical stress.

Figure 19. Precision Planting SpeedTube

The second sowing, using a simple seeding tube and a powdered inoculant, appeared to be easier to handle. The dry treatment was significantly gentler on the seed coat, and there was less visible damage to the seeds. Overall, the emergence following the second sowing seemed somewhat more uniform.

Figure 20. To the left of the red line are plants from the first sowing on June 14. Photo taken on July 21.

The first seedlings appeared starting on June 20, but many seeds rotted. There were isolated instances of crow damage, i.e., plants that had been pulled up. Only 2 of the 6 rows germinated reasonably well.

Figure 21. To the right of the red line are plants from the second sowing on June 26. Photo taken on July 21.

In the second planting, the plants emerged more uniformly, and the rows were clearly more visible despite being planted 12 days later.

Figure 22. Plant from the first sowing, photo taken on July 21.

Figure 23. Plant from the second sowing, photo taken on July 21.

Although the seedlings had emerged more uniformly, the difference in growth remained clearly visible for a long time. By mid-August, however, the above-ground plant biomass had evened out, and the plants looked identical.

On July 21, 64,000 plants per hectare were counted in the first sowing, and 61,818 plants per hectare in the second sowing. Counts were taken over 2 linear meters at 5 and 10 locations in the field, respectively (first sowing and second sowing). However, the differences in plant density were considerable, with between 3 and 10 plants counted per 2 linear meters.

Figure 24. Plant dug up on October 7

Test excavations on October 7 showed that harvesting was not worthwhile. Although fully mature peanuts were present, their number was too small to justify the effort. On October 30, a random sample of plants was dug up and the nuts were cleaned. The number of fully mature nuts, the number of partially mature nuts, and the total number of nuts per plant were assessed. For each planting date, 3 by 2 running meters were excavated. The condition of the plants deteriorated rapidly between October 7 and October 30. While the plants still appeared healthy on October 7, many were already dying and rotting by October 30.

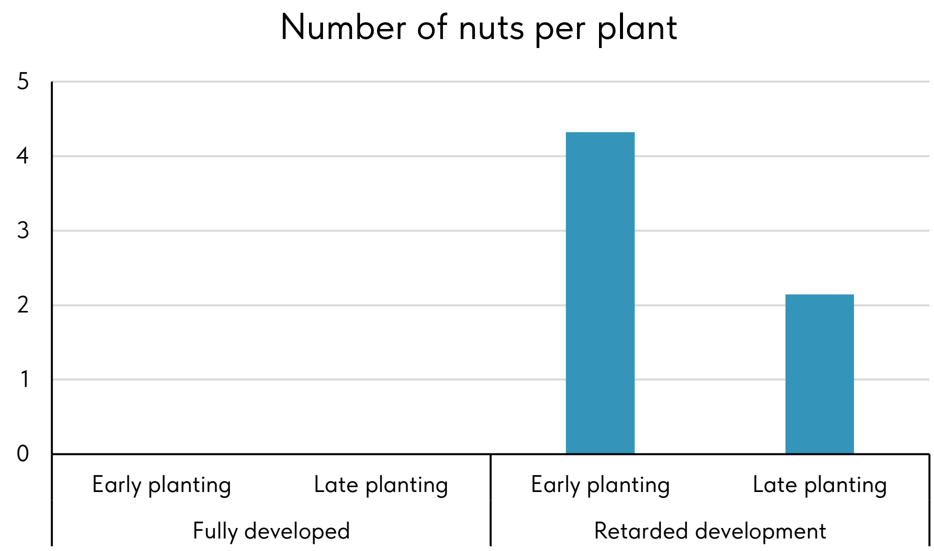

Figure 25. Yield measurements on October 30, 2026

Plants from the early sowing produced significantly more fruit than those from the late sowing. In the early sowing, an average of 7.3 fruits per plant were counted, compared to only 2.6 in the late sowing. In the late sowing, on average, only about one in two plants produced a fully developed fruit, while in the early sowing, 3.3 fully developed fruits per plant were produced. For half-developed fruits, the early sowing still produced more than twice as many fruits as the late sowing (4.3 vs. 2.1 fruits per plant).

Figure 26. Harvested peanuts, whole

Figure 27. Harvested peanuts, cross-section

Figure 26 and Figure 27 show examples of harvested fruits. The top two specimens are fully ripe, and the reddish seed coat is clearly visible. The bottom two specimens are not yet fully ripe; the fruit has not yet reached full maturity.

CONCLUSION AND OUTLOOK

As expected, growing peanuts under the given conditions proved to be challenging. In particular, the careful application of the rhizobium inoculant and the use of appropriate seeding equipment (precision planting) were crucial for successful field emergence. The harvest results show that, in hindsight, more patience after the first sowing would have been advisable: despite initially weaker emergence, the plants from the early sowing developed significantly better and ultimately yielded higher returns. Concerns regarding the supposedly older seed thus proved unfounded. Weed control was carried out entirely by hand and was correspondingly labor-intensive. For the next growing season, the plan is to sow even earlier and to grow the peanuts on ridges to achieve higher soil temperatures. In addition, sowing will be done by hand to avoid mechanical damage to the sensitive seeds as much as possible. The goal is to better assess the site-specific yield potential of the peanut under conditions that are as optimal as possible.

1.8 Implementing spot spraying using existing equipment

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BACKGROUND AND OBJECTIVES

The targeted and resource-efficient application of plant protection products is becoming increasingly important in modern agriculture. One promising technology in this context is “spot spraying.” With this method, plant protection products are no longer applied across the entire area, but only in specific spots where an infestation—such as weeds—is actually detected. This is made possible by camera-based sensor systems and intelligent algorithms that distinguish between crops and weeds in real time and control the application accordingly.

Specialized systems already exist today that successfully demonstrate this technology in practical use. Examples include the autonomous or semi-autonomous solutions from Ecorobotix or camera-controlled spot sprayers such as those from Farm-ING. These systems impressively demonstrate the potential of precise individual plant treatment, particularly with regard to a significant reduction in the use of pesticides. Nevertheless, the adoption of such technologies in Switzerland has been limited so far. Various challenges exist—including high investment costs, operational complexity, and integration into existing work processes (Eppenberger, 2026).

This is where the implementation at the Swiss Future Farm comes in. The focus is on how spot spraying can be carried out using a conventional field sprayer—in this case, the Horsch Leeb CS 1.4. The goal is to determine how complex the implementation is and how significant the savings on crop protection products actually are. What compromises must be made when standard farm equipment is used instead of specialized spot-spraying hardware?

The advantage is clear: there is no need to invest in spot-spraying technology, and the utilization of the field sprayer is increased.

TRIAL DESIGN

An initial test examined the requirements an application map must meet in order to be correctly implemented by the sprayer or tractor. Furthermore, various buffer zone sizes around identified weeds were evaluated. A test run was then conducted to verify the accuracy of herbicide application and to identify specific considerations for spot spraying.

A wheat crop in the Grund field served as the test site. The field contains scattered patches of creeping thistle, which were manually mapped for the initial test using the Emlid Reach RS2 RTK surveying rod.

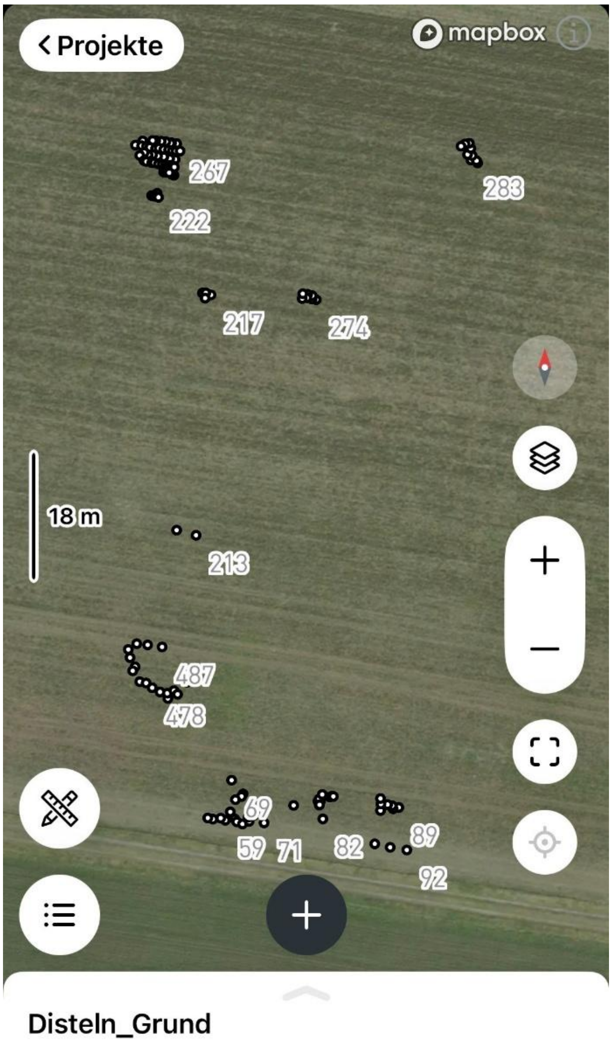

Figure 28. Mapping with the Emlid Reach RS2 RTK pole. Each individual point represents a field thistle

The points were then exported from the Emlid Flow app as a Shapefile and imported into QGIS.

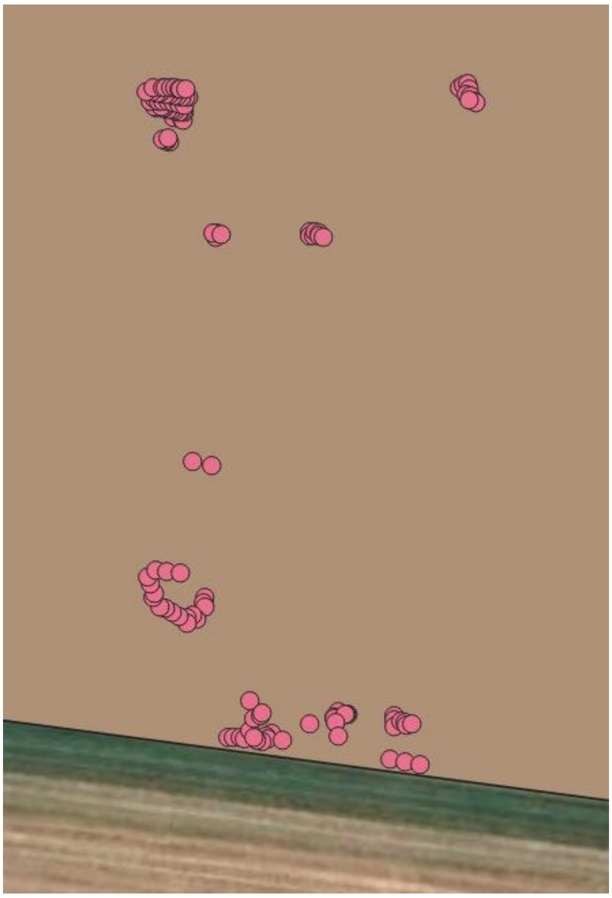

Figure 29. Displaying mapped thistles in QGIS

Each point was then buffered by 4 meters. In other words, a circle with a radius of 4 meters was drawn around each point. This expansion of the treatment area was intended to ensure that there would be enough time to start the spraying process as the sprayer passed over the area, so that the full amount would be applied by the time the nozzle was directly over the field thistle at the latest.

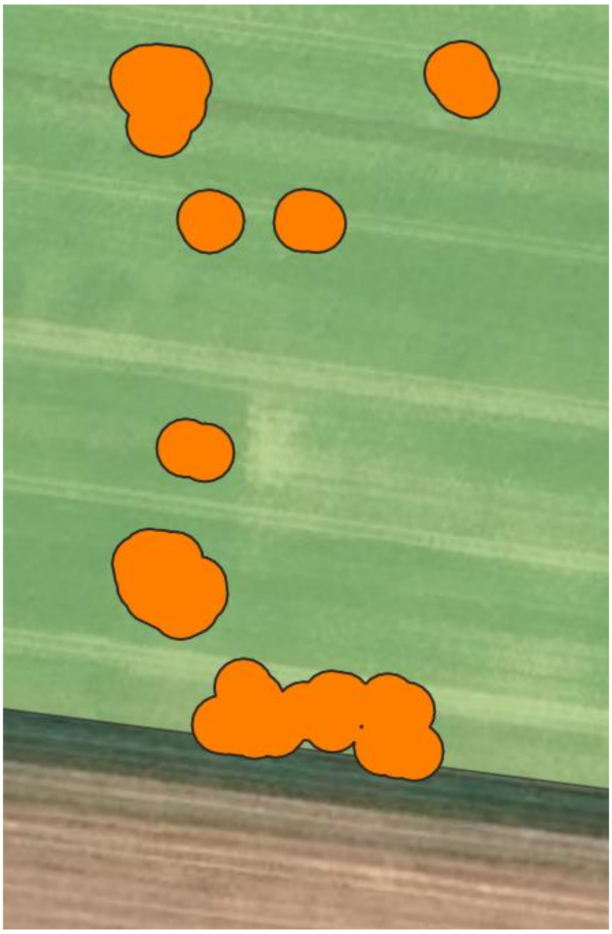

Figure 30. Final prescription map showing the buffered locations of field thistles

The resulting application map was then imported into the Fendt 620's terminal and used in the field.

Figure 31. Fendt 620 with a Horsch Leeb CS 1.4 performing spot spraying. Only the nozzles on the far left are active.

Figure 32. Display of a spot-spraying prescription map on the FendtONE terminal

In addition to the application described above in April 2025, spot spraying was also tested in October 2025 on the Langwies field. Langwies is a natural meadow used as a hay pasture. Here, broad-leaved dock (Rumex obtusifolius) was mapped using a drone and Agroscope's detection algorithm. The coordinates of the individual plants were then available in a .csv file, imported into QGIS, and buffered. The resulting application map is identical to the one described at the beginning.

CONCLUSION AND OUTLOOK

We successfully created functional application maps capable of effectively processing the combination of tractor and field sprayer. Position data from various sources could be utilized, making the process flexible for the future. The only stumbling block was the resolution of individual points in QGIS. During resolution, the boundaries between overlapping areas are removed, and a single, contiguous area is created from multiple overlapping individual areas. A map simplified in this way could no longer be used; the areas to be treated needed to be represented as individual points or circles. With these insights, maps can be created promptly for future trials, regardless of which upstream process the weed location data comes from.

Manual mapping of weeds is not effective because it is far too time-consuming. If individual plants or clumps need to be treated, this is done directly with a backpack sprayer. At the time of treating field thistles, however, no detection algorithm was yet available for them. In the case of black nightshades, however, this was different thanks to a project by Agroscope and OST. Mapping fields using drones promises to yield weed maps with a reasonable time investment. In future trials, more recognition algorithms for various weeds should be evaluated. In doing so, the focus will shift to the topic of drone flight and the camera to be used.

The biggest challenges involved the field sprayer, particularly in accurately determining the parameters of travel speed, application rate, and buffer size. The tests conducted showed that field thistles and black thistles were not adequately targeted. The “BoomControl” boom control system automatically raises the spray boom to a predefined height when the system is turned off. This is desirable, for example, at the headland. However, during spot spraying, this caused the boom to frequently raise itself to the starting position in the field and lower too slowly when approaching an area to be treated, or the travel speed was too high to lower it in time. For spot spraying, the starting position should therefore be set - similar to the application height - to 25 cm above the crop. It also became apparent that the travel speed must be reduced to minimize the distance traveled by the nozzle during the switching process. In other words, the higher the travel speed, the larger the buffer must be to allow the nozzle sufficient time to activate. However, this conflicts with the goal of minimizing the treated area as much as possible. With a constant nozzle spacing and type, reducing the travel speed requires an increase in the application rate. Alternatively, nozzles designed for a lower flow rate can be used. In subsequent tests, the optimal balance between application rate, travel speed, nozzle type, and buffer size must therefore be determined.

1.9 Cover crop seeding with a drone

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BACKGROUND AND OBJECTIVES

To meet the requirements of the Production System Contribution (PSC) for “adequate soil cover,” arable land must not remain uncovered for more than seven weeks after harvest. One way to cover the soil is through green manure, which can be sown either shortly before or after the harvest of a crop. An innovative method for sowing before the crop harvest is the use of drone seeding. The following questions were investigated as part of this experiment:

- What does the seed distribution pattern look like for a cover crop sown by drone?
- How does a cover crop sown by drone develop?
- Which plant species establish themselves well?

A similar experiment was conducted last year.

TRIAL DESIGN

The trial was conducted on the Halde plot. As part of a separate trial, a mixture of winter white peas and barley had been sown on this plot. On November 5, 2024, 160 kg/ha of WEE Furtif and 40 kg/ha of WG Loony were sown as a mixture using the Horsch Versa 3 KR. Compared to the 2024 trial, herbicide treatment was applied only in the fall of 2024.

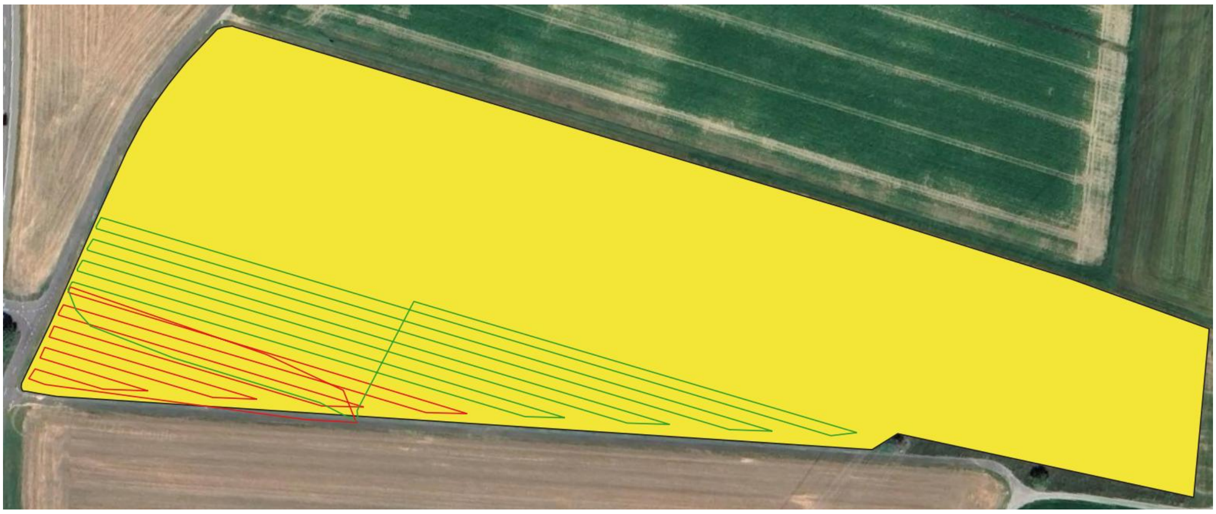

Figure 33. Area of the Halde trial field, including the drone's first two flights

Figure 33 shows the trial plot area of the Halde field, including the drone's first two flights. The first flight is highlighted in red; after this flight, the drone returned to the starting point to refill the seed hopper and replace the batteries. The second flight is highlighted in green, continuing until the seed hopper was refilled and the batteries were replaced again.

Figure 34. Catch tray in a winter pea and barley crop

To assess the distribution quality of the seeds, collection trays were placed throughout the crop. The trays were positioned on top of the crop (Figure 34), so that they would catch all seeds that fell onto the crop. No data was collected on how many seeds fell onto the soil surface or when they did so. Some seeds may have remained attached to the standing plants and may have fallen to the ground later, or not at all. However, it is nearly impossible to determine which seeds fall directly onto the soil surface, as any movement in the crop during the inspection would skew the results.

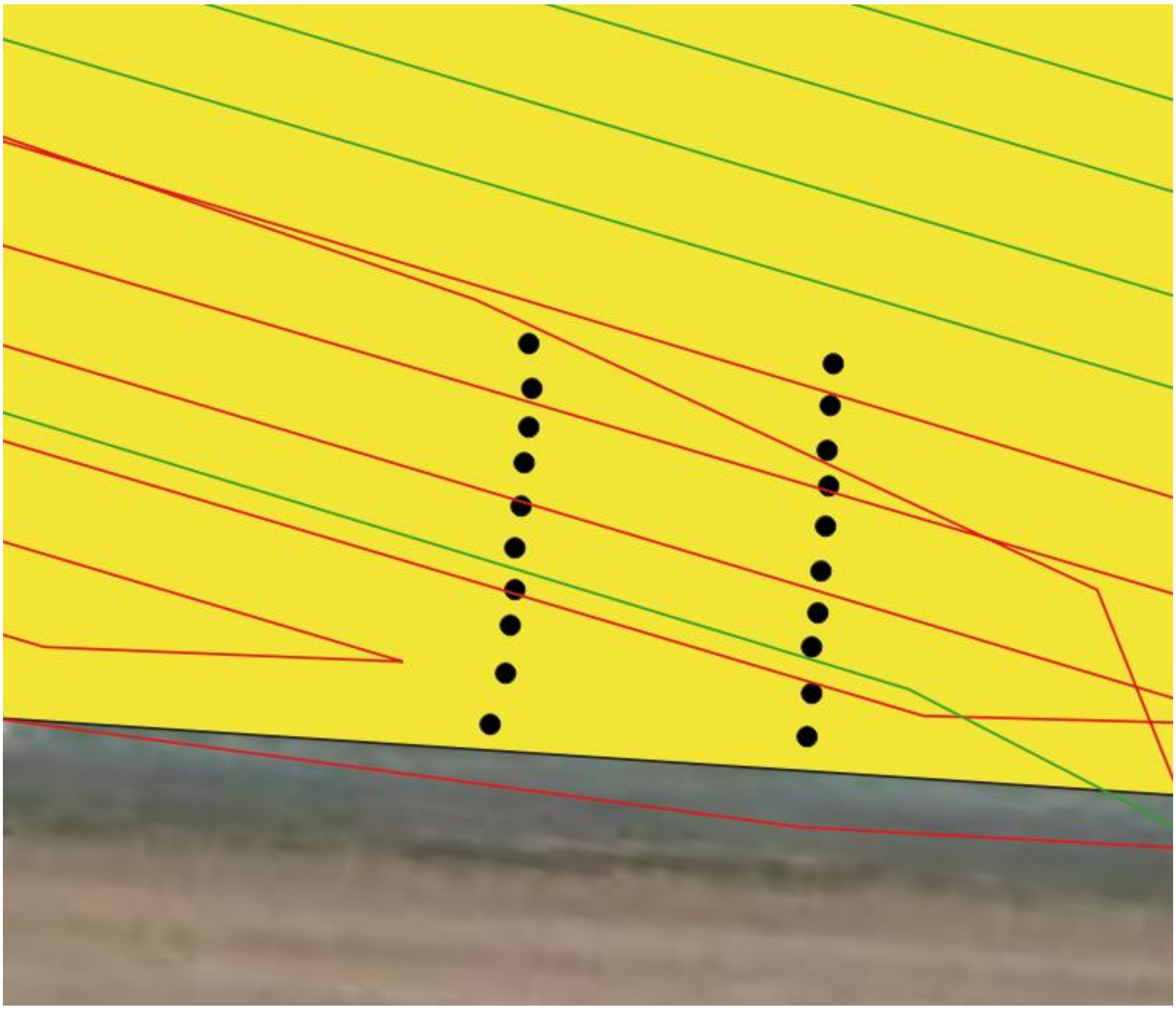

Figure 35. Platzierung der Fangschalen im Feld

Figure 35 shows how the 20 collection trays (2 rows of 10 trays) were distributed across the field. The flight path planning and the position of the collection trays were not ideally coordinated; the drone flew parallel to the northern edge of the field, so the collection trays were located in the drone's turning area and were not all flown over evenly. Of course, an even distribution of seed is also desirable at the field edge and in turning areas, but it is to be expected that the quantity will vary more significantly in areas where the drone is braking and accelerating.

The seeding was carried out by Daniel Wiesli, Head of Drone Services at the Laveba Cooperative. A DJI Agras T20 drone was used.

Seeds were sown on June 13, 2024, under sunny skies and with almost no wind. The UFA Drohne seed mixture was sown at a target rate of 15 kg/ha:

- 40 g Alexandrian clover, single-cut
- 40 g Incarnate clover
- 25 g Hybrid Sudan grass
- 30 g Guizotia
- 15 g Oil radish, multi-resistant

It took about 30 minutes to mark out the field and 60 minutes to sow the seeds.

RESULTS

During the first pass, 10 kg of seed was spread over approximately 43 ares (23.3 kg/ha). Since this rate was too high, the slides were opened less fully, and during the second pass, 10 kg of seed was spread over approximately 91 ares (11 kg/ha). The rest of the field was then seeded using this setting. For the seed collection trays, this means that a seeding rate of 23.3 kg/ha can generally be assumed.

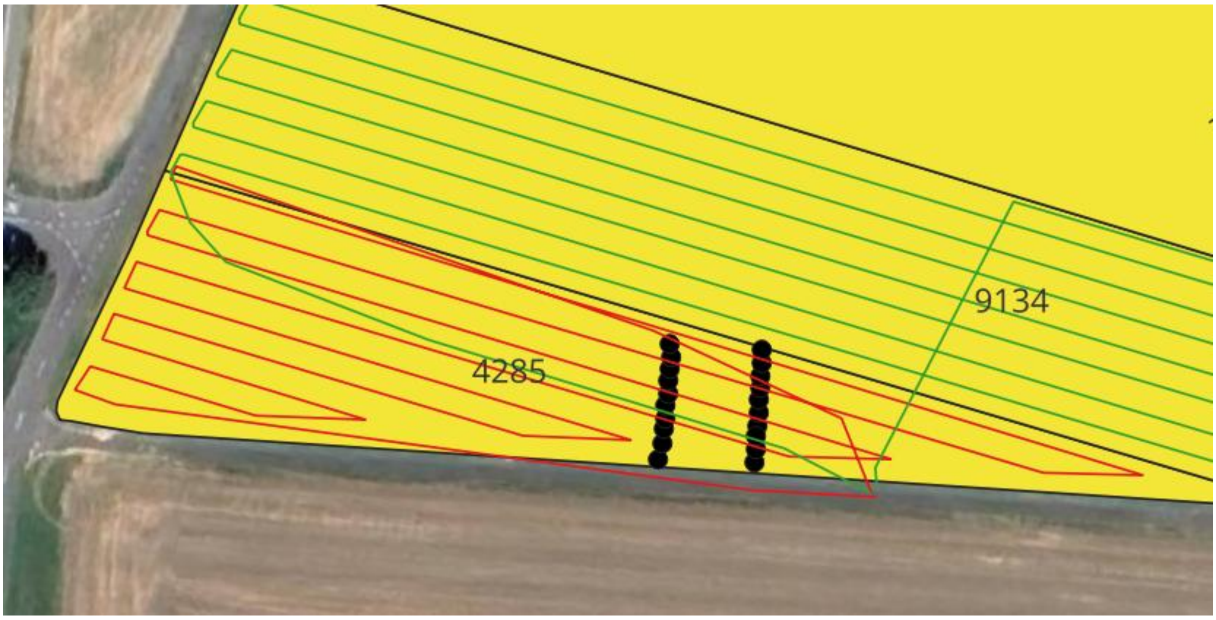

Figure 36. Flight path and areas

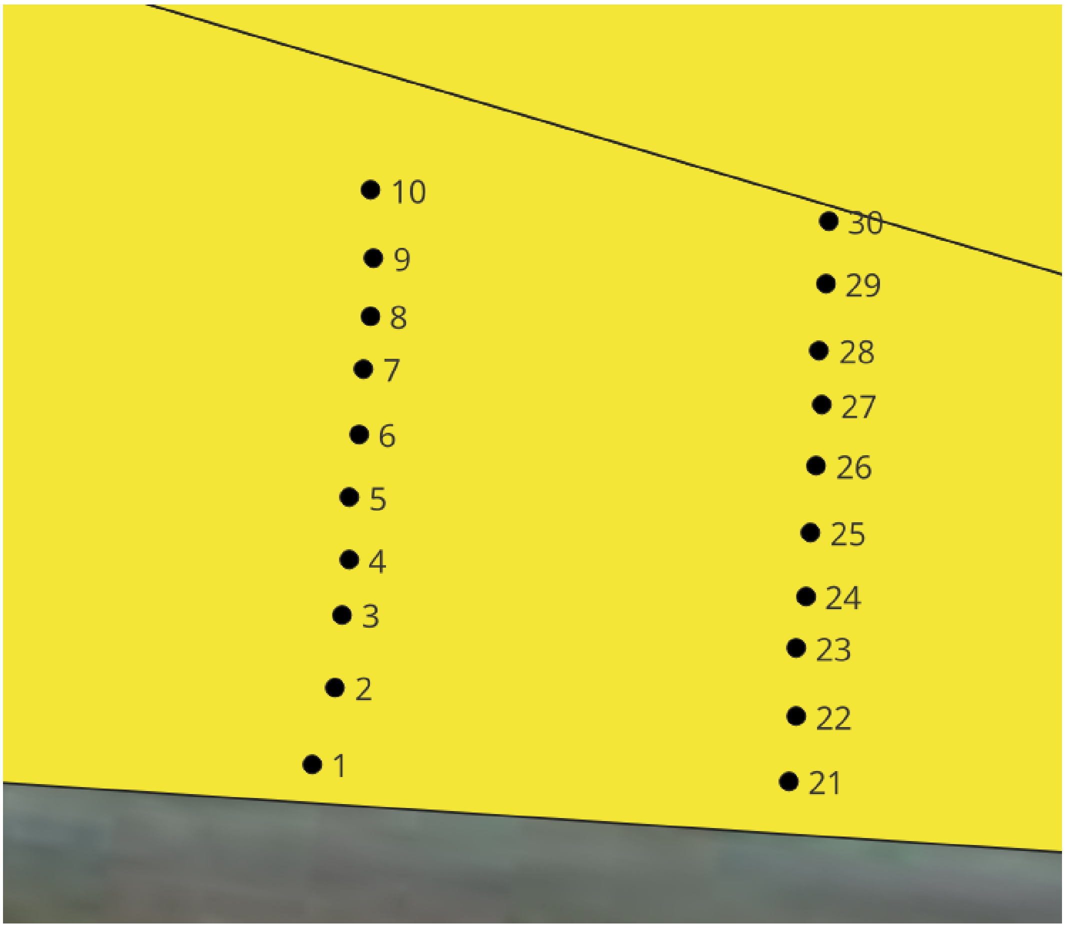

Figure 37. Numbering of the catch trays

Table 24. Weights measured in the catch trays

Tray	Weight [g]	kg/ha
1	0.79	31.6
2	0.43	17.2
3	0.41	16.4
4	0.27	10.8
5	0.38	15.2
6	0.31	12.4
7	0.30	12.0
8	0.41	16.4
9	0.29	11.6
10	0.31	12.4
21	0.85	34.0
22	0.86	34.4
23	0.46	18.4
24	0.24	9.6
25	0.22	8.8
26	0.43	17.2
27	0.33	13.2
28	0.25	10.0
29	0.17	6.8
30	0.21	8.4

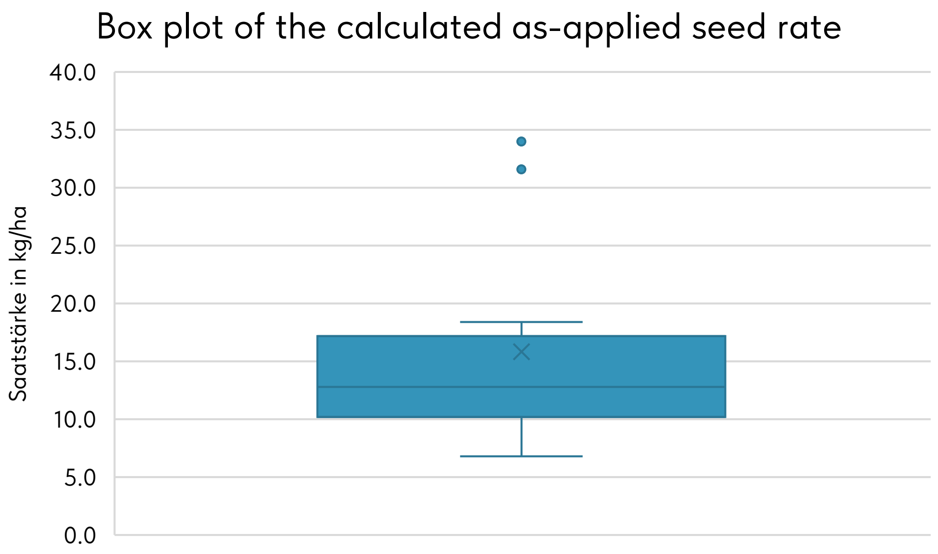

Figure 38. Box plot of the calculated as-applied seed rate

Overall, the determined seeding rate ranged from 6.8 kg/ha to 34.4 kg/ha. The median is 12.8 kg/ha. This seeding rate is significantly lower than the approximately 23.3 kg/ha that would be expected, and the variance is very high. One possible explanation is that some of the seeds were blown out of the collection trays by the drone's wake, even though the trays are equipped with a grid designed to prevent or at least reduce this effect.

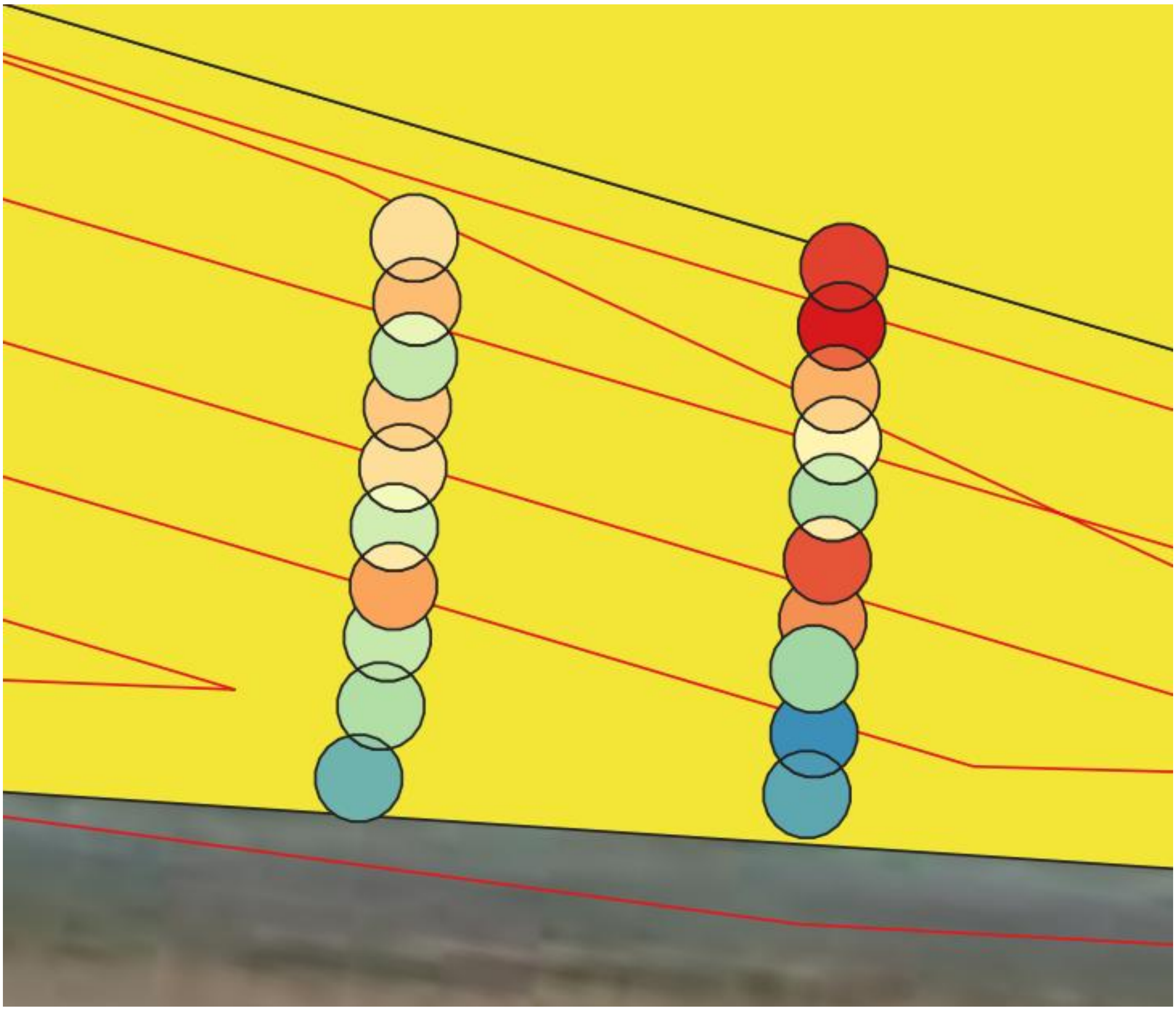

Figure 39. Seed distribution pattern (red: low seed rate; blue: high seed rate)

This assumption is supported by the weight distribution pattern. Relatively low weights are measured directly beneath the drone's flight path (areas shown in orange to red). Relatively high weights have been measured between flight paths or at the edges during braking and turning maneuvers (areas shown in green to blue).

Figure 40. Seed sample from catch tray No. 1

In general, all types of seeds were found in the collection trays; the sample from collection tray No. 1 is shown here as an example.

On August 25, the success of the green manure establishment was assessed. To this end, a 1-meter-by-1-meter area was evaluated at five randomly selected locations in the field.

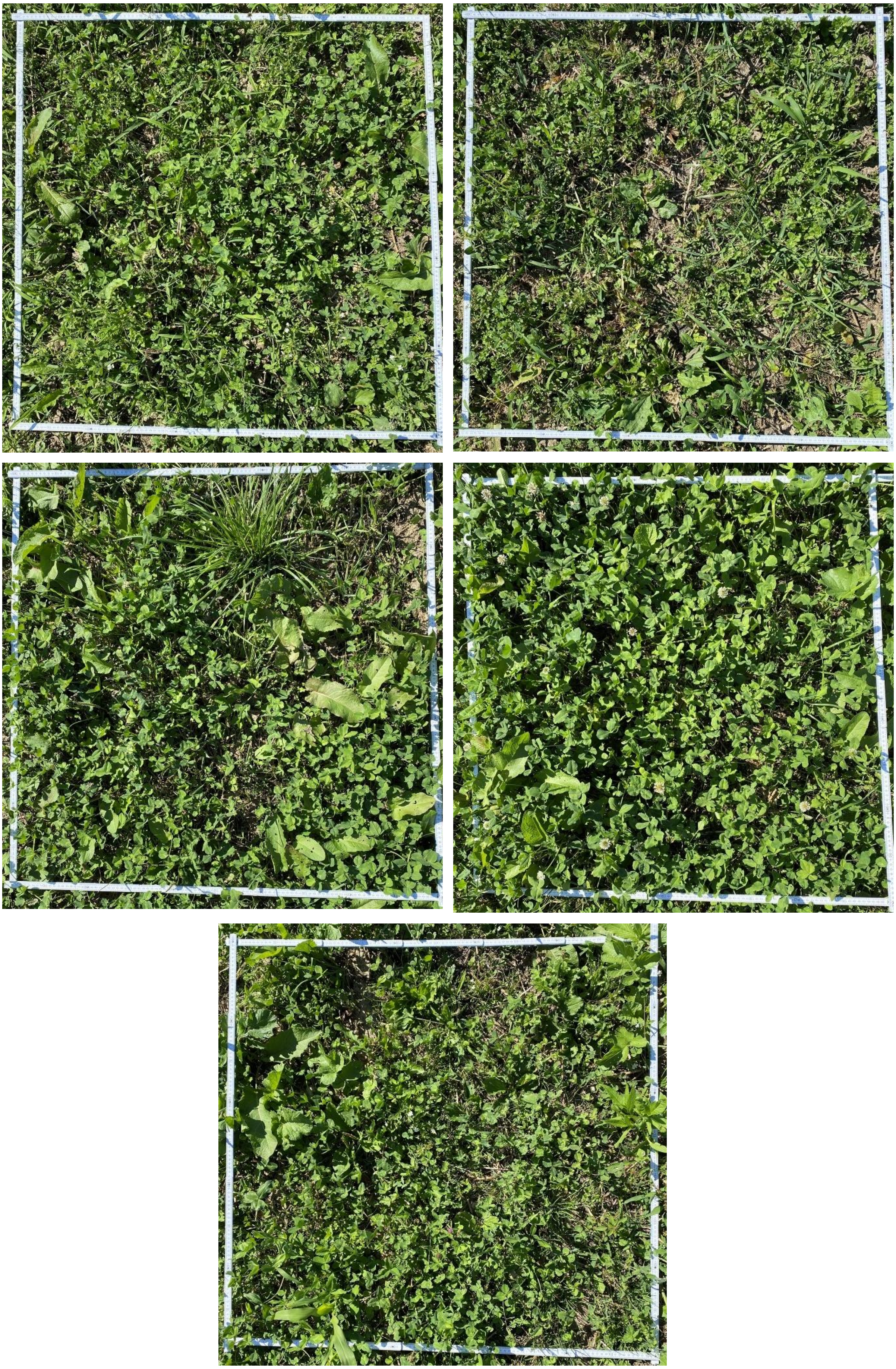

Figure 41. Photos of the 5 sites evaluated in the field

The cover crops (Alexandrian clover, crimson clover, hybrid Sudan grass, Guizotia, and oil radish) have established themselves only moderately. The following plants were found across the total area of 5 m²:

- Hybrid Sudan grass: 3
- Guizotia: 0
- Oil radish: 4

Clover was abundant, but always a mixture of the sown clover varieties and red or white clover. The ratio was either 1:1 or heavily in favor of red and white clover. Establishment success was highly variable; in some places, a few Guizotia plants were indeed observed, though not at the randomly selected sites. Weed pressure (Rumex, Plantago) was very high in some parts of the field.

Figure 42. Barley in the combine's swath

It was also clearly evident that seedling establishment under the straw swath was much poorer than alongside it. In each case, volunteer grain dominated.

The total cost of seeding by drone amounted to CHF 347.95. CHF 99.60 of this was for travel expenses. Dividing the remaining CHF 222.30 by the seeded area of 3.1 ha, the cost of seeding alone amounts to CHF 71.70/ha.

A comparison with conventional seeding technology might look like this:

Tractor 75-89 kW, 49.00 CHF/h
Horsch Pronto 3 DC[1], 118 a/h, 78 CHF/ha
Labor costs of 32 CHF/h

[1] For the Horsch Pronto 3 DC, the values from codes 5004 and 5062 were averaged

The cost of this method would amount to CHF 207.17 per hectare. However, in this case, sowing could only take place after the harvest (July 11, approximately one month later) and once the straw has been removed. The figures are taken from the Agroscope Machinery Cost Catalog 2025.

CONCLUSION AND OUTLOOK

As observed last year, the variations in application rates are significant. To conduct an initial assessment of the application rate, 43 ares were seeded. In a second step, an additional 91 ares were then seeded. The drone operates very quickly, which means that a large area can be seeded rapidly, even if the application rate is not correct. It would therefore be advisable to test specific, frequently used mixtures (such as presumably UFA Drone) precisely with different drones or metering systems to determine the correct settings, rather than determining them in the field. However, with the pilot's experience, the correct amount was achieved quite well (even last year). Establishment success did not meet expectations in this trial either. It is possible that seeds became lodged in the protein peas and/or the awns of the barley.

It is also possible that precipitation after sowing was insufficient. Although 14 mm of precipitation was measured on June 15 (two days after sowing), only a total of 20 mm of rain fell in the two weeks following sowing up to July 2. It was not until between July 3 and July 8 that another 44.7 mm of precipitation fell. The three weeks following sowing were thus rather dry, and the crop (protein peas and barley) was still vigorous (harvest took place on July 11).

1.10 Short Stature Corn (SSC)

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BACKGROUND AND PROJECT OBJECTIVES

Short Stature Corn (SSC), also known as "short stature corn," represents a relatively new approach in modern corn cultivation. These corn varieties are characterized by reduced plant height, thicker stalks, and a lower cob attachment point. SSC corn is based on a natural mutation that was discovered in the Midwestern United States and has since been further developed through breeding. (as was the case with the cultivation system for ALS-resistant Conviso Smart sugar beets). Because the plants are shorter with a lower ear position, the center of gravity is lower. Combined with the thicker stalks, this results in improved plant stability and a lower risk of lodging due to wind or storm events.

In addition to agronomic traits, advantages related to the cropping system are also being discussed in connection with SSC. Due to the shorter plant height, it is proposed that plant density be increased to optimize light utilization and that row spacing be reduced. This is expected to result in faster ground cover and potentially better weed suppression, while also reducing the risk of erosion. It is also assumed that the shorter distance between the flag leaf and the stigma promotes pollination and can thus contribute to more stable yields. Furthermore, improved water and nutrient efficiency is anticipated, as space distribution within the stand can be optimized (narrower row spacing, higher plant densities).

In addition, SSC is said to have a greater ability to compensate for crop losses (due to higher seeding rates), such as those caused by pests like snails, crows, or leafhoppers. Because of its potentially better weed suppression, the system is also considered promising for organic farming. On the other hand, disadvantages may arise in terms of disease tolerance (poor aeration, ears close to the ground).

The characteristics mentioned are based primarily on assumptions and initial observations from 2024. The extent to which each characteristic is pronounced will become clear over the course of several years and also depends heavily on the variety, which was not the same in 2024 and 2025.

The objective of this experiment is therefore to systematically investigate selected traits of short-stature corn under the given site conditions and to gain further insights into crop development, lodging resistance, and the cultivation system.

As part of this project, Swiss Future Farm (SFF) is subject to a confidentiality agreement with Bayer. In this context, it is stipulated that all parameters collected in this project conducted jointly with Agroscope - in particular dry matter yields, starch yields, and other quality parameters - will be evaluated and communicated exclusively by Agroscope.

The SFF, on the other hand, focuses on the practical evaluation of the cultivation system. This includes, in particular, observations of plant growth habits, the overall behavior of the system, and the response of SSC varieties to different seeding rates. The goal is to gather experience under field conditions and gain insights into how these factors affect crop development and cultivation characteristics.

TRIAL DESIGN

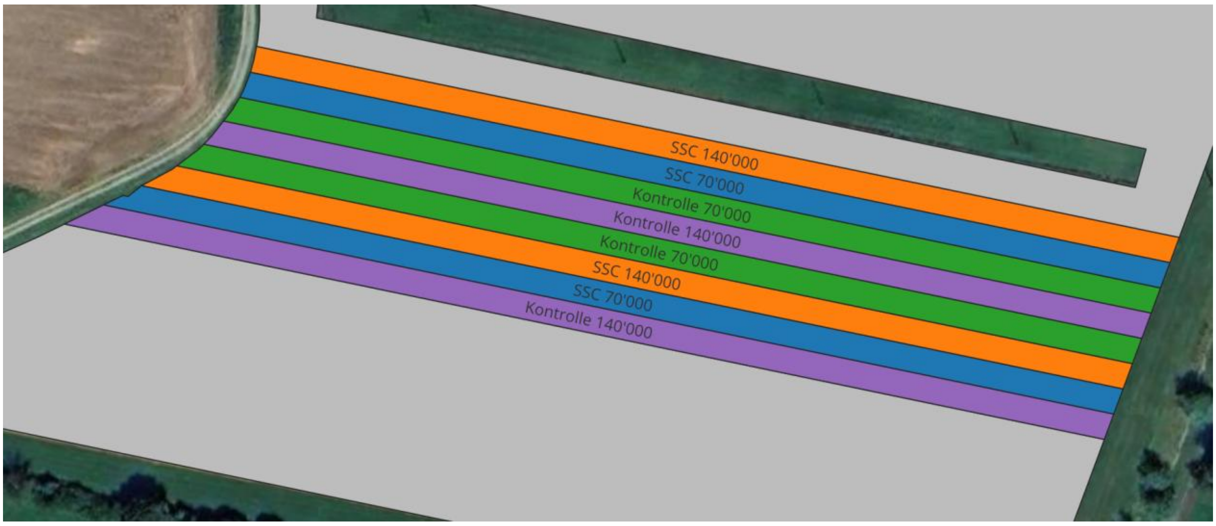


Figure 43. Trial design SSC 2025

The trial was conducted on the Rütteli plot. The trial compared seed rates of 70,000 seeds/ha and 140,000 seeds/ha (sown). Two varieties were included in the trial: Farmueller as the control and SSC variety 1. A second SSC variety was sown in the northern part of the field, but not under the same experimental design, which is why the results cannot be directly compared. The rest of the field was managed according to standard farm practices. The Rütteli plot has a slope of >2% toward the north. The preceding crop was winter rapeseed, after which UFA Lepha and then UFA Silo Quattro were sown (August 15, 2024 / November 10, 2024). This cover crop was mulched in April, and on May 3, the seedbed was prepared in strips using the Strip-Till, with seeding carried out on May 14 using the Precision Planting planter. Two days before seeding (May 12), the field was rolled with a Cambridge roller. On the day of seeding, Roundup Powermax and Starane Max were applied, followed by an application of Equip Power on June 16. Fertilization was identical and consisted of 41 m³/ha of pig manure on April 16 and 100 kg of urea on June 14. Harvesting (silage corn) took place on October 17, 2025.

RESULTS

On August 19, 2025, the total plant height and the height of the ear were measured.

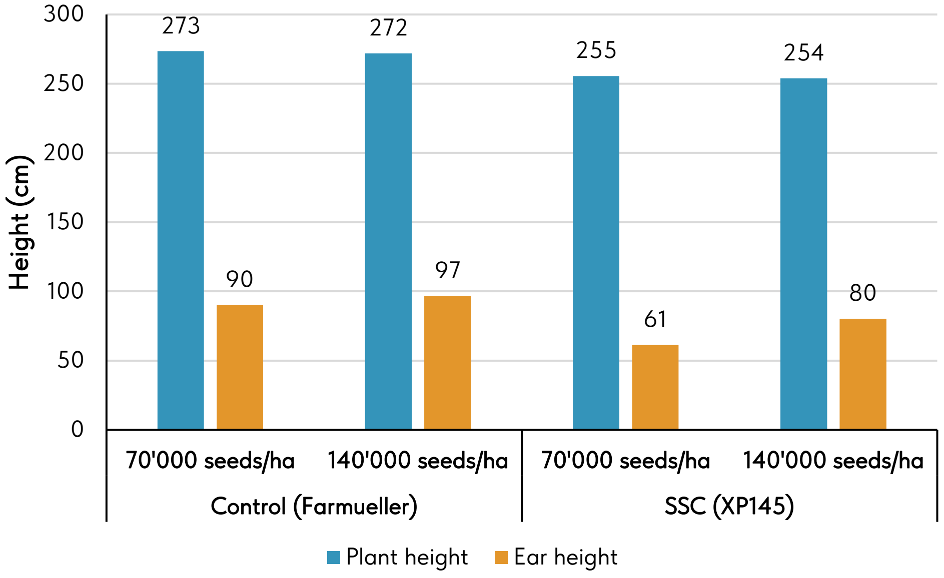


Figure 44. Total plant height and ear height measurements results.

On the same day, the stem diameter was also measured 2–3 cm above the ground.

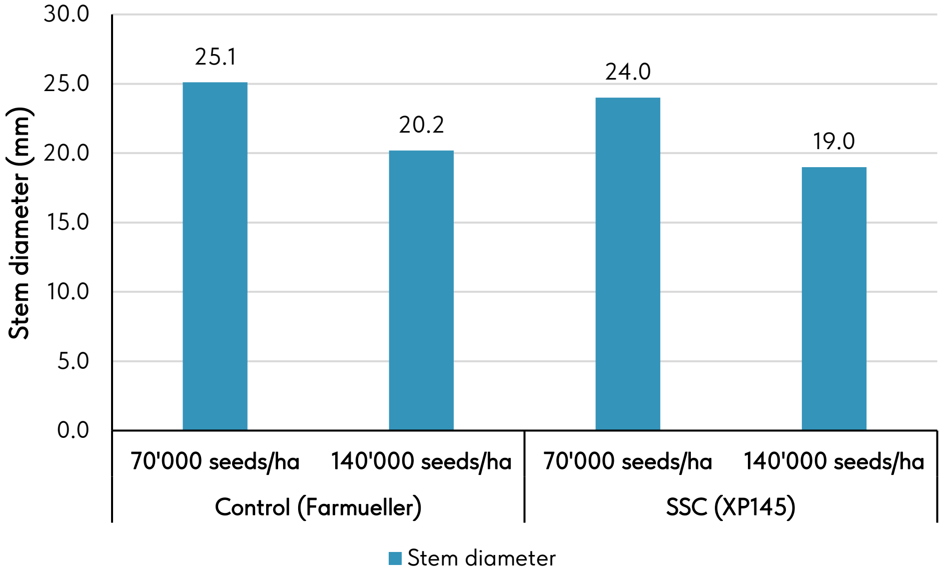


Figure 45. Stem diameter measurement results

After harvest, samples were taken from all varieties at the silo and analyzed in the laboratory. For the reasons mentioned above, only the dry matter content at harvest is presented here.

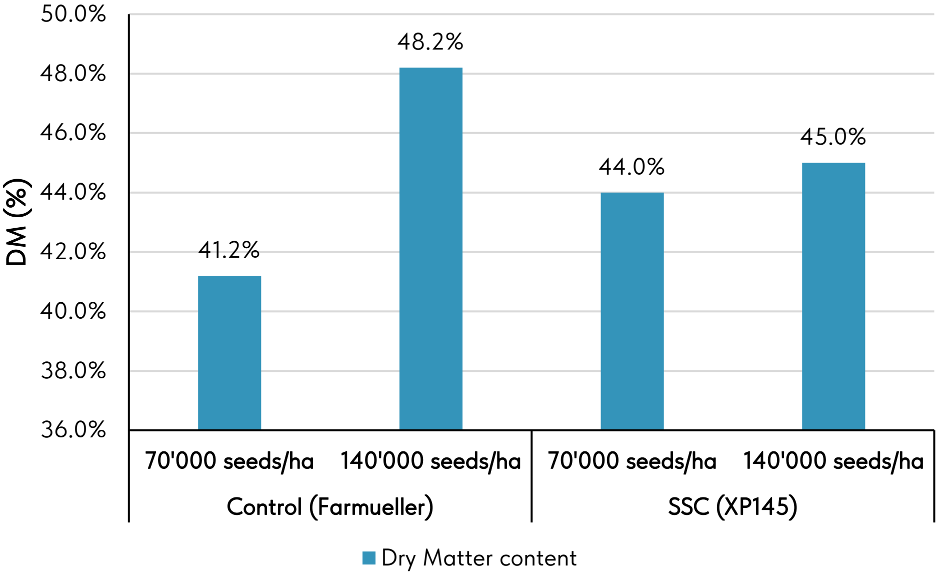


Figure 46. Dry matter content at harvest

DISCUSSION AND OUTLOOK

As the name suggests, short-stalk corn exhibits a significantly more compact growth habit. At the tested plant densities (70,000 and 140,000), the plants of the selected control variety reached heights of 273 cm and 272 cm, respectively, whereas the short-stalk plants reached 255 cm and 254 cm, respectively. The total height is thus just under 20 cm lower. The seeding rates themselves had no effect on height in either the control or the short-stalk type.

The ear emergence was also lower in the short-stalk variety. Here, the difference between seeding rates was more pronounced in the short-stalk variety. At 70,000 plants/ha, the ear emergence was 29 cm lower; at 140,000 plants/ha, it was still 17 cm lower. In short-stalk corn, ear emergence increased more significantly with higher plant density than in the control.

In terms of stem diameter, there were hardly any differences this year, or, more specifically, for the XP145 variety, compared to the selected control variety. Contrary to expectations, the stems were actually slightly thinner, by a good 1 mm in both seeding depths. However, the seeding rate itself had a clearly measurable effect here; at the deep seeding rate, the stems were 25% and 26% thicker, respectively (control and SSC). The identical fertilization may be a reason for this, as fertilization was not varied between plant densities in the trial.

When comparing dry matter content at harvest, it is striking that the difference between seeding rates is much more pronounced in the control than in the short-stalk corn. In the control, the dry matter content was 41.2% at 70,000 seeds/ha, whereas it was 48.2% at 140,000 seeds/ha—a difference of 7%. For short-stalk corn, the values were much closer together at 44.0% and 45.0%, respectively. One possible conclusion is that short-stalk corn performs significantly better at high seeding rates than “normal” corn varieties. The characteristics mentioned at the outset, such as reduced shading and improved water and nutrient efficiency, allow short-stalk corn to grow longer and enter competitive pressure and stress ripening less quickly.

Yields were comparable; here, too, it is evident that short-stalk corn performs better at high seeding rates. Weed suppression and erosion were not evaluated in the trial; however, the comparatively better performance of short-stalk corn at high seeding rates suggests that the targeted cropping system has the potential to work effectively in terms of yield and quality.

1.11 Weed Control in Sunflowers

CONTACT

Christian Stutz, Crop Production Consultant, Arenenberg, christian.stutz@tg.ch

The trial was conducted as part of the Forum Ackerbau and supervised by Carol Tanner and Christian Stutz of Arenenberg.

OBJECTIVES

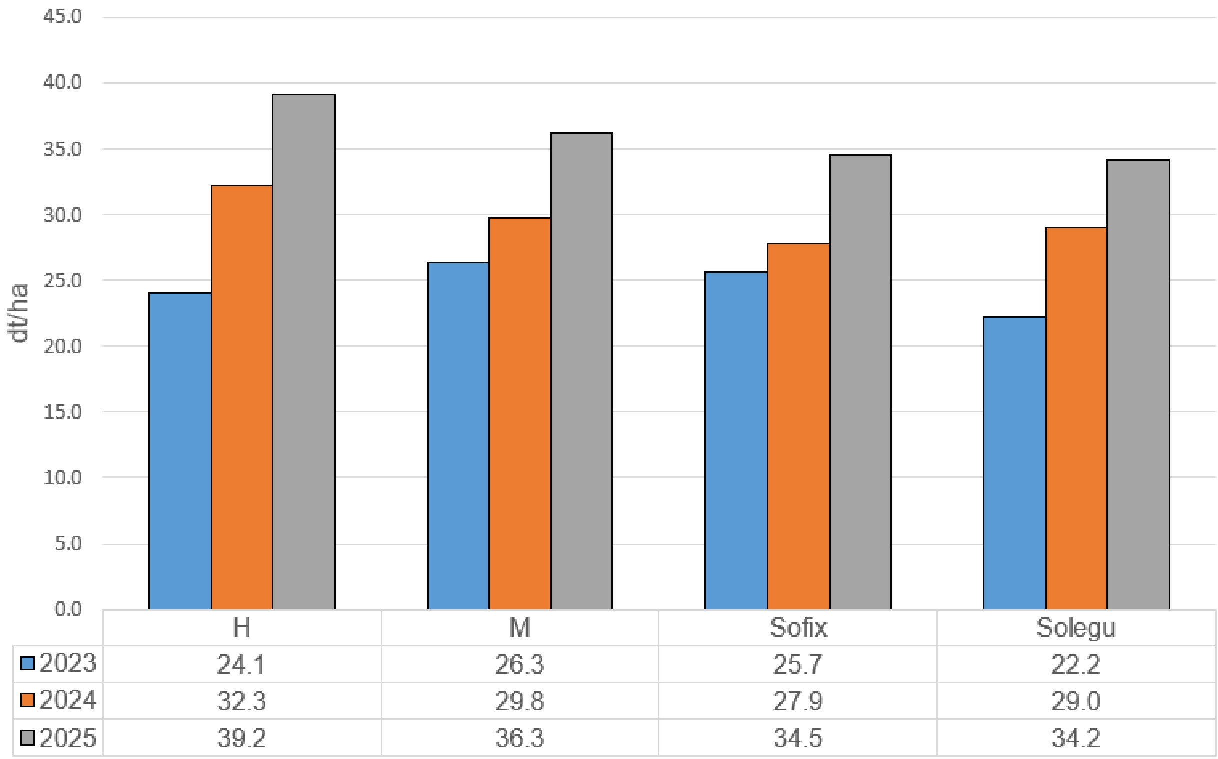
Demand for Swiss cooking oil is high. However, due to high pest pressure in rapeseed and limited insecticidal active ingredients, sunflower cultivation is becoming a more attractive alternative, and the willingness to grow sunflowers is increasing. In 2025, the contracted volume for sunflowers rose to 26,000 tons and is expected to reach 28,000 tons in 2026. The three-year trial conducted by the Forum Ackerbau aimed to investigate the practicality and profitability of mechanical weed control in sunflower cultivation. The Production System Contribution (PSB) “Herbicide-Free Cultivation” supports herbicide-free sunflower cultivation with CHF 250/ha.

TRIAL DESIGN

The trial was conducted at the Swiss Future Farm from 2023 to 2025 as a strip trial with three replicates per treatment. In the “herbicide” treatment, a pre-emergence herbicide was applied. For sulfonylurea-tolerant varieties, a corrective treatment was applied post-emergence if necessary. In the other treatments, weed control was performed mechanically without herbicide. In two of the mechanical treatments, two different undersown crops (UFA Sofix and UFA Solegu) were applied during or after the final hoeing pass.

THREE-YEAR RESULTS

Average yields varied significantly from year to year and across locations, reflecting the unfavorable weather conditions in 2024 (approx. 28 dt/ha across all sites, 25 dt in Tänikon) as well as the favorable conditions in 2025 (approx. 39 dt/ha across all sites, 36 dt in Tänikon). On average across all years and trial sites, the herbicide treatment showed a slight yield advantage over the other methods, with an average yield increase of approximately 3 dt/ha. The yields from the three trial years for the Tänikon site are shown in the following graph.



	H	M	Sofix	Solegu
🟦 2023	24.1	26.3	25.7	22.2
🟧 2024	32.3	29.8	27.9	29.0
◼ 2025	39.2	36.3	34.5	34.2

Figure 47. Yields from the three trial years at the Tänikon site

In terms of financial returns, however, the mechanical method without cover cropping performed best, followed by the method using herbicides and the two cover cropping methods. The variants with undersowing appear to be the least economically viable, although the subsidies for avoiding herbicide use partially offset the costs of mechanical weed control. However, this statement does not reflect the full picture of the trial. The following aspects must therefore be taken into account.

The cover crops generally established themselves well by the time the sunflowers matured, despite slow growth in the spring. Weed surveys indicated that the cover crops had a slight competitive effect, though this cannot be quantified in monetary terms. On average, the Sofix cover crop appeared to suppress weeds slightly more effectively than the Solegu mixture. In any case, cover crops are an effective measure in terms of soil life and trafficability, as well as for harvesting or grazing the cover crop after the sunflower harvest or as winter-hardy green cover, which, in the case of an early sunflower harvest, also qualifies for the production system contribution “adequate soil cover.” Sunflowers also incur lower plant protection and fertilization costs than rapeseed. They are also suitable for cultivation without insecticides and fungicides and can thus be registered in the “No Plant Protection Products” program (formerly Extenso) with a subsidy of CHF 400/ha. The complete and more detailed trial report is available in the 2025 Annual Report on the Forum Ackerbau website (https://www.forumackerbau.ch/fileadmin/forumackerbau.ch/Versuchsberichte/Versuchsbericht_2025.pdf).

1.12 Winter Rapeseed Cultivation Trial

CONTACT

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The trial was conducted as part of the Forum Ackerbau and supervised by Carol Tanner of Arenenberg.

OBJECTIVES

Rapeseed, one of Switzerland's most important field crops, is facing increasing pest pressure, particularly from the flea beetle. Only pyrethroid-based insecticides are effective against the stem weevil and the flea beetle, which can promote the development of resistance. Furthermore, pyrethroids are highly toxic to aquatic organisms. It is therefore reasonable to assume that pyrethroids will be banned in the near future. This raises the question of how pest pressure can be reduced. One idea is to bring forward the sowing date so that, should the rapeseed flea beetle arrive, the plants are already sufficiently developed that the potential for damage is no longer significant, or the pests seek out other, younger plants. This three-year trial at six Forum Ackerbau sites is therefore intended to determine whether advancing the sowing date can reduce the use of pyrethroids and what impact early sowing has on yield.

TRIAL DESIGN

The experiment was first conducted at the Swiss Future Farm in the form of a strip trial in 2025 and is scheduled to last for two more years. On the experimental plots, half of the area was sown in mid-August, and the other half in early September, 14 days after the early sowing. Two different seeding rates, 25 and 40 seeds per square meter, were tested in three replicates each. In addition to assessing flea beetle infestation and measuring yield, plant biomass was also measured at the end and beginning of the growing season.

PRELIMINARY ASSESSMENT

After just one year of trials, it is not yet possible to draw definitive conclusions or reliably evaluate yield figures. However, the results from this first year suggest that both planting dates generally yield similar levels of crop production.

1.13 Inoculant Trial in Soybeans

CONTACT

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The trial was conducted as part of the Forum Ackerbau and supervised by Carol Tanner and Christian Stutz of Arenenberg.

OBJECTIVES

There are various seed inoculation methods, each with its own advantages and disadvantages. Pre-inoculated soybeans are easy to handle, but due to their limited shelf life, they are only available for a short time. Soybeans inoculated by the farmer are more susceptible to errors during inoculation, but can be inoculated immediately before planting, which yields better results. In the new Ensemo method, the soybean is slit open, the inoculant is applied, and the slit is closed again. The question now is whether and to what extent the type of inoculation influences growth and yield.

TRIAL DESIGN

The strip trial was first conducted at the Swiss Future Farm in 2025, is scheduled to last two more years, and was designed with three replicates for four treatments. The methods selected were sowing standard pre-inoculated seed, pre-inoculated seed that was re-inoculated at the time of sowing, non-pre-inoculated seed that was inoculated only at the time of sowing, and the new Ensemo seed, which was not treated further.

PRELIMINARY ASSESSMENT

After just one year of trials, it is not yet possible to make definitive statements or reliably evaluate yield figures. However, the results from this first year indicate that there is a strong correlation between the number of nodules and yield, and that in most cases, the pre-inoculated seeds performed the worst compared to the other methods, both in terms of nodule formation and yield. However, the evaluation must also take into account whether the soils are already accustomed to soybeans or not. Soybeans have never been grown on the soils in Tänikon, so it is to be expected that the effect of the inoculations is significant.

1.14 Winter Wheat Variety Trial

CONTACT

Christian Stutz, Crop Production Consultant, Arenenberg, christian.stutz@tg.ch
The trial was conducted as part of the Forum Ackerbau and in collaboration with Agroscope, and was supervised by Carol Tanner, Arenenberg.

OBJECTIVES

The winter wheat variety trials are conducted annually in collaboration with Agroscope, Groupe Cultures Romandie, and DSP, with support from the industry organization swiss granum. The evaluation included the five sites from the Forum Ackerbau trial network, including the Tänikon site at the Swiss Future Farm. The aim is to determine how different winter wheat varieties perform in terms of yield and quality under Extenso and ÖLN conditions.

TRIAL DESIGN

The experiment was set up in small plots of 9 square meters, each with three replicates, using the Extenso and ÖLN methods.

RESULTS

The 2025 harvest year was marked by an exceptionally dry spring. Nevertheless, rainfall was regular, so that the crops benefited from very good growing conditions overall and the wheat harvest began early. Compared to the three-year average, yields in the good wheat year of 2025 were significantly higher. Pianalto and Spontan achieved the highest yields, both under the ÖLN and Extenso systems. An analysis of yields and quality over the past three years clearly shows that Extenso cultivation achieves better economic performance than the ÖLN methods. The highest contribution margins were achieved by the varieties Cadlimo, Caminada, and Diavel. A detailed analysis can be found in the Forum Ackerbau 2025 Annual Report (https://www.forumackerbau.ch/fileadmin/forumackerbau.ch/Versuchsberichte/Versuchsbericht 2025.pdf).

2 Projects

2.1 Smart-N consulting project successfully completed

CONTACT

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BACKGROUND

The Smart-N advisory project is the first initiative under the Smart Technologies in Agriculture Demonstration Station in the Schaffhausen and Thurgau region. The experimental station is a consortium comprising the Agroscope research institute, the cantons of Thurgau and Schaffhausen, and the AGRIDEA advisory center. Its goal is to test the potential of digitalization in agriculture to promote resource- and climate-friendly farming practices and to further develop these technologies specifically for practical application. To this end, projects are carried out in collaboration with and on commercial farms. Swiss Future Farm is responsible for the technological implementation and advising the farms within the project.

PROJECT OBJECTIVES

The Smart-N project applies a methodology for satellite-based, site-specific nitrogen fertilization - also known internationally as Variable Rate Application (VRA) - to winter wheat on commercial farms in the cantons of Schaffhausen and Thurgau. The use of this technology is intended to better estimate the plants' nutrient requirements, improve nitrogen use efficiency, and reduce nitrogen surpluses. The focus is on providing advisory support to the farms and on translating the methodology into practical application.

STUDY DESIGN

The experimental design was simplified after the first experimental year in 2022. In 2023, 2024, and 2025, the fields were generally divided into two halves, one of which was fertilized using standard farm practices and the other using plot-specific fertilization. Control plots and GRUD plots were covered with tarps during fertilization. The experimental design is illustrated in Figure 48.

Across all experimental years, the size of the experimental plots is as shown in Table 25.

Table 25. Size of the test plots in the Smart-N project

Study year	Number of farms	Number of fields	Total area in ha
2022	4	4	13.8
2023	7	11	40.1
2024	7	11	36.4
2025	7	14	42.5
Total	8	40	132.8

Figure 48. Exemplary experimental design: plot-specific fertilization on the left, uniform fertilization according to farm standards on the right. The values are given in kilograms of fertilizer per hectare. The plots fertilized according to GRUD are shown in black.

Description of the different fertilization options:

Farm:

In the “Farm” option, the farm's standard fertilization strategy is implemented. The total amount of nitrogen, as well as the amount and timing of individual applications, are determined by the farm manager. Application is not site-specific.

Variable Rate Application (VRA):

To implement the satellite-based, site-specific fertilization method, the project is collaborating with Vista – Geowissenschaftliche Fernerkundung GmbH. As part of its TalkingFields® products, Vista creates fertilizer application maps based on long-term biomass maps, current satellite images for crop development, and the calculated historical N uptake of the crop. For the first fertilizer application, long-term biomass patterns play a primary role; for subsequent applications, the current satellite image is given greater weight. Further information can be found at: www.talkingfields.de. The maximum N amount per field is specified by the farm managers at the beginning of the year.

Control Plots / Fertilization According to GRUD N_{min}:

On each experimental plot, there are three 4x6-meter areas in both the Farm and VRA variants, which are marked out by the project team prior to each fertilization application. These areas are shown in black in Figure 48. Half (4x3 meters) remains unfertilized (control plots) and serves as an indicator of nitrogen release from the soil at the end of the year. The other half is used for fertilization according to the Nmin method of GRUD (Guidelines for Fertilization of Agricultural Crops in Switzerland) (hand-applied).

TECHNICAL IMPLEMENTATION OF FERTILIZATION

There were no surprises in the fourth year of the project. The proven and established technology worked as intended. Problems arose during testing of a new mobile app designed as a low-cost entry-level solution. Due to incorrect names in the shapefile attribute table, the map was displayed incorrectly in the app, resulting in incorrect fertilization. The areas were therefore excluded from the analysis. However, the workflow was used specifically to test the app within the project; it is only recommended for experienced GIS users and, due to the significant amount of work involved, is hardly relevant in practice.

YIELDS AND FERTILIZER APPLICATION RATES IN 2025

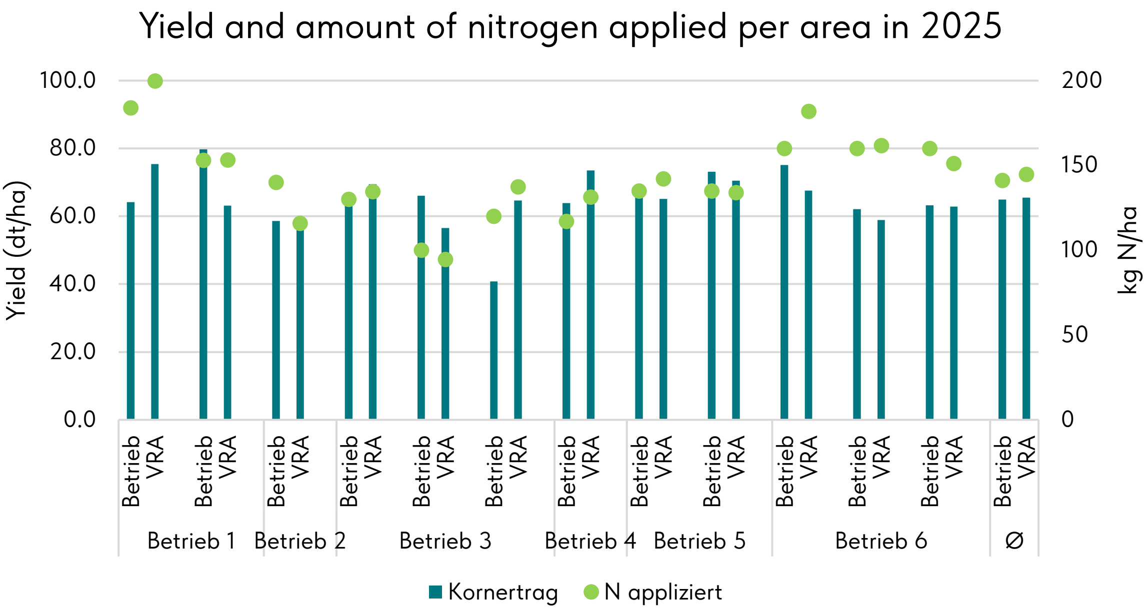

Figure 49. Ertrag und applizierte Menge N je Fläche

Figure 49 shows the yields and fertilizer application rates for the Farm and VRA methods across the 12 project plots in the 2025 trial year. It should be noted that the harvest quantities were determined using hand samples, which are known to overestimate yields. However, the yield ratio between the two fertilization methods corresponds well between the hand samples and the yield maps, which is why hand samples are very well suited for comparing the variants.

In the conventional variant, yields range from 40.8 dt/ha to 79.7 dt/ha, with a mean of 64.9 dt/ha. In the VRA variant, yields range from 56.6 dt/ha to 75.4 dt/ha, with a mean of 65.5 dt/ha. In 2025, the yield was 0.9% higher with site-specific fertilization.

In the conventional farming variant, a total of between 100 kg N/ha and 184 kg N/ha was applied, with an average of 141 kg N/ha. With VRA, between 95 kg N/ha and 200 kg N/ha was applied, with an average of 145 kg N/ha. Nitrogen application in the VRA variant was thus 3% higher.

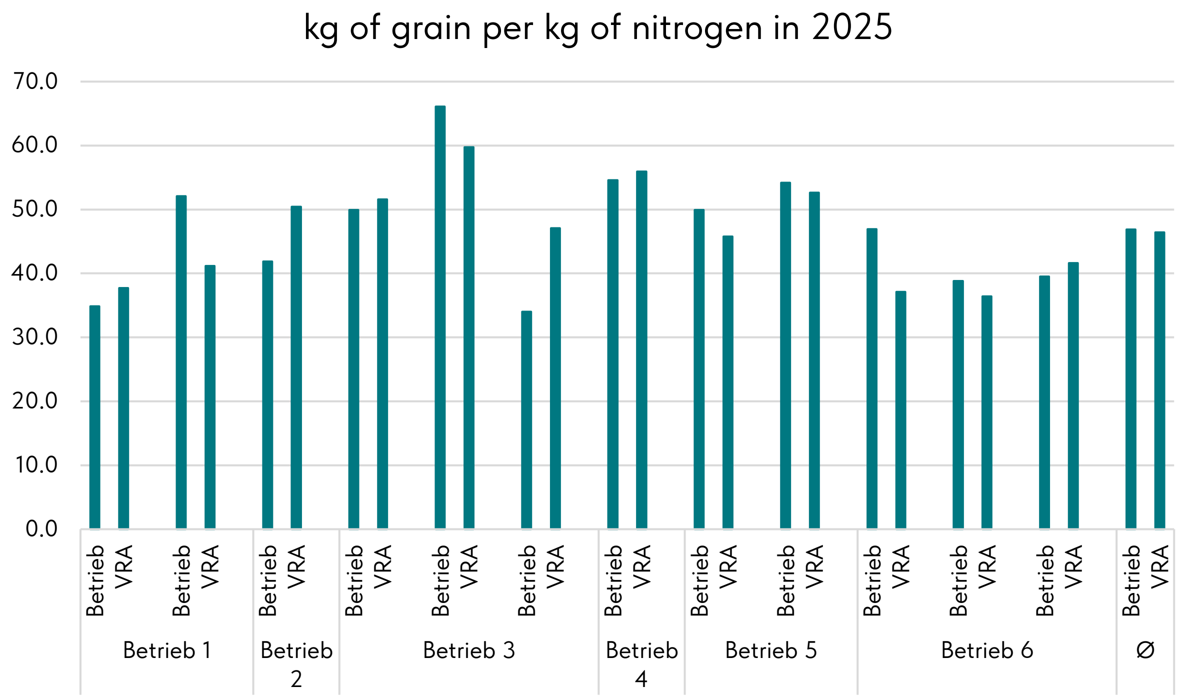

Figure 50. Grain yield per kg of nitrogen

The grain yield per kilogram of nitrogen was higher in the VRA treatment on 6 out of 12 plots. On average, the yield in the conventional treatment was 46.9 kg of grain per kilogram of applied nitrogen, while in the VRA treatment it was 46.6 kg.

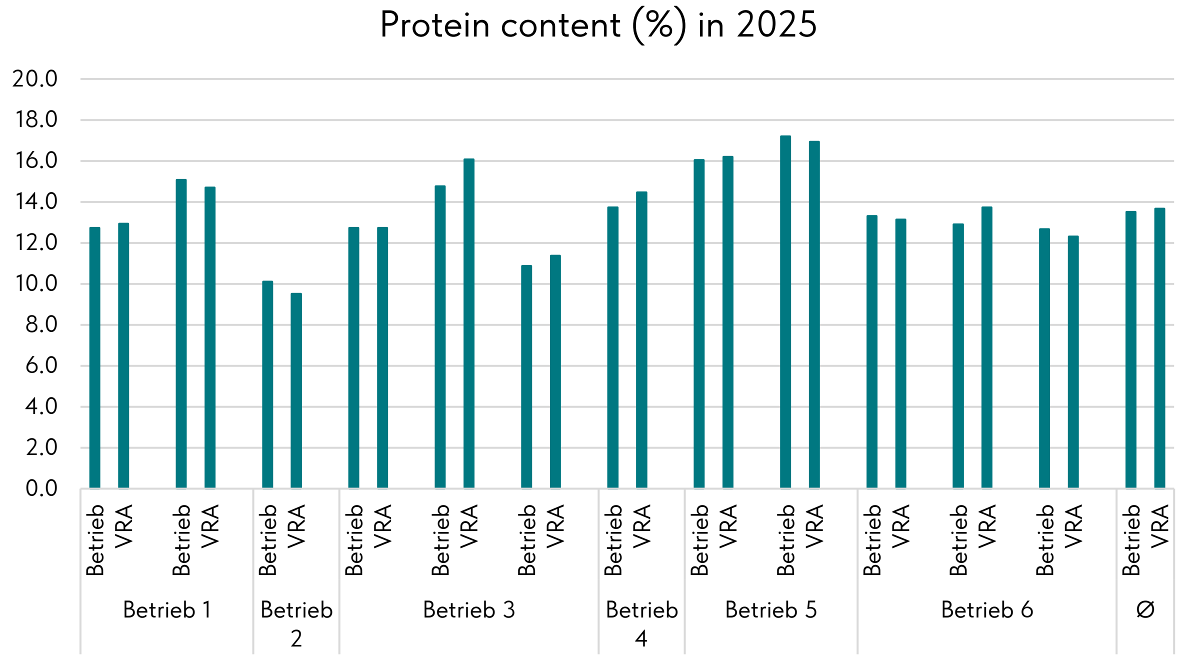

Figure 51. Protein content in %

There was little difference in average protein content; it was 13.5% in the standard variant and slightly higher at 13.7% in the VRA variant.

REDUCING NITROGEN SURPLUSES THROUGH SITE-SPECIFIC FERTILIZATION BY 2025

The main objective of the Smart-N project is to reduce nitrogen surpluses by adjusting nitrogen fertilization to the plants' needs. In the project, surpluses are defined as fertilized nitrogen that is not taken up by the wheat. They consist of the amount of nitrogen applied plus the nitrogen released from the soil, minus the amount of nitrogen taken up by the wheat.

$$N_{Surplus} = N_{applied} + N_{from\ soil} - (N_{straw} + N_{grain})$$

To determine the surpluses, the N content of grain and straw is measured in the laboratory at the end of the year. The values from the 0-plots serve as an indicator of the N released from the soil.

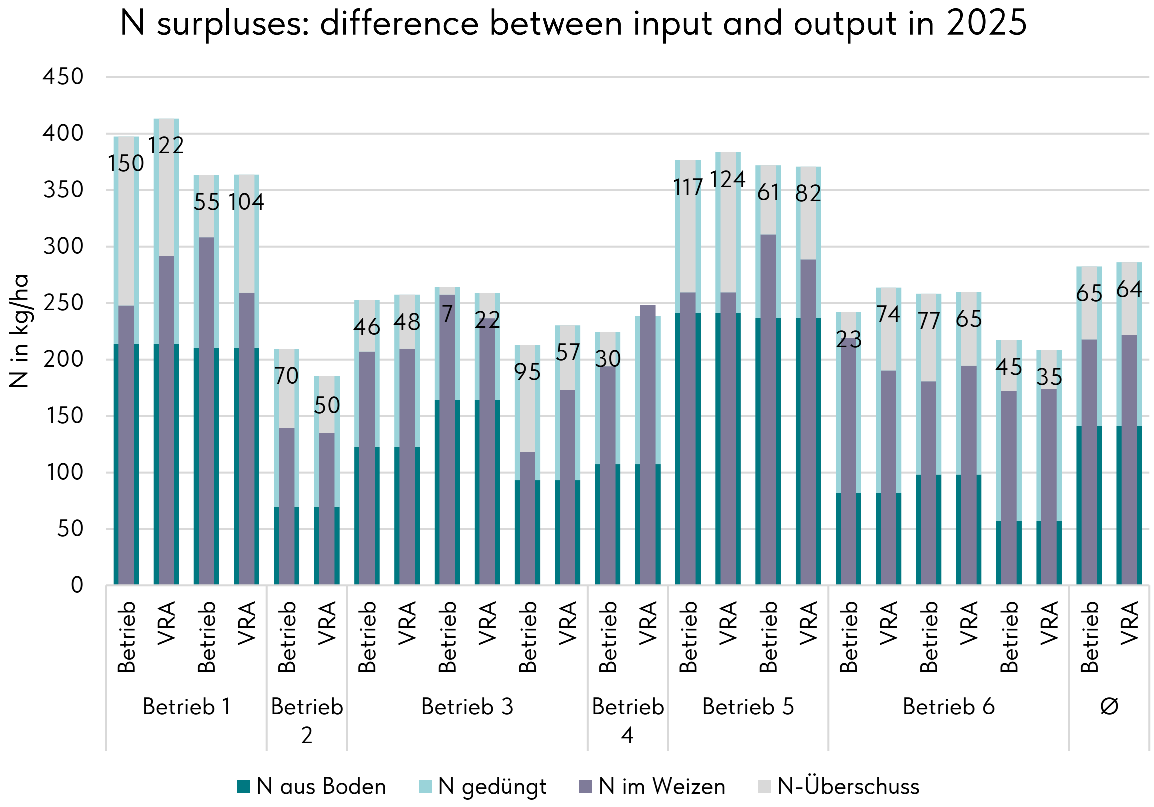

Figure 52. N surpluses as the difference between N input and N output

Nitrogen supply from the soil in 2025 ranged from 57.2 kg N/ha to 241.4 kg N/ha. Nitrogen surpluses in the farm variant ranged from 7 kg N/ha to 150 kg N/ha, with a mean of 64.5 kg N/ha. In the VRA variant, they ranged from 0 kg N/ha to 124.1 kg N/ha, with a mean of 64.5 kg N/ha. The N surpluses were thus identical on average for both variants.

YIELDS AND FERTILIZER APPLICATION RATES FOR 2023, 2024, AND 2025

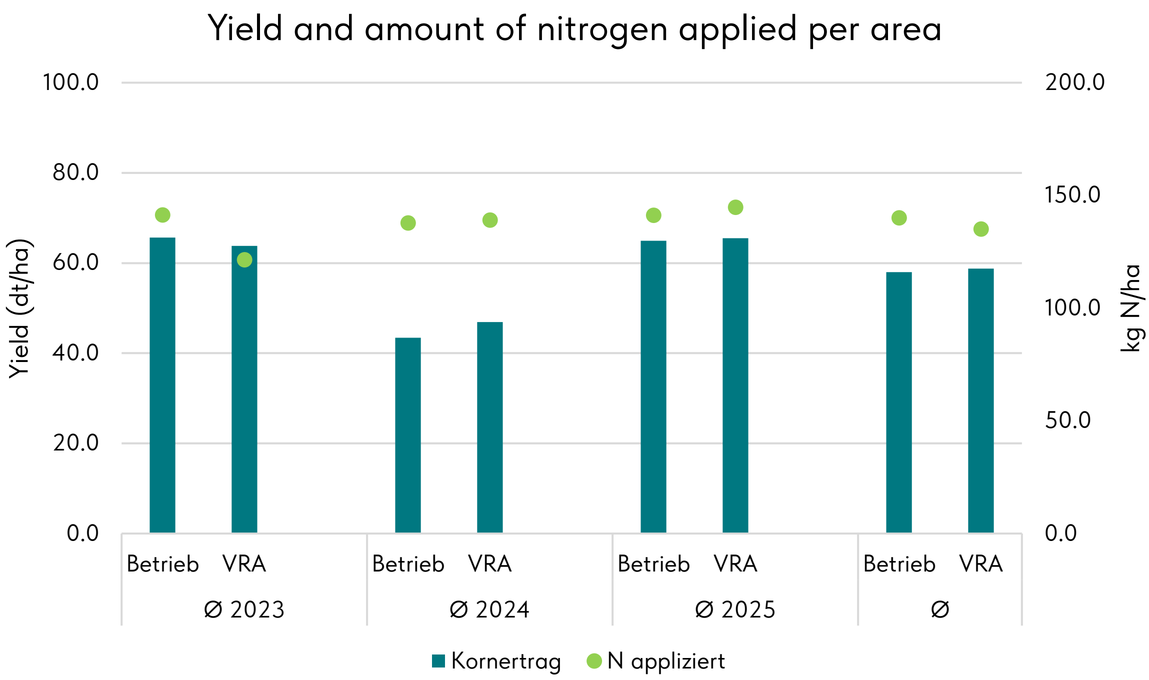

Figure 53. Yield and amount of nitrogen applied per area

Figure 53 shows the yields and fertilizer application rates for the Farm and VRA treatments by trial year.

In 2023, the VRA variant achieved an average yield of 63.8 dt/ha, while the conventional variant achieved 65.7 dt/ha—1.8 dt/ha more. In the VRA variant, an average of 19.9 kg N/ha less fertilizer was applied.

In 2024, the VRA variant yielded an average of 46.9 dt/ha, while the conventional variant yielded 43.5 dt/ha—3.5 dt/ha less. In the VRA variant, an average of 1.3 kg N/ha more fertilizer was applied.

In 2025, the VRA variant yielded an average of 65.5 dt/ha, while the farm variant yielded 64.9 dt/ha—0.6 dt/ha less. In the VRA variant, an average of 3.6 kg N/ha more fertilizer was applied.

Over all years, the VRA variant achieved an average yield of 58.7 dt/ha, whereas the farm variant achieved 58.0 dt/ha, 0.7 dt/ha less. In the VRA variant, an average of 5.0 kg N/ha less fertilizer was applied. Thus, over all years, a 1.3% higher yield was achieved with 3.6% less nitrogen application.

REDUCTION OF NITROGEN SURPLUSES THROUGH SITE-SPECIFIC FERTILIZATION IN 2023, 2024, AND 2025

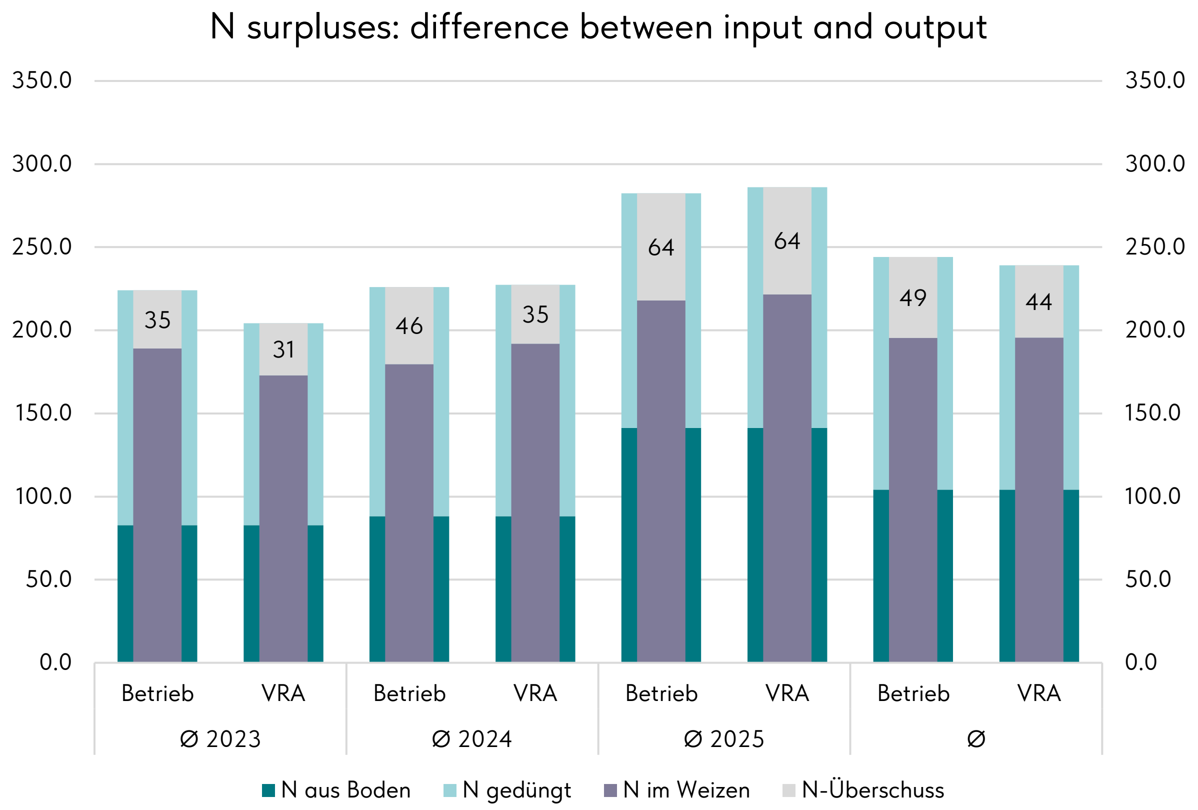

Figure 54. N surpluses: the difference between input and output

In 2023, the nitrogen surplus was reduced by 4 kg N/ha, or 10.9%.

In 2024, the nitrogen surplus was reduced by 11 kg N/ha, or 23.9%.

In 2025, the nitrogen surplus was reduced by 0 kg N/ha, or 0.0%.

Averaged over all years, the nitrogen surplus was reduced by 5 kg N/ha, or 10.2%.

CONCLUSION AND OUTLOOK

On average across the trial years 2023–2025 (36 fields), a minimal increase in yield was observed with a slightly lower nitrogen application rate. However, the differences are in the low single-digit percentage range. The increase in nitrogen use efficiency is much more pronounced. Nitrogen loss - that is, the portion of the applied fertilizer that is not taken up by the plant - was reduced by 10.2% through site-specific fertilization. However, the variation in results across the individual trial years, as well as across individual fields and farms, is considerable.

Site-specific fertilization can thus contribute to the reduction pathway. Farm managers, however, face the challenge of amortizing the necessary investment within a reasonable timeframe. The additional yields and savings on fertilizer are too small for this. The reduction in nitrogen losses cannot currently be converted into monetary added value.

More information on the Smart Technologies in Agriculture Research Station and the Smart-N project:

Link: https://www.agroscope.admin.ch/agroscope/de/home/ueber-uns/standortstrategie/versuchsstationen/versuchsstation-smarte-technologien.html

Videos:
https://www.agroscope.admin.ch/agroscope/de/home/aktuell/newsroom/2022/11-24 intelligente-duengung.html

https://www.youtube.com/playlist?list=PL7ZaE-gccj2XS7mlrx751xmnHwTTQL-aJ

2.2 Precision Agroforestry

CONTACT

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BACKGROUND

Agroforestry - the deliberate integration of trees and shrubs into agricultural land - is becoming increasingly important in the context of climate change, the decarbonization of supply chains, and growing demands for sustainability. In particular, the ability of woody plants to store carbon, promote biodiversity, and increase the resilience of agricultural systems makes agroforestry a promising approach for future land management.

Until now, however, agroforestry has primarily been practiced on more extensive or ecologically oriented farms. For specialized, highly mechanized crop farms, there have been significant hurdles: fears of yield losses, limited machine efficiency, high investment costs, and a lack of practical planning tools. At the same time, there was a lack of scientifically sound approaches that specifically combine agroforestry systems with precision agriculture technologies. Against this backdrop, Swiss Future Farm (SFF) and ZHAW have jointly launched the “Precision Agroforestry” project. The goal is to demonstrate how agroforestry systems can be integrated into specialized arable farming in a systematic, technology-supported, and economically viable manner.

Figure 55. Agroforestry on April 22, 2026

PROJECT OBJECTIVES

The project's overarching goal is to move agroforestry out of its niche status and make it a viable option for specialized crop farms. This gives rise to the following sub-objectives:

- Development of a modular, practice-oriented agroforestry toolbox to support farmers and advisors in planning, implementation, and management.
- Testing a pilot agroforestry system at the Swiss Future Farm under real-world operating conditions.
- Integration of precision agriculture technologies (e.g., RTK steering systems, variable rate application, drone and sensor technology) to minimize conflicts of interest between trees and crop farming.
- Assessment of ecological and economic effects, particularly with regard to yield, labor requirements, operational efficiency, and ecosystem services.
- Derivation of transferable recommendations for specialized arable farms in Switzerland.

TRIAL DESIGN AND PLOT PLANNING

The following section discusses the planning of the plot. It explains the considerations that led to the decisions made.

- Planning of the field boundary and the riparian zone
- Planning of the arable and tree strips
- Selection and positioning of the trees
- Seeding of the green strip

The pilot agroforestry system is being established at the Swiss Future Farm, on the Schüürpünt plot (TG.BWE.13909). The site allows for the use of state-of-the-art agricultural technology as well as detailed data collection during ongoing operations.

The system comprises:

- Tree strips with selected, climate-resilient tree species,
- productive cropland between the tree strips,
- green strips serving as transition and biodiversity elements.

The orientation and spacing of the tree rows are consistently tailored to the use of modern agricultural machinery and RTK-based guidance systems.

Field Boundaries

For planning purposes, a surveyed field boundary derived from the guidance systems used in the SFF was available.

Figure 56. Layer "Gewässer swissTLM3D"; map.geo.admin.ch

By the end of 2026, the municipality will redefine the watercourse area of the two streams (Figure 56) that border the parcel to the north and east. This was taken into account during planning insofar as part of the area may be lost for agricultural use. The area is planned such that, in this case, a new field boundary can be drawn outside the watercourse area and a tramline can be created directly at the edge of the field. This would leave half a sprayer width available for production.

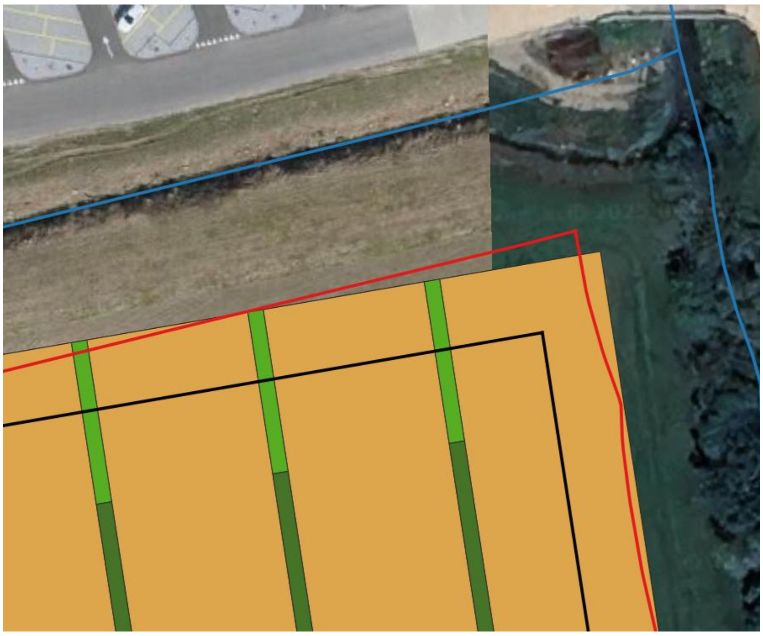

Figure 57. Consideration of possible boundaries of the water protection zone

Figure 57 shows the course of the waterway (blue) and a possible boundary of the waterway corridor (red) if it were 18 meters wide. In this case, the adjusted field boundary would be the black line in the field.

Field and tree strips

Figure 58. Division into crop and tree strips

A row of birch trees has been planted along the main road, so the field begins on the west side with a 21-meter-wide strip of arable land (beige). This width is designed to accommodate the working width of the Horsch Leeb 1.4 CS crop protection sprayer. The working widths of the forage harvesters and combine harvesters (5.5 m to 7.8 m) can also be integrated into this width without too much overlap.

This is followed by the first tree strip, 2 m wide (green). The green area is not used for forage production and is therefore kept to a minimum. The goal is to maximize the arable land area and minimize yield losses caused by the green space. These dimensions are extended from west to east, resulting in 6 arable strips, each 21 m wide, and 5 tree strips, each 2 m wide.

To the south and north, the tree strips are laid out so that there is also a little more than 21 meters available from the field edge to the first tree. This allows the headland to be treated in a single pass with a fully extended field sprayer. The area shown in light green in Figure 3 is the extension of the tree strip, which lies within the headland area. To enable automated green strip maintenance (mowing or mulching robots), these areas can also be established as grassland. However, in the first season after planting the trees, summer barley is sown across the entire area, including the extension of the tree strips. Thus, 5.5% of the plot's area is accounted for by the tree strips, and 94.5% of the area is arable land.

Trees

Since the project aims to develop recommendations for specialized arable farms, the following criteria were established for selecting tree species:

- High robustness and adaptability
    - Undemanding, frost-hardy, and heat- and drought-tolerant species
- Root system
    - Deep-rooted and taproot species
- Ecosystem services
    - Promotes biodiversity, nitrogen fixation, and humus formation
- Utilization potential
    - High-value timber

In addition, the trees should be as low-maintenance as possible; therefore, fruit-bearing species were excluded.

The following is a brief description of the selected tree species:

- Flat-leaved elm: A fast-growing, deep-rooted, flood-tolerant tree with high climate tolerance and resistance to Dutch elm disease.
- oney locust (Lespedeza): A drought- and heat-tolerant, deep-rooted tree with a loose crown and low site requirements.
- Karelian birch: A slow-growing, deep-rooted tree with high timber value potential and pioneer characteristics.
- Purple alder: A fast-growing, nitrogen-fixing, deep-rooted tree with a loose crown that is undemanding.
- Black alder: A nitrogen-fixing, wind-resistant, and tap-rooted tree with high tolerance for soil and water conditions, which also contributes to humus formation through rapid leaf decomposition.
- Black walnut: A fast-growing, deep-rooted large tree with high timber value potential and good heat tolerance.

- Norway maple: A highly adaptable, drought- and wind-resistant large tree with rapid growth.
- English oak: A very robust, deep-rooted, and storm-resistant large tree with high timber value potential.
- Rowan: A slow-growing, pruning-tolerant, deep-rooted small tree with high drought and frost tolerance, which is particularly appealing for its ability to promote biodiversity and its low maintenance requirements.
- Wild cherry: A moderately fast-growing, frost-hardy tree with potential for high-quality timber and moderate space requirements.
- Aspen: The aspen is a fast-growing, completely frost-hardy, and very undemanding native pioneer tree species with a loose, light-permeable crown, high tolerance to drought and moisture, and exceptionally high biodiversity value.

The trees are generally grouped by species so that the effects of individual species on field crops can be studied at a later date. The second row of trees on the west side also includes almost all species that have nitrogen-fixing properties. The trees were planted on December 9, 2025.

Figure 59. Final plot plan

The tree strip is 2 meters wide. In the first few years, the trees should be trained to develop deep roots; this means that roots extending too close to the root zone of the field crops are cut back along the tree strip, for example using a subsoiler.

Green Strip

The green strip should require as little maintenance as possible. For this reason, the UFA Mulch Mix is sown while moist. It consists of the following:

- 5g red fescue (lawn type)
- 125g meadow fescue (lawn type)
- 100g tall fescue (lawn type)
- 200g English ryegrass lawn type

Seeding in November using the Horsch Pronto 3 DC was unsuccessful because it was done too late and the weather conditions were unfavorable following the seeding.

In the spring, reseeding was done by hand; however, as of the publication of the 2025 annual report, the grass cover has not yet developed satisfactorily.

LABOR AND COSTS

At the time of this annual report’s publication, spring barley is still in the field. Initial data on yields and labor requirements in the context of agroforestry will be published in the 2026 annual report.

Figure 60. Aerial view of the plot the day after planting (December 10, 2025)

Labor Hours for Establishment

The planting took place on December 9, 2025. A total of 50 hours and 45 minutes was spent planting the 59 trees, or slightly less than 52 minutes per tree. This includes digging the planting hole, mixing in some compost, placing the tree and stake, installing the browsing protection, and tying the tree in place. Due to the rather heavy soil on the plot (stagnogley brown soil, low in organic matter, slightly sandy and slightly clayey loam, waterlogged) and the installation of the browsing protection, the time required tended to be higher. At the end of March, the tree pits were covered with wood chips, which took a total of 4 hours of work. During this process, the anchoring of individual trees was also readjusted.

Costs

The 59 trees cost a total of 3,352.41 CHF, or an average of 56.82 CHF per tree. Stakes and tree guards cost a total of 899.75 CHF, or an average of 15.25 CHF per tree. Thus, the total material costs per tree average 72.07 CHF. The trees were purchased from Josef Kressibucher AG and Kurt Rudisühle Nurseries. The Karelian curly birch was sourced from Traian Tudor.

Registration and Direct Payments

Rowan and wild cherry were registered in the structural data survey under code 0921 – standard-sized field fruit trees. These are generally eligible for a subsidy of 13.50 CHF per tree in quality level 1 or 31.50 CHF per tree in quality level 2. In addition, 1 are of BFF can be credited per tree. Only Q1 can be achieved in the experimental plot. English oak, black alder, Norway maple, purple alder, and aspen are registered under code 0924 – Native, site-appropriate individual trees and avenues. No subsidies are paid for trees in this category. However, 1 are per tree can also be credited as BFF. The remaining trees are reported as 0926 – other trees. For this category, neither subsidies are paid nor can area be credited as BFF.

CONCLUSION AND OUTLOOK

At the time of this publication, spring barley is growing on the plot. Among other things, the study will examine how border-spreading fertilizer affects yields near the tree strips. A comparison will also be made with the spring barley on the Chaiblen Nord field. In addition, the tree strips will need to be replanted. ZHAW will conduct biodiversity monitoring and finalize the toolbox.

2.3 Analyzing and promoting the use of Smart Farming by farm manager families

CONTACT

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Florian Bachmann, Arenenberg, florian.bachmann@tg.ch

BACKGROUND

Under the leadership of Prof. Dr. Mirjam Pfister, Swiss Future Farm is participating in the project "Analyzing and Promoting the Use of Smart Farming by Farm Manager Families." Digitalization is a key trend in agriculture and enhances efficiency, sustainability, and profitability. It encompasses precision farming (connected machinery), decision farming (decision support), and e-governance. At the same time, it brings challenges such as high costs, complex implementation, a lack of skills, and uncertainty among farmers. Advisory services play an important role in providing support, but in Switzerland in particular, data on this topic has been lacking so far, and the adoption rate of digital technologies remains relatively low. This is where the project comes in, by examining the role of (cantonal) advisory services in the digitalization process and specifically identifying ways to better support farm families in the use of digital technologies - both in terms of content and process - to facilitate implementation and increase acceptance.

PROJECT OBJECTIVES

The project will first examine how farm manager families use Smart Farming technologies (precision and decision farming), what challenges arise in the process, and how these technologies contribute to efficiency, sustainability, and reducing the workload. It will also analyze differences between farms as well as their needs for support from agricultural advisors and private companies. In a second step, the project will analyze how agricultural advisory services (at the cantonal level and provided by companies) support the use of digital technologies, what approaches and competencies are necessary for this, and how collaboration among stakeholders can be structured. Building on this, the project identifies successful "leader farms," examines their learning processes, and highlights success factors and obstacles. Finally, based on these findings, continuing education and training programs will be developed for advisors to specifically strengthen their digital skills and improve support for farm families in the area of Smart Farming.

CONTRIBUTION 2025

As part of the project's advisory group, Swiss Future Farm helped develop the interview guide and the selection criteria for interviewees. Subsequently, five interviews were conducted in the canton of Thurgau over the course of the summer. In consultation with the project group, a mix of farms was identified that covers the diversity of Swiss agriculture and farm structures as comprehensively as possible.

From Thurgau, this includes a large vegetable farm that already uses guidance systems, robots, and various computer programs for planning; a farming cooperative focused on dairy production that relies on a milking robot; a smaller organic farm that produces seeds; a family farm that focuses equally on dairy production and arable farming and has invested heavily in barn modernization in recent years; and an arable farm that also provides contract services and has gained experience in guidance systems and irrigation.

A one-hour interview with standardized questions was conducted with each farm manager. The interview sought to determine how and why the farms chose their respective solutions, how and by whom they were advised, and where their individual challenges in digitalization lie.

OUTLOOK

Some of the expert interviews have yet to be conducted, as has the survey of cantonal extension advisors. These interviews will be completed in the next phase. In addition, the farms to be featured in the peer-to-peer videos will be identified, and the videos will be produced. Following that, HAFL and Agridea will develop the training program for cantonal extension advisors.

2.4 Optifert

CONTACT

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BACKGROUND AND PROJECT OBJECTIVES

Need-based nitrogen fertilization faces a key challenge in agricultural practice: While conventional soil analyses, such as the Nmin method, provide precise values, they reflect only a snapshot of the available mineral nitrogen. They do not allow for a reliable assessment of how much nitrogen the soil will release in the weeks following sampling through the mineralization of organic matter.

This is where the OptiFert project comes in, a three-year collaboration launched in 2024 between Agroscope, the universities HEPIA and ZHAW, and the startup Digit Soil. The goal is to make soil biological activity measurable in order to better incorporate nitrogen release into fertilization planning on a quantitative basis.

TRIAL DESIGN

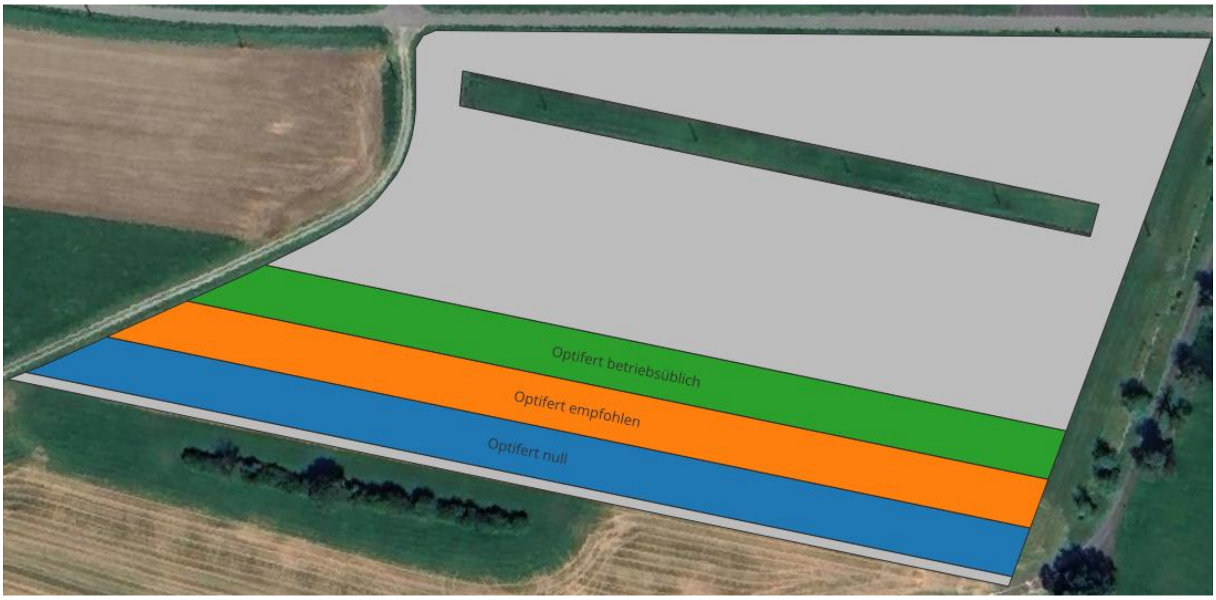

Figure 61. Trial design Optifert 2025

The trial was conducted in silage corn on the Rütteli plot at Swiss Future Farm. A 15-meter-wide strip was established for each fertilizer treatment. The control strip was located at the southern edge of the field, followed by the recommended treatment and the standard farm practice treatment. The rest of the field was also managed according to standard farm practices but was not part of the trial. The Rütteli plot has a slope of >2% toward the north. The preceding crop was winter rapeseed, followed by sowing of UFA Lepha and then UFA Silo Quattro (August 15, 2024 / November 10, 2024). This cover crop was mulched in April, and on May 3, the seedbed was prepared in strips using the Strip-Till, followed by seeding on May 14 with the Precision Planting planter of corn hybrid Farmueller (mid-early, 250). Two days before seeding (May 12), the field was rolled with a Cambridge roller. On the day of seeding, Roundup Powermax and Starane Max were applied, followed by an application of Equip Power on June 16. Fertilization is described in Table 26. Harvesting took place on October 17. Soil samples were taken at the 4–5 leaf stage, and Nmin was determined. Additionally, a sample for Digit Soil was taken at the 4–5 leaf stage.

Fertilization:

Last year, 6 t/ha of pig manure was applied on September 20, 41 m³/ha of cattle slurry on October 1, and 20 m³/ha of cattle slurry on November 22. The application rates were identical across all experimental plots.

Table 26. Amounts of nitrogen applied

		Control	Recommended	Farm Standard
16th April	Pig slurry	0 kg N/ha	65.6 kg N/ha	65.6 kg N/ha
14th June	Urea	0 kg N/ha	0 kg N/ha	46 kg N/ha
25th June	Urea	0 kg N/ha	23 kg N/ha	0 kg N/ha
Total		**0 kg N/ha**	**88.6 kg N/ha**	**111.6 kg N/ha**

RESULTS

Soil samples were collected during the growing season for Nmin analyses and enzyme measurements:

Table 27. N_{min} values (0-90cm)

	Control	Recommended	Farm Standard
4-5-Leaves stadium	97.7 kg N/ha	105.9 kg N/ha	108.4 kg N/ha

Since the timing of fertilization and water availability are just as important as the amount of fertilizer applied, the fertilization dates and daily precipitation are shown below for the year 2025 and retroactively for the year 2024.

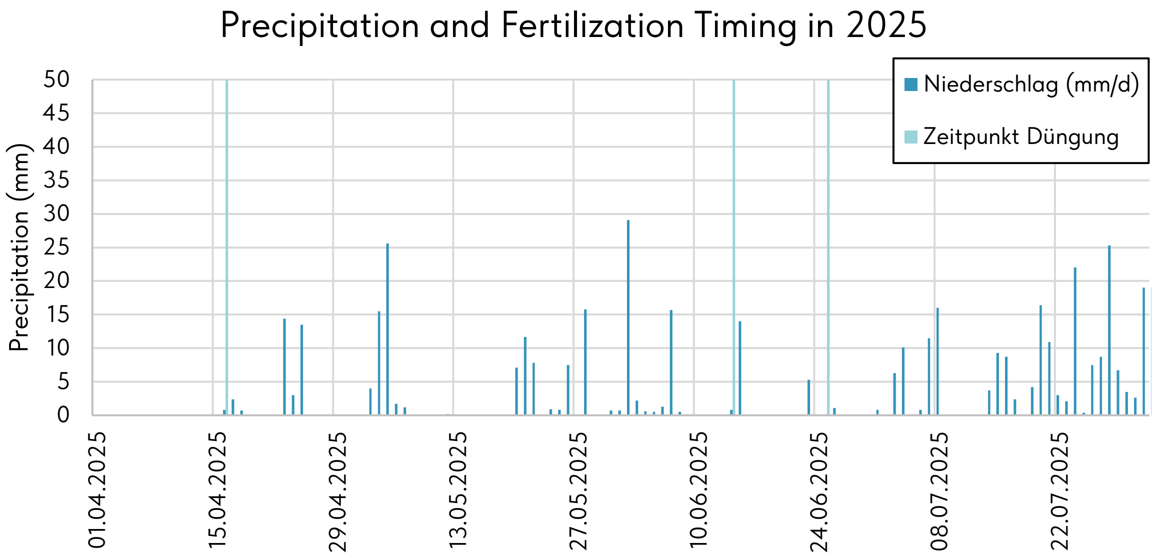

Figure 62. Precipitation distribution in 2025

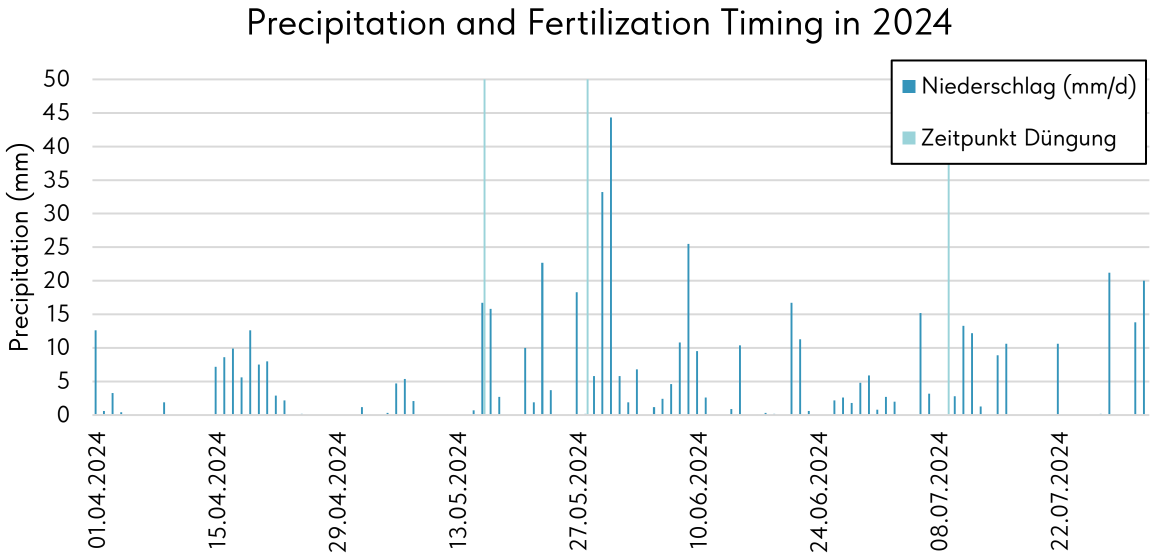

Figure 63. Precipitation distribution in 2024

During the harvest on October 17, 2025, the following yield values were measured for the individual trial plots:

Table 28. Yield

	Control	Recommended	Farm Standard
Yield in Fresh Mass (whole plant)	240.8 dt/ha	418.7 dt/ha	400.8 dt/ha
Dry Matter content	42.7%	47.2%	46.6%
Yield in Dry Matter (whole plant)	102.8 dt/ha	197.6 dt/ha	186.8 dt/ha
NEL	7.10 MJ/kg DM	7.00 MJ/kg DM	7.00 MJ/kg DM

Fertilizer efficiency is calculated and presented below based on yield and fertilizer application rate.

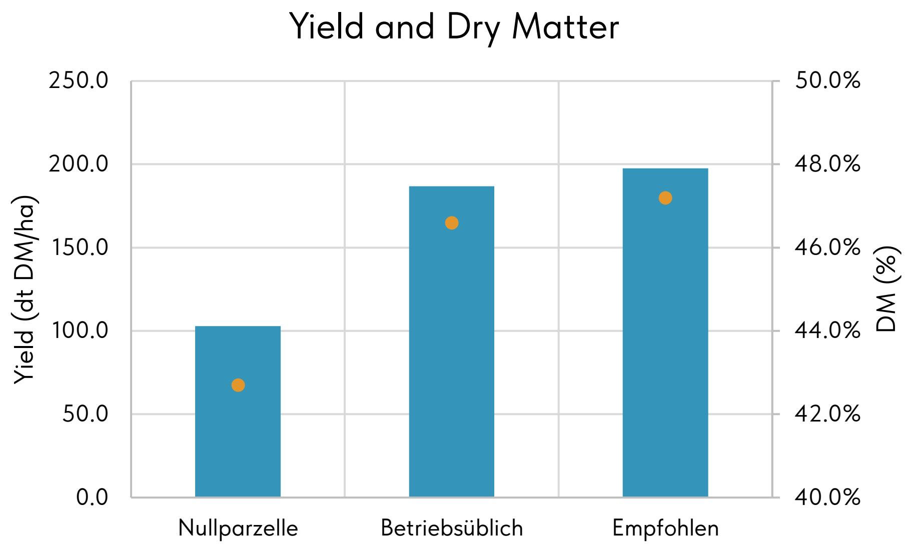

Figure 64. Yield and Dry Matter content in Optifert trial

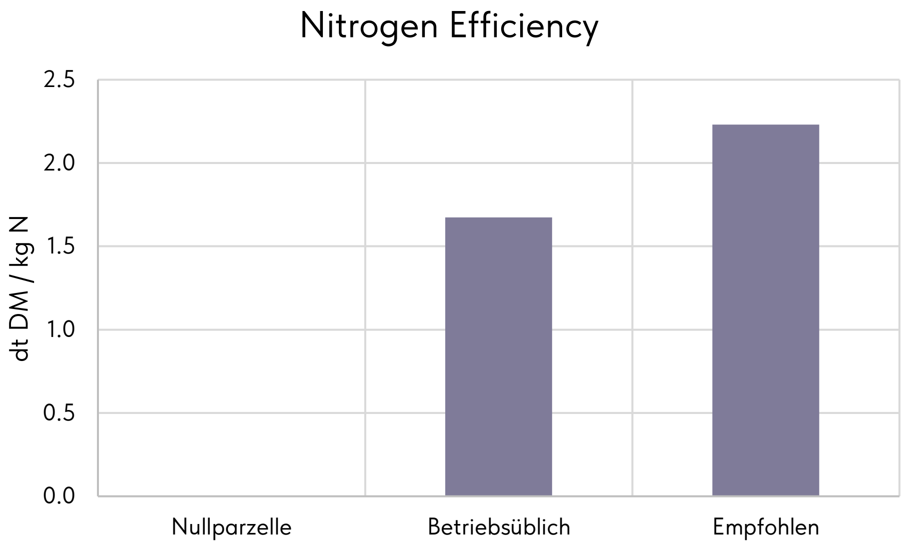

Figure 65. Nitrogen Efficiency in Optifert trial

DISCUSSION AND OUTLOOK

The results from the previous year—specifically, the lack of a fertilization effect—led to discussions following the experimental year. A point of criticism was the failure to account for precipitation distribution. The timing of fertilization (crop stage, but also precipitation following fertilization) is at least as important as the amount of fertilizer itself.

In 2025, 21.2 mm of precipitation was measured in the two weeks following standard fertilization, most of it on the day after fertilization. In the two weeks following the recommended fertilization, however, 46.6 mm was measured, though predominantly in the week following fertilization. In total, 390.1 mm of precipitation fell between April 1 and August 1, 2025.

As mentioned in the 2024 trial report, the 2024 fertilization recommendation arrived too late, meaning that no mineral fertilization was carried out in the recommended variant. In the two weeks following mineral fertilization on July 9, 2024, 59.8 mm of precipitation fell, evenly distributed. A total of 521.5 mm of precipitation fell between April 1 and August 1, 2024.

Based on this comparison, it can be concluded that there was likely sufficient precipitation in both trial years and that a lack of precipitation following mineral fertilization was not the cause of the low fertilizer efficiency.

Yields were also comparable in 2025, at 186.8 dt/ha DM in the standard practice treatment and 197.6 dt/ha DM in the recommended treatment. The control plot lagged significantly behind at 102.8 dt/ha DM. The yield difference was 6%. The standard practice applied 111.6 kg N, while the recommended application was 88.6 kg N; the recommended amount thus contained 21% less nitrogen. This results in an overall 24% improvement in nitrogen efficiency with the recommended fertilization. Under standard farm practices, 1 kg of N generated a yield of 1.67 dt DM, whereas in the recommended treatment, it generated 2.23 dt DM.

DigitSoil's fertilization recommendation has thus led to an increase in efficiency. It was consequently determined that the crop requires less nitrogen than is typically applied on the farm. However, the timing of the fertilization also differed, and with it, the amount of rainfall following fertilization. In the standard farm practice scenario, less water was available in the 14 days following fertilization. It is not possible to determine or compare retrospectively how the standard fertilization practice would have performed with higher precipitation. The different timing was a result of delayed communication and laboratory analyses. For the following trial year, a more efficient process should be sought to eliminate the variable of application timing.

Further Information

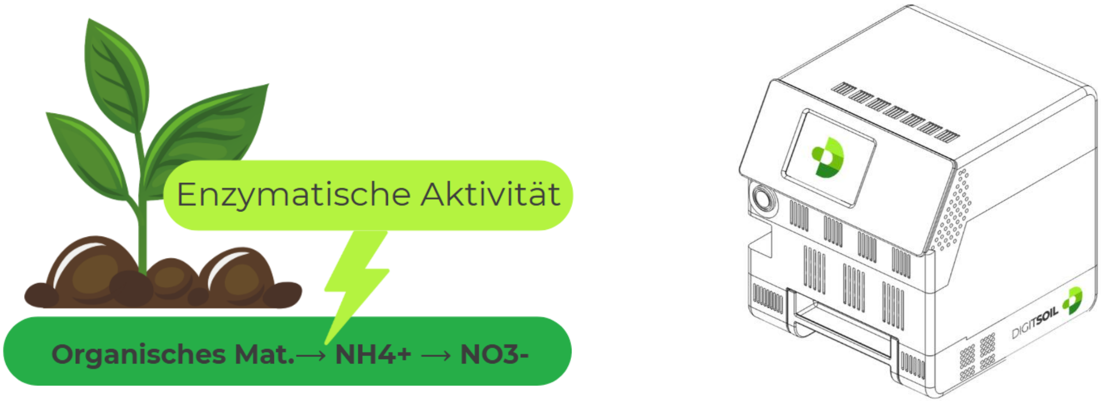

Figure 66. Schematic representation of nitrification (left) and the Soil Enzymatic Activity Reader (right)

Scientific validation: The basis in the preliminary trial

To test the theoretical link between extracellular enzymatic activities (EEA) and nitrogen release in practice, Agroscope and Digit Soil have since analyzed over 200 soil samples from various sites, long-term experiments, and lysimeters. Figure 68 below shows the results of a preliminary trial with a selected group of samples. In controlled incubation trials (over 56 days at 25 °C, see Figure 67), net mineralization without plant influence was precisely documented. These initial data show a clear, statistically significant correlation: the enzymatic activity (beta-glucosidase) measured at the start correlates directly with the amount of nitrate released during the subsequent incubation period. Note on the data set: The graph presented here is intentionally limited to data from the preliminary experiment. The comprehensive results of the subsequent main studies, involving over 200 samples, are currently undergoing the scientific peer-review and publication process and will be published in full upon its completion.

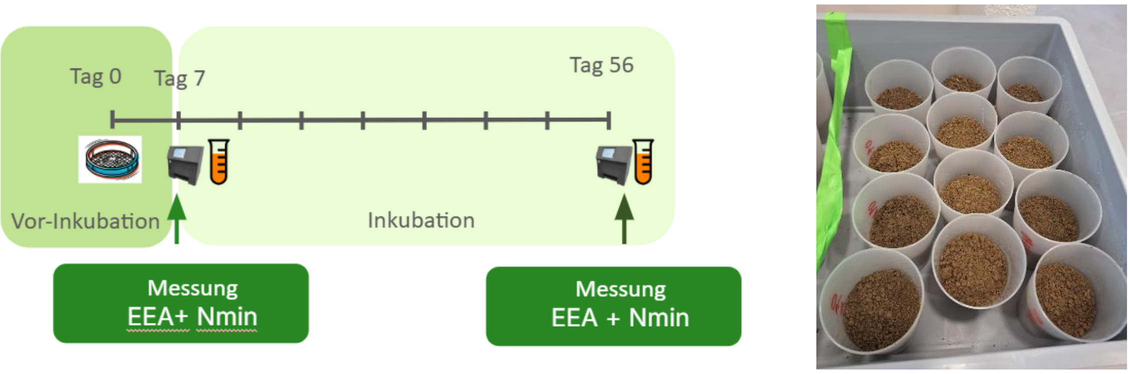

Figure 67. Schematic representation of the incubation experiments. The soil samples were sieved to 4 mm and incubated in beakers (in triplicate) under controlled conditions; they were then analyzed for mineral nitrogen (Nmin) and enzymatic activity (EEA).

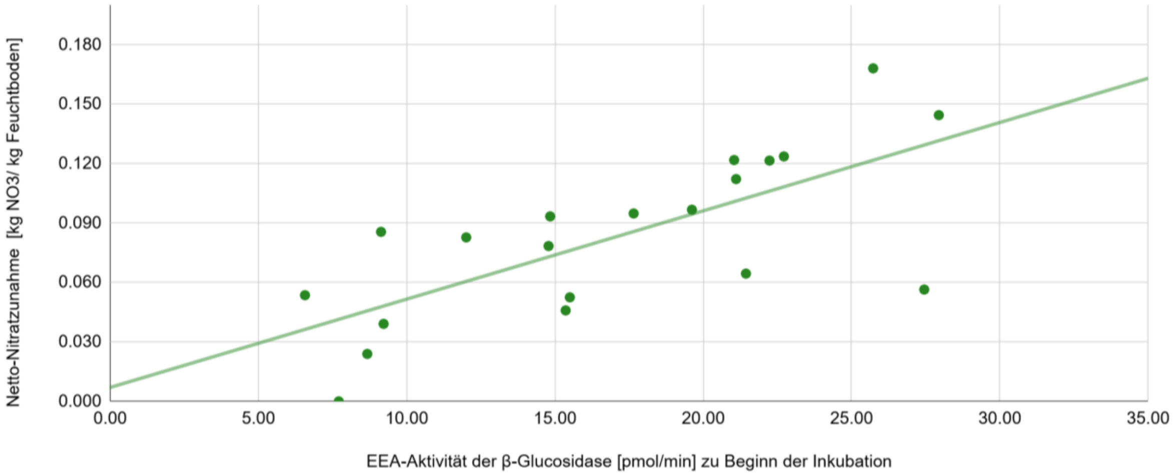

Figure 68. Correlation between the net increase in nitrate in incubated soil samples (from t7 to t56) and the β-glucosidase activity measured in the soil at time point t7.

Ongoing Modeling and Future Results

Data collected from the large-scale experimental series in 2025 and 2026 is already being directly incorporated into the optimization of the software model. By integrating additional enzyme groups and specific soil factors, the accuracy of the predictions is being improved step by step.

In practice, however, there is a clear methodological distinction based on land use type:

- Current focus (arable farming): At this stage, the Digit Soil software model is primarily calibrated and validated for areas where crops are already growing. Here, the system already provides reliable indicators for practical use.
- Future expansions (pasture & uncultivated land): For permanent pasture or uncultivated land, biological processes often behave differently. Additional parameters and modified modeling approaches are required for these land use types. The corresponding research data and expanded model functions are currently being analyzed and will be made available to Swiss farmers in the future.

In addition, research is currently underway to investigate how enzyme activity changes over time, in order to recommend the optimal timing for field sampling with even greater precision.

Figure 69. Manual sampling for the comprehensive characterization of the experimental plots was time-consuming and labor-intensive. For the initial modeling, in addition to enzyme activity, texture, soil density, carbon content, and pH had to be precisely determined (left). Right: The experimental plots with wheat and corn crops at the Swiss Future Farm in Tänikon.

Practice-Integrated Solution and Outlook

A functional model requires precise input data. For this reason, the OptiFert project includes not only the analyzer but also a sampling system developed at HEPIA. This ensures accurate and reproducible soil density, which minimizes measurement errors for enzymes and other parameters (Nmin, carbon, etc.) compared to conventional sampling methods. An accompanying app provides digital support for the entire process, from sampling to evaluation.

Figure 70. Testing the sampling system in a corn field. Left: Soil sample collection point (hole). Right: Initial concept developed in fall 2024 in collaboration with HEPIA, ZHAW, Agroimpact, Agroscope, and Digit Soil.

The complete system (measuring device + software app) ultimately links the measured enzyme levels with meteorological data and the nutrient uptake of the respective crop. Following extensive field testing in 2026, the BOB system is expected to be ready for practical use by the end of this year, providing farmers with a data-driven, on-farm decision-making tool for their nitrogen management strategy.

A heartfelt thank you to the farming community

The Optifert project can only succeed through the close collaboration between science and agricultural practice. A big thank you goes to Swiss Future Farm for providing the experimental plots and for the excellent collaboration on the Krapf plot. We would also like to extend our sincere gratitude to all the dedicated farmers who, through their support, the provision of soil samples, and their valuable feedback, have contributed significantly to the success of this project.

3 SFF as Testing Platform for Third Parties

The following is a brief overview of projects that are planned, managed, and evaluated entirely by third parties. The Swiss Future Farm serves as a platform in this context, providing land, machinery, and labor.

3.1 Legendary – Mixed Cropping of Lentils

CONTACT

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BACKGROUND AND PROJECT OBJECTIVE

The objective of the LEGENDARY project is to quantify ecosystem services in mixed cropping systems involving legumes across various climatic zones. Mixed cropping is intended to reduce the cultivation risk associated with legumes and to support legumes—which are somewhat less competitive—by using cereals to suppress weeds. To investigate this, factors such as weed, pest, and disease pressure; the presence of pollinators and beneficial insects; the nitrogen cycle and the effect of preceding crops; and the impact of intercropping on soil aggregate stability and yield performance are being examined.

TRIAL DESIGN

The experimental design in Tänikon includes lentils (two different varieties) and oats in mixed stands, with the respective crops in pure stands serving as controls. The pure oat stand is studied in two ways: once following the GRUD fertilization recommendations and once with reduced fertilization. To investigate the effect of the preceding crop, winter barley is planted following the lentil trials.

IMPLEMENTATION

In 2024, the lentil trials were planted and various assessments were conducted. Subsequently, to investigate the effect of the preceding crop, winter barley was sown with reduced fertilization on the original lentil plots following reduced tillage. Sample material and data are still being analyzed. The trial was repeated in 2025 to generate data from multiple growing years. The harvest of the subsequent winter barley is still pending. Since there was very high weed pressure on the trial field in 2024, the lentil trial will be repeated once more in 2026.

Figure 71. Oat-lentil mixture 2025. Photo: Philippa v. Nathusius, Agroscope

Figure 72. 2024 Winter Barley Trial. Photo: Philippa v. Nathusius, Agroscope

3.2 DONA

CONTACT

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TRIAL DESCRIPTION

Agriculture is associated with significant nitrogen (N) losses, as on average only about 50% of the applied nitrogen is taken up by crops. The main loss pathways are nitrate leaching and ammonia volatilization, while a smaller portion is emitted as nitrous oxide (N_2O), a potent greenhouse gas.

In recent years, biological nitrification inhibition has been proposed as a promising strategy for reducing agricultural N losses. In this experiment, we investigated whether introducing Plantago lanceolata into a standard grass-legume mixture can reduce N_2O emissions and nitrate leaching compared to a control treatment using the standard mixture alone.

Our results showed that the inclusion of Plantago did not reduce either N_2O emissions or nitrate leaching. Nitrous oxide losses were low in both treatments and did not differ significantly. In contrast, nitrate leaching was higher in the Plantago treatment. This was likely due to lower biomass production, which reduced N uptake and left a larger N surplus in the system, ultimately leading to greater nitrate leaching in winter.

These results suggest that the reduction of N losses through biological nitrification inhibition depends heavily on the composition of the plant mixture and that identifying an optimal species combination is crucial for this approach to be effective.

Figure 73. Clover-grass mixture from the DONA project

Figure 74. Clover-grass-plantain mixture from the DONA project

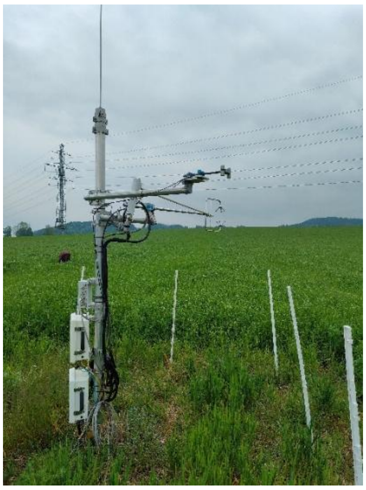

Figure 75. Eddy covariance flux tower for measuring material fluxes

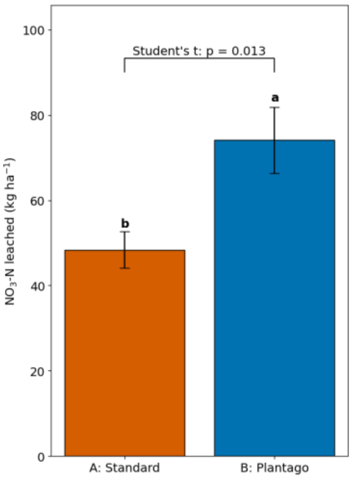

Figure 76. Preliminary results from the DONA project

4 SFF as event location and at external events

CONTACT

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BACKGROUND AND PROJECT GOALS

In 2025, the Swiss Future Farm once again hosted numerous informational sessions, educational classes, training workshops, public events, and field trips in its buildings and fields. SFF staff also provided insights into the project and specific areas of expertise during external presentations.
In total, over 1,300 people came into contact with the Swiss Future Farm in 2025, amounting to nearly 650 course participant days.

Our visitors and their connection to agriculture are extremely diverse. They range from high school students, college students, and apprentices to researchers, politicians, and government officials, as well as stakeholders in the food industry and, of course, farmers. Their needs are equally diverse - from people visiting a farm for the first time to experts developing agricultural technology or growing crops themselves. This diversity is also reflected in our activities: for example, we gave presentations on steering systems, FMIS, and precision farming, and showcased our experiments and findings during field tours. We had the pleasure of hosting AGCO executives as part of the LEAP program and providing insights into the practical work at the Swiss Future Farm during the GVS Agronomy Day. We also welcomed students from HfWU Nürtingen-Geislingen, the University of Weihenstephan-Triesdorf, and ETH Zurich.

Students from Arenenberg also visited us regularly as part of elective courses such as Energy Production, Agricultural Technology, and Digitalization, as well as during educational days. In addition, we welcomed international delegations, including representatives from the Latvian Ministry of Agriculture and a group of corn and soybean producers from Minnesota. The Food Industry Innovation Forum has also remained a loyal partner to our location. This broad and diverse mix makes our work particularly exciting. We would like to take this opportunity to express our sincere gratitude for the great interest and trust you have shown in us.
Some of the events are briefly presented below.

4.1 Swiss Demopark

On May 21 and 22, 2025, 24 exhibitors showcased machinery and solutions for municipal use such as for landscaping, cleaning, and logistics at the Swiss Future Farm. More than 250 visitors per day attended the event to gather information, network, and take test drives. The event placed a particular focus on the latest machinery innovations and cutting-edge technology presented by various manufacturers.

Figure 77. Fendt e107 V Vario

Figure 78. Schäffer T6680

4.2 Introductory Course on Working with Prescription Maps

On October 21, the SFF, in collaboration with Agridea, held the course "Creating Prescription Maps for Site-Specific N Fertilization" in the SFF training rooms. The course offered a simple and cost-effective way to implement Precision Agriculture on the farm. Participants learned how to create prescription maps themselves and use them directly in the field with digital tools. The course combined theoretical fundamentals with practical exercises, thereby promoting the direct transfer of knowledge into practice.

4.3 Education Day

Every two years, Arenenberg hosts an Education Day in Tänikon. During this event, students get to know the Tänikon site as part of Arenenberg. They gain insight into current research topics and the practical relevance of the experimental farm. A scavenger hunt was organized for the students covering topics such as cover crops, alternative crops, hoeing techniques and strip-till, dairy cattle feeding, health monitoring of dairy cattle, the use of drones, and a tour of the OST Living Lab.

4.4 Hosting SRF School

In a special segment, the television show “SRF School” explored how food is produced in Switzerland and the journey it takes from the field to the plate. The program explained the diverse roles of agriculture, the work of farmers, and the importance of soil, animals, and processing. The goal is to foster an understanding of how important agriculture is for our food supply and the environment. In the second part of the series, SRF School visited the SFF, and we provided a glimpse into our machinery and current research topics. Link: https://www.srf.ch/sendungen/school/woher-kommt-unser-essen-landwirtschaft-in-der-schweiz

Figure 79. SRF School at the Swiss Future Farm's trial plots

5 Links

5.1 Websites

www.swissfuturefarm.ch

www.agcocorp.com

www.bbz-arenenberg.ch

www.gvs-agrar.ch

www.fusesmartfarming.com/de

www.agrar-landtechnik.ch

www.precisionplanting.com

eu.precisionplanting.com

www.agroscope.admin.ch/agroscope/de/home/themen/wirtschaft-technik/smart-farming/swiss-future-farm.html

5.2 Social Media

https://www.instagram.com/swissfuturefarm

https://www.facebook.com/swissfuturefarm

https://www.youtube.com/channel/UCzsEm9mMLs0X_IT3MoaCJXQ

6 Publishing Information

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