OK-Net Arable - Organic Knowledge Network Arable

Geographical location:
Belgium

Main geographical location (NUTS3):
Arr. de Bruxelles-Capitale / Arr. van Brussel-Hoofdstad

Keywords:
organic farming
organic fertilizer
soil fertility
non-chemical weed control
non-chemical pest control
crop variety
crop rotation

Main funding source:
Horizon 2020 (EU Research & Innovation programme)

Project type:
Research project

Project Identification:
Thematic network

Starting date:
2015

End date:
2018

Project status:
going

Website:
OK-Net Knowledge Platform [1]

Title (in English):
OK-Net Arable – Organic Knowledge Network Arable

Objective of the project (in English):
The overall aim of ‘OK-Net Arable’ was to increase productivity and quality in organic arable cropping by improving the knowledge exchange among farmers, farm advisers and scientists.
To achieve this, the project had three objectives:
1. synthesize existing knowledge about organic arable farming and identify the best ways for exchanging this knowledge. Based on this, advisory material that is easy to use was collected.
2. create a European network of farmers to exchange experiences and discuss the selected advisory material.
3. create an online platform to make the advisory material available for a wide audience of farmers and advisers and facilitate farmer-to-farmer learning across Europe.

See objectives in English
OK-Net Arable worked with 14 farmer innovation groups in 10 countries. Data from the groups showed a wide range of crop yields. This indicates a need, but also a clear possibility for improvements. Based on scientific literature and input from the farmers, more than 100 materials with practical solutions have been brought together on the OK-Net Arable knowledge platform (farmknowledge.org). Farmer groups evaluated formats and some solutions in practice. Their experiences have been documented in videos and practice abstracts. Farmer groups translated materials that were relevant to them into their own language. Online courses were held introducing the materials to farmers and advisers.

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Short summary for practitioners

Practice abstract 1

Short title (native language):
Control of creeping thistle by stubble cultivation

Short summary for practitioners (native language):

Problem:
Creeping thistle can rapidly spread, especially in crop rotations that contain a high number of cereal crops without perennial grass-clover leys. It reduces crop yields by competing for water and nutrients.

Solution:
Creeping thistle populations can be successfully reduced by repeatedly undertaking stubble cultivation after an early maturing crop and cultivating a densely growing catch crop.

Outcome:
Multiple cultivations lead to a repeated physical damage of the thistle. Each time it regrows, it uses further nutrients until it is weakened and a new crop will out-compete it. This method is also effective against other rootspreading weeds such as couch grass and bindweeds. Practical recommendation:
- After harvesting grains, perform stubble cultivation with a skim plough or a completely flat-cutting wing share cultivator at a depth of 7-10 cm.
- After the thistle plants have re-emerged (maximum 10 cm), repeat the cultivation 1-2 times while increasing the working depth.
- Sow a dense, fast-growing catch crop such as vetch or fodder radish after the stubble cultivation to further weaken the thistles.

This method only works on dry soils and in dry weather; in wet conditions, it can lead to an increase in thistles! Link:
Practice abstract 2

**Short title (native language):**
Weed control in soy with a finger weeder

**Short summary for practitioners (native language):**

Problem:
Weeds within a row are poorly accessible and in the case of a late weed infestation, it can seriously disrupt the development of the crop and cause costly manual labour. Weed control in between rows with duck-foot tines is typically ineffective for controlling the weeds inside the seed rows.

Solution:
In order to minimise weed competition in soy cultivation, weeds growing near the soy plants need to be controlled. The combination of a hoeing device with duck-foot tines and ridging discs with a finger weeder is able to control the weeds across the entire surface.

Outcome:
The finger weeder is the only mechanical hoe that also controls weeds within the row thanks to a slanted position and adjustable overlap of the finger plates, and it greatly reduces manual labour. It offers good performance for most row crops.

Practical recommendation:
- Pass once with the harrow 2 to 3 days after sowing the soy (blind harrowing), when many seed weeds have already sprouted. At this moment, the harrow is able to efficiently cover or expose the weeds (up to 90 % efficiency), but avoid damaging the soy seedlings.  
- A second round with the harrow, applying little tine pressure (a precision tined-weeder recommended), is possible when the soy plants have developed their first pair of leaves.  
- From the soy's two-internode stage (plant height of about 15 cm) onwards, the use of the finger weeder is possible, provided the crop is well-rooted and the weeds are - if possible - still at their sprouting stage. Ideally the finger weeder is combined with a hoeing device with duck-foot tines.  


Practice abstract 3

**Short title (native language):**
Intercropping grain peas with barley

**Short summary for practitioners (native language):**

Problem: Cultivated as a pure crop, grain peas have not enough strength, and this often leads to greater late-weed infestation and difficulties when harvested.

Solution: The cultivation of half-leafless grain peas and barley as a mixed crop. The barley serves as a supporting crop, significantly increasing the pea yield.
Outcome Barley prevents pea lodging, thus reducing the losses during threshing, and increases the quality of the harvested crop. The cereal crop also improves the soil cover, suppresses weeds. Growing two crops at the same time reduces the risk of yield loss.

Practical recommendation:
- The seed bed should be not too fine-grained after cultivation or reduced tillage. A further possibility is mulch-till, whilst on heavy soils a plough with subsoiler might be needed. Possibly application of green manure or compost.
- For seeders with only one single tank, mix the seeds well at the ratio of 80 % peas and 40 % barley (relating to the standard sowing quantities of both crops) before filling the seeder. Until sowing, repeatedly check the homogeneity of the mixture, and for seeders with two or more tanks, apply the seeds of the mixture crops separately. - Sow with a conventional seeder, not too early to keep the pea plants small enough during winter, and with a row spacing of 12 cm and a placement depth of 3 to 4 cm. Link: http://orgprints.org/31018/32/PA_003_Mixed-cultivation-grain-peas-barley...

Practice abstract 4

Short title (native language):
Blackgrass control in winter cereals with hoeing

Short summary for practitioners (native language):
Problem: Black grass mainly sprouts in the autumn and is therefore already rooted strongly enough to withstand harrow tines during the first harrowing of the 3-leaf-stage winter cereal. This harrowing can even stimulate blackgrass sprouting. Heavy soils tend to encourage black grass, further impairing the harrow's effect. Solution: The cereals can be sown with a row spacing of at least 20 cm, so as to enable the use of the duckfoot-bladed hoe or a device combination of harrow and bladed hoe for weed control in between rows, in addition to the harrow. Outcome: Thanks to the use of the bladed hoe, strong-rooting grass weeds can be successfully uprooted even in heavier soils. Other problem weeds, such as cow vetch, hemp-nettle, windgrass, or burdock, can also be controlled with the bladed hoe.

Practical recommendation
- Sow the winter cereal in October, in rows with spacing of at least 20 cm.
- When the cereal is at the 3-leaf-stage, control sprouting weeds with 1-2 harrowing procedures.
- After using the harrow and as the winter cereals begin tillering, root out the yet intact, well-rooted grass weed between the rows with help of a duckfoot-bladed hoeing device. The duckfoot-bladed hoe may also be used in combination with the harrow. Link: http://orgprints.org/31019/18/PA_004_Black-grass_final QR.pdf

Practice abstract 5

Short title (native language):
No-till cultivation of maize in rolled forage peas

Short summary for
practitioners (native language):

Problem: Tilling maize crop leads to soil compaction and reduces soil quality, which can have a negative impact upon the growing conditions of subsequent crops. No-till processes are soil-conserving, but highly challenging in organic farming.
Solution: For the conservation of soil quality, no-till maize cultivation in a rolled green manure has proven to be successful in practical trials by FiBL. The use of lush peas (EFB33 peas) is recommended as they almost stop growing after being rolled, and cover the soil well. With the mulching process, the trials achieved crop yields virtually equal to the ploughing method.
Outcome: The non-tilled, constantly covered soil has improved water retention and also shows a better carrying capacity during harvest, and is less affected by weed infestation, compaction, nutrient-leaching, and erosion.
Practical recommendation At the beginning of August, carry out 1 to 2 stubble-tillage operations after harvest. Sow the wintering forage peas in October. At the end of May, kink the peas' stems with a knife-cylinder roller, after which you drill in the maize with row cleaners. The green manure lying on the ground must be properly dried off before sowing. The mineralisation rate, which will be lower due to the soil cover, can be compensated for with targeted nitrogen fertilisation in the rows. Link: http://orgprints.org/31020/33/PA_005_Direct-sowing-maize_final_QR.pdf [7]

Practice abstract 6

Short title (native language): Catch crop in maize

Short summary for practitioners (native language):

Problem: As a late-sown crop with a large row spacing and slow early development, maize is vulnerable to erosion. Crop cover takes place as late as mid- to end of June. Soil compaction due to the use of heavy harvest machinery can further contribute to soil erosion. Solution: Due to its late establishment and tall growth, maize is well suited to catch cropping with pure or mixed clover (for stockless farms), or with overwintering, single-year grassclover (for livestock-holding farms). Outcome: Reduction of soil erosion, given a good development. • Suppression of seed-propagated weeds. • Better load-carrying capacity of the soil during harvest. • Fixation of nitrogen thanks to the legumes, and utilisation of nutrients in the soil after maize harvest. • Grazing possible immediately after maize harvest. Inconveniences • Competition for water in the case of severe drought. • Cost of seeds.
Practical recommendation • Sow the maize at the beginning of May. • If possible, harrow a first time before appearance of the maize plants (blind harrowing). Second harrowing should take place at a plant height of 10 cm, when the maize plants are well rooted. Between a plant size of 10 to 20 cm a first hoeing should take place. • Apply liquid manure at 25-30 m³ per ha. • When the maize plants reach a height of about 20 to 30 cm (from 4- to 6-leaf stage), undertake a second hoeing. Combine the second hoeing with simultaneous sowing of the catch crop into the weed-free crop. Link: http://orgprints.org/31021/13/PA_006_Catch-crop-maize_final_QR.pdf [8]
Practice abstract 7

**Short title (native language):**
Reducing weed seed pressure with the false seedbed technique

**Short summary for practitioners (native language):**

Problem: Annual crops are especially sensitive to weed pressure during early growth. Intensive weed pressure limits crop growth through competition for light, nutrients and water.

Solution: Grow the weeds, and then grow the crop! The false seedbed technique consists of preparing a regular seedbed (early) and then – instead of sowing the crop directly – you allow the weeds to germinate and then control them repeatedly before planting or sowing the actual crop.

Outcome: The false seedbed technique reduces the weed seed bank in the topsoil and, as a result, significantly reduces competition of annual weeds in the succeeding crop.

Practical recommendation: 1. Prepare a regular seedbed 2 to 4 weeks before the planned seeding date of the next crop. 2. Let the weeds germinate and grow to the 2- to 4-leaf stage, the most effective stage for weed control. 3. Uproot the weeds to a depth of 3 to 5 cm using a harrow comb or a flexible or chain harrow. 4. If (a) weed density is high, (b) if you have 7 to 10 days available for sowing the crop, or if (c) weed competition in the following crop is very critical, repeat the procedure a second time before sowing the crop as usual. 

[Link: http://orgprints.org/31022/25/PA_007_False-seedbed_final_QR.pdf]

Practice abstract 8

**Short title (native language):**
Testing peas for legume fatigue

**Short summary for practitioners (native language):**

Problem: Among legume crops, forage peas show the most symptoms of legume fatigue. This is due to infestation with Mycosphaerella-, Phoma-, Fusarium-, Aphanomyces- and other soil-borne pathogens as a result of over-cultivation of peas or other legumes such as lupins, field beans, vetches, red clover, or lucerne. A heavy infestation may lead to a total loss of the peas.

Solution: With the help of a simple method, the soil can be examined for legume-fatigue symptoms prior to cultivation with field peas.

Outcome: The method offers reference points regarding the soil's contamination with these pathogens, and thus indication for a possibly required cultivation break. Refraining from cultivating on contaminated soils helps avoid the situation of a high yield loss due to legume fatigue.

Practical recommendation: 1. Extract 10 litres of humid soil from the field plot you wish to examine and sieve it down to a grain size of 10 mm. 2. Moisten dry samples and mix them up evenly. 3. Fill four aluminium trays with the humid soil and store the remaining soil. 4. Cover the trays filled with soil with tinfoil and place them in the baking oven. Sterilise the
samples for at least 12 hours at 70-100 °C in the oven. 5. Let the aluminium trays cool for 12 hours after sterilisation. 6. Mark four flowerpots with "R" (for untreated reference) and another four with "H" (for heat-treated soil). 7. Fill the four H-flowerpots with the heat-treated soil and fill the four R-flowerpots with the untreated soil. Link: http://orgprints.org/31023/19/PA_008_Legume-fatigue_final_QR.pdf

Practice abstract 9

**Short title (native language):**
Nitrogen supply for winter oilseed rape

**Short summary for practitioners (native language):**

Problem: Modern varieties of winter rapeseed require a lot of nitrogen in early spring. In cool, moist and dry soils, the N mineralisation can be inhibited, which leads to an insufficient N supply and yield losses.

Solution: Fast releasing fertilizer application in autumn and spring can perfectly complement the basic fertilisation (applied via crop rotation and manure before sowing) and prevent a lack of nitrogen in spring.

Outcome: Optimal fertilisation ensures that the current rapeseed varieties and reach their full yield potential.

Practical recommendation:
- In conventional cultivation, the nitrogen uptake of winter oilseed rape amounts to 140 kg N per ha for a yield expectation of 35 dt per ha. In organic agriculture, about 100 kg suffice for a yield expectation of 20-25 dt.
- The ideal time for cultivating oilseed rape is after grass-clover or legumes. After grains, apply about 30 tonnes per ha of manure or manure compost before cultivating rapeseed.
- In dry conditions in spring, an early single application of nitrogen is preferable to two smaller applications. In the case of slurry with a low N content, two applications are often required because maximum of 40 m3 of slurry can be applied at once. Regularly analyse the N content of slurry (regular content: 1 kg of N per m3 of slurry or tonne of manure, respectively; range: 0,3 kg N per m3 for cow slurry to 3 kg N per m3 for pig slurry). The N contents of commercial fertiliser and liquid digestate are disclosed by the suppliers.
- On farms without livestock, one dose of organic commercial fertiliser is applied in early spring.

Link: http://orgprints.org/31024/19/PA_009_Nitrogen_fertilisation_winter_oilse...

Practice abstract 10

**Short title (native language):**
Winter field peas as green manure before maize

**Short summary for practitioners (native language):**

Problem
On arable farms without livestock, nitrogen insufficiency can occur when cultivating nutrient
demanding crops like maize. This can lead to yield losses and weed infestation.

Solution

Use a green manure of winter field peas before growing crops that have a high nitrogen demand in the rotation.

Outcome

Ploughing in winter field peas in spring provides 100 kg of nitrogen to the succeeding crop and increases yield. The improved development of the crop also leads to an improved weed control. Possible disadvantages are the growing costs and restrictions when cultivating peas as a main crop in the rotation. Position of green manure in the crop rotation: • After late crops like potatoes, sunflowers and field vegetables. After grains, green manure is possible after repeated stubble treatment against root weeds. • Possible succeeding crops are maize, potatoes or field vegetables that require nitrogen (e.g. spinach). Not grain legumes. • The earliest point for repeating the pea fertilization on the same field is after 6 years. In between this time frame, peas must not be cultivated as a main crop. Cultivation of winter field peas: • In case of soil compaction, primary soil tillage should be carried out. Seedbed preparation with a rotary harrow or a tined rotor. • Ideal seeding period: Beginning of October to middle of November. Sowing depth: 3-5 cm. • Quantity of seeds: End of September/beginning of October: about 1.5 kg/a (100 seeds/m²), middle to end of October: 2 kg/a, frost seeding in winter: max. 4 kg/a

Link: [http://orgprints.org/31026/31/PA_010_Peas_green_manure_final_QR.pdf](http://orgprints.org/31026/31/PA_010_Peas_green_manure_final_QR.pdf)

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Practice abstract 11

**Short title (native language):**
Reducing the use of copper in potatoes

**Short summary for practitioners (native language):**

Problem: Copper is still the most effective permitted means of protection for plants against leaf blight in organic potato production. However, this heavy metal has the great disadvantage of accumulating in the soil and damaging soil organisms in the case of higher input. The annual maximum quantity of pure copper as specified by EU organic regulations is set at 6 kg per ha. For members of national organic associations lower maximum quantities may apply.

Solution: In order to minimise the negative effects of copper on the environment, and to avoid exceeding the current maximum quantities per hectare and year, the dosage of copper and the intensity of treatment can be adapted to specific levels of infection, as well as weather conditions.

Outcome: • Lower accumulation of copper in the soil. • Less damage to microorganisms in the soil. • Potential saving in costs of spraying agent. • Improved distribution of spraying agent over the required period of treatment until exhaustion of the permitted maximum quantity.

Practical recommendation: Adapting dosage to state of infestation: As long as there is no infestation in a radius of 50 km, refrain from treating. Observe national information and alert services. As soon as the first case of infestation in the region is reported, protect potatoes with 200 to 250 g of pure copper per hectare. If potatoes in your own or neighbouring fields are afflicted by leaf blight, increase the dosage to 800 g and do not wait longer than a week.
Practice abstract 12

**Short title (native language):**
Diverse fertility building leys in arable rotations

**Short summary for practitioners (native language):**

Problem: Leguminous leys are a cornerstone of organic arable systems. However, they do not always deliver reliably, and there is a need to improve their fertility-building capability and resilience. A typical ley of one or two legume and grass species can be vulnerable to failure under unfavourable conditions. Good establishment, weed suppression and controlling the quantity and timing of N release can be especially challenging.

Solution: Different legume species have different growth characteristics and nutrient use profiles. Growing a complex mixture of species can maximise the exploitation of nutrients, aid weed suppression, attract a more diverse range of pollinators and enhance the stability and resilience of the stand. On-farm and field trials (including trials as part of the three year LegLINK project) have evaluated the role of functionally diverse species-rich leys in arable rotations in the UK.

Outcome: The results of a three year study in the UK suggest that there are several advantages to more complex mixtures; • Greater resilience to variable conditions • Combine early and late weed suppression • Slower decomposition on incorporation • Extends forage availability for key insect pollinators • Generally achieve higher forage yields • Potential for higher subsequent crop yields.

Practical recommendation: • There are a number of plant characteristics that have an impact on nitrogen release and mobilisation, namely C:N ratio, lignin and polyphenol content which result in slower N release and lower N losses or better N utilisation.


Practice abstract 13

**Short title (native language):**
Aerated compost tea (ACT) to improve soil biology and to act as a biofertiliser/biofungicide

**Short summary for practitioners (native language):**

Problem: Soil organisms are essential for healthy crop production, but arable farming tends to destroy them and cause an imbalance between different microorganism groups. This imbalance is bad for the soil food web and bad for the crop and may encourage soil borne pathogens and increase the level of plant disease, with little in the way of plant protection products to help control this disease.

Solution: There is an increasing body of experimental evidence indicating that compost teas
can improve the health of both soil and crop. Making and applying compost tea to an arable crop can help increase levels of beneficial fungi and bacteria and improve the overall balance of the soil food web, and therefore the health of the crop.

Outcome: There is a growing body of evidence supporting the benefits of aerated compost tea (ACT) application, but not all studies have shown this conclusively. Compost tea application helps build healthy soils which can lead to benefits for the crop including improved crop health and nutrition, improved crop quality, as well as growth promotion and plant protection through pathogen suppression.

Practical recommendation: • Exact methods of composting and compost tea making are open to debate, but this practice abstract will focus on the method for producing aerobic compost tea. • The most important step is to produce mature, well aerated compost full of the beneficial microorganisms needed in the soil and by the plant. Compost should be regularly turned to maintain levels of Oxygen while avoiding the build-up of CO2 and keeping the temperature below 65 degrees °C


Practice abstract 14

**Short title (native language):**
Cultivating a diverse wheat population suitable for low-input and organic farming

**Short summary for practitioners (native language):**

Problem: Monoculture pure line wheat varieties bred for high input conditions do not provide the genetic and physical diversity needed to increase crop capacity and resilience. Organic crop production requires plant varieties that are disease resistant, competitive against weeds and effective at scavenging for nutrients.

Solution: Genetic and physical crop diversity can bring stability and increased productivity. As a result of investigating composite cross populations, the ORC Wakelyns Population was developed. Parent varieties varied in their disease tolerance, adaptability to various weather conditions, yield capabilities, and nutritional quality.

Outcome: The Population produces more stable yields than those of the parent varieties due to more efficient use of soil nutrients and water, and lower plant disease and pest levels. When compared to the parent varieties, it produces yields of higher quality; increased protein content, improved hardness, good baking quality, comparable nutrition levels, and it is suitable for animal feed.

Practical recommendation: • The Population is most suitable for growing in low input or organic systems (under high input conditions it maintains its stability, but could yield significantly lower than pure line varieties). • It is able to adapt to changing environmental and weather conditions and cope with variation in diseases and weeds. To further increase crop resilience, you could also consider intercropping grain legumes and cereals. • Evolutionary change can occur within 2 to 3 years, but grain yield, disease incidence and genetic diversity should not be affected.

Link: [http://orgprints.org/31043/1/PA_017_ORC_Wakelyns_Population_new_QR.pdf](http://orgprints.org/31043/1/PA_017_ORC_Wakelyns_Population_new_QR.pdf) [16]
Practice abstract 15

**Short title (native language):**
Controlling docks by stubble cultivation

**Short summary for practitioners (native language):**

Problem: The traditional plough with a working depth of 20 cm is only partly suitable for controlling docks as it splits the roots, making it difficult to bring them to the surface manually or with a harrow. Most of the dock roots that stay in the soil start to sprout again. Solution: In order to clear docks, the skim plough and the flat cultivator have proved to be effective. They cut through the soil at a depth of 12-25 cm and expose the old roots. The challenge is then to bring these roots to the surface with a suitable harrow in order to collect them. Outcome: The stubble cultivation cuts the dock roots below growth points. The vegetative plant parts are then cut off from the water and nutrient supply, and regrowth is inhibited.

Practical recommendation: • Summer dock treatment is especially worthwhile in dry summers with catch crop cultivation and after early maturing crops (winter barley, whole-crop silage) or with an early tillage of grass-clover. • After grass-clover lay or cereal harvest, undercut the dock plants at a depth of 12-15 cm with a skim plough (without skimmer) with a support wheel, a stubble cleaner or an overlapping flat cultivator. • Bring the roots to the surface by passing over the field with a spring-tine harrow every 7-14 days. Additionally, apply a rotary harrow in heavy soils to expose the roots. • After every round, collect roots manually or let them dry in suitable weather conditions. Only leave fully dead roots on the field.

Link: [http://orgprints.org/31030/19/PA_025_Dock_final_QR.pdf](http://orgprints.org/31030/19/PA_025_Dock_final_QR.pdf)

Practice abstract 16

**Short title (native language):**
Rolling of grains to prevent winter kill damage

**Short summary for practitioners (native language):**

Problem
Extreme frost in cold winters can lead to soil movements that cause tears in plant roots and the hypocotyls of the grain. This makes growth more difficult in spring and makes the grain very susceptible to a lack of moisture up until the 3-leaves growth stage. This results in crops with gaps.

Solution
Rolling the grains in spring reconnects soil crumbs with the soil and supports the soil water capillarity and water availability in the topsoil.

Outcome
The pressure of the roller stimulates not only the formation of roots and improves access to water, but stimulates also the tiller of the grain increasing its stability and thus reducing the risk of falling over.
Practical recommendation:- Rolling requires dry soil in order to prevent the soil from sticking to the roller and ripping out the plants (especially when using smooth rollers). - The corrugated roller must not damage the plants too much. Take special care when using sharp-edged rollers. - Every mechanical interference puts the plants under stress. For this reason, it is advised to go at a maximum rolling speed of 5 km/h. - Even in densely sown or strongly fertilized spelt crops, the rolling is recommended. It weakens the main shoot and increases growth on side shoots, which improves the stability of the plants at the expense of longitudinal growth. Spelt is often rolled later (up until the 1-node stage) and more aggressively than winter wheat. Link: [http://orgprints.org/31034/19/PA_030_Roll_winter_grains_final_QR.pdf](http://orgprints.org/31034/19/PA_030_Roll_winter_grains_final_QR.pdf) [18]

Practice abstract 17

**Short title (native language):**
Use of rock dust against the rape pollen beetle

**Short summary for practitioners (native language):**
Problem: The rape pollen beetle is a major pest in rapeseed cultivation. An infestation can lead to high yield losses.
Solution: Rock dust or other dusty products applied to the rapeseed plants at the beginning of developing buds prevent the pollen beetle from eating, and thus mitigates the damage. Suitable substances are silicate rock dust (product name “Klinospray”); combined with the wetting agent “Heliosol”), Kaolin (a clay mineral; product name “Surround” and others) and locally available rock dusts. Several trials on the application method and effectiveness were carried out.
Outcome: Through the use of rock dust at the beginning of the bud development, the infestation by the rapeseed beetle can be reduced by an average of one third. In the treated area the pods per square meter increased by up to a quarter, thereby increasing the yield in treated areas by around 25 %. 
Practical recommendation: • Optimal time of treatment: The rape pollen beetles enter the fields at a temperature of 15 °C. Therefore a first treatment with rock dust is appropriate as soon as this threshold has been reached and the buds become visible between the leaves and will be reached by the spray liquid (BBCH 52). • Note: Pollen beetle infestation is supported by late blooming, frequent rapeseed cultivation and cultivation close to woodland. • A second treatment should be performed shortly before blooming begins to also protect the lateral buds. In the case of heavy rain, further applications may be required. • Very finely ground rock dust can be sprayed with the usual farm method. More coarsely ground meal is applied with a fertilizer spreader.
Link: [http://orgprints.org/31036/25/PA_032_Rock%20dust_pollen_beetle_final_QR.pdf](http://orgprints.org/31036/25/PA_032_Rock%20dust_pollen_beetle_final_QR.pdf) [19]

Practice abstract 18

**Short title (native language):**
Growing cover crops in organic arable crop rotations: Best practices from Denmark
Short summary for practitioners (native language):

Problem: Reduced soil quality, soil erosion, nutrient losses and high weed pressure are common challenges in arable farming. Cover crops can help to overcome these problems. But they are ‘yet another expense’ and might compete with the main crop for water, light and nutrients. Thus, successful implementation of cover crops requires knowledge of where in the rotation to grow them, which species to grow, and when and how to manage them.

Solution: Growing cover crops solves many of the problems related to arable farming. Based on extensive experiences with cover crops in Denmark, SEGES has drawn conclusions for management of cover crops in arable rotations.

Outcome: When sown correctly at the right time, in the right position within the rotation, cover crops retain nutrients, conserve water, prevent soil erosion, improve soil fertility and quality, and suppress weeds. Growing cover crops is recognized as a climate-smart agricultural practice.

Practical recommendation: Where to position and when to time cover crops in the rotation? • Grow cover crops in the 1st and 2nd year after ploughing of clover-grass to avoid nitrogen losses. • Grow nitrogen fixing cover crops on soils with low fertility. • Sow cover crops into or immediately after the main crop. In row crops, sow the cover crop in combination with the last hoeing. If the harvest of the main crop is rather early, sow the cover crop after harvest. • The earlier a cover crop is sown in August, less nitrogen is lost. Each day of delay in sowing a cruciferous cover crop in August results in loss of about 2 kg of N per ha.

Link: [http://orgprints.org/31051/13/PA_036_Cover_Crops_QR.pdf](http://orgprints.org/31051/13/PA_036_Cover_Crops_QR.pdf) [20]

Practice abstract 19

Short title (native language):
Efficient use of nitrogen from livestock manure

Short summary for practitioners (native language):

Problem: Nitrogen is often a yield limiting factor in organic arable crops. Therefore, it is important to apply available nitrogen sources, such as livestock manure, efficiently based on crop-specific needs.

Solution: Optimum use of nitrogen from livestock manure requires knowledge on crop-specific nitrogen demand, yield optimisations and response of crops to different amounts of ammonium-N.

Outcome: Optimized application of nitrogen from livestock manure will reduce nitrogen losses and result in higher yields.

Practical recommendation: Nitrogen application from livestock manure to winter and spring crops has different effects on crop yields depending on the pre-crop and the amount of ammonium-N provided. The results above show that nitrogen availability from livestock manure is limited. Based on the results, the following recommendations can be made: • If the pre-crop is not nitrogen-fixing, apply 20 to 60 kg of ammonium-N from livestock manure prior to sowing of crops. • Livestock manure application to a spring crop after nitrogen-fixing clover-grass is not yield effective and may bear the risk of nitrogen losses.

Crop rotation and its ability to suppress perennial weeds

Problem: Perennial weeds like thistle and couch-grass hinder growth and yields of arable crops. Without a proper focus on perennial weeds (through a good crop rotation system) organic arable cropping systems may not manage for more than 6 years without facing major weed problems. Solution: Crop rotation is a key tool for preventive control of perennial weeds in arable farming. Weed-suppressing rotations include an appropriate percentage of competitive crops and green manures. Selection of the right crops and their proper management are important for successful weed prevention.

Outcome: The appropriate combination of crops and green manures prevents spread of perennial weeds and increases crop yields and quality. Weed-suppressing crop rotations are absolutely essential for sustainable organic arable farming.

Practical recommendation: Basic rules • Implement green manures, such as clover or lucerne, in at least 20% of the rotation. • Do not grow more than 50% of cereals with low weed competitiveness in the rotation. Do not cultivate such crops for more than 2 consecutive years. • In fields with prevalent high weed pressure cultivate only crops with high weed competitiveness. [22] Link: http://orgprints.org/31053/1/PA_038_Crop_Rotation_OR.pdf

Practice abstract 21

Short title (native language): Calculate the risk of wireworm infestation in the field.

Short summary for practitioners (native language):

Problem: Wireworms, the larvae of the click beetle, can cause severe damage to potatoes (and other susceptible crops). They burrow into the tubers and render them unsuitable to be marketed for consumption. Wireworms usually live in the top soil layers in spring and autumn, but during summer as the heat increases, they move downward. If the heat and dry weather persist, they actively seek the watery tubers and start burrowing.

Solution: By setting up wireworm traps during spring, the number of wireworms can be determined before planting the potatoes. The traps are based on the premise that wireworms are drawn to sources of CO2 (like sprouting roots).

Outcome:
With this measure, a field can be evaluated and deemed fit for cultivating potatoes. Thanks to the assessment of the number of wireworms, high economic yield losses due to unmarketable tubers can largely be avoided. The assessment of wireworm density provides a quite reliable indication to infestation risk because wireworms are not very mobile.

Practical recommendation: In spring, with a soil temperature of at least 8 °C, place a pot full of cereal or maize grains into water and allow it soak for 24 hours. Spread out the soaked grains on about 20 cardboard or plastic plates, pot traps, stockings with adequate mesh size or similar materials. Sealable containers must have several holes; through which the worms can access the trap. Position the traps at a depth of 10 cm with at least 10 to 15 traps per field. The more traps per ha, the more reliable the results. Cover the traps with earth to soil-level and mark the locations.

Link: http://orgprints.org/31033/1/PA_029_calculate_risk_wireworms_final_QR.pdf [23]

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**Practice abstract 22**

**Short title (native language):**
Choosing cover crops for arable crop rotations.

**Short summary for practitioners (native language):**

Problem: Growing cover crops in organic arable crop rotations provides many agronomical benefits. Cover crops improve soil fertility, limit nitrate leaching and soil erosion and/or break weed, pest or disease cycles. Nevertheless, choosing appropriate cover crops can be a challenging task.

Solution: ITAB developed a decision tree for selecting cover crops in arable crop rotations. The decision tree is complemented by technical guides that provide information on cover crop management and appropriate cover crops.

Practical recommendation: First step: Determining the constraints Considering constraints with regard to suitability of cover crops helps to narrow the number of potential plant species. A first selection refers to the main crops, the intercropping period, dates of sowing and the soil type. Second step: Ranging objectives. In a second step, applicable objectives are selected from a proposed list. The species that are best suited to meet the objectives are selected. Third step: Adapting cover crop management. In a third step, the methods of sowing and crop termination are taken into account. If the selected species with the best characteristics do not match the available workforce and machinery, species selection is redefined. Fourth step: Final choice. The fourth step refers to the selection of a single species or a combination of different species. Seed costs and seed availability on the market or the farm finalize cover crop selection.

Link: http://orgprints.org/32606/1/PA_034_ITAB_cover_crop_final.pdf [24]
Short title (native language): Comb harrow: efficient weed control in cereals.

Short summary for practitioners (native language):

Problem: Weeds are a major problem in organic cereal production. Weed development before tillering can reduce yields, hinder the harvest, and increase weed pressure in the subsequent crop.
Solution: Organic farmers depend on preventive weed control measures such as crop rotation and mechanical control measures for weed control. In many countries, the comb harrow is a standard tool for weed control in early stages of cereal growth. The aim is to achieve the lowest possible weed density until the end of tillering. Problem weeds such as cleavers, chamomile, hollow tooth, field foxtail, mustard, etc. should be prevented until the end of stem extension. The comb harrow was tested in Bulgaria on 3 farms for 3 cereals (wheat, spelt and einkorn).
Outcome: In the beginning, weeds with shallow roots were successfully eradicated by the harrow. Others (e.g., burdock and stork’s bill) were controlled to a certain extent. The results show that the comb harrow had a significant impact on the yield, with an increase of 12.7 % for wheat, 16.7 % for spelt and 23.4 % for einkorn. The weeds decreased by 51.15 %, 58.14 % and 36.37 %, respectively.
Practical recommendations: Drill winter cereals in rows with an increased sowing rate of 7-10 % compared to conventional cereal crops during the most appropriate period (September 25 to October 5 for Northern Bulgaria, 5 to 15 October for Southern Bulgaria). When the crop is in the „3-leaf“ stage, control the emerging weeds with a comb harrow. Repeat the procedure, when the wheat plants start tillering. Use the harrow again at the earliest possible time in spring to destroy the soil crust and aerate the soil.
Link: http://orgprints.org/32614/7/PA_024_BIOSELENA_comb_harrow_en_final.pdf [25]

Practice abstract 24

Short title (native language): Commercial organic fertiliser as supplementary fertilisers in potato crop production
Short summary for practitioners (native language):

Problem: During the first 35-50 days after emergence, potatoes require an optimal nitrogen supply in order to develop a good haulm and tuber growth. Manure and slurry cannot meet the demand of the crop during its growth stage. High or late fertiliser inputs lead to a late nitrogen supply, which delays the maturing of the plants, complicated the removal of the haulm and decreases tuber quality.
Solution: Effective commercial organic N fertilisers can optimally complement the basic supply for potatoes in spring, which consists of the preceding crop, rotted manure and slurry.
Outcome:
Commercial organic N fertilisers allow a relatively accurate dosage of the nitrogen supply without increasing the infestation risk of Rhizoctonia. Due to the relatively high costs, commercial fertilisers are, however, only economically viable as an addition to farm manure.

Practical recommendation:
The nitrogen requirement varies depending on variety and usage. The conventional fertilisation amounts to 120 kg of N per ha in table potatoes and potatoes for processing. Early potatoes and seed potatoes require slightly less nitrogen at about 100 kg of N per ha. Link: http://orgprints.org/31027/13/PA_011_Commercial-fertiliser-potatoes_fina... [26]

Practice abstract 25

**Short title (native language):**
Controlling potato beetles with Bt

**Short summary for practitioners (native language):**

**Problem:**
Potato beetles can develop rapidly, especially in warm summers on late-maturing crops, causing extensive damage to the potato plants.

**Solution:**
In the case of a large infestation, direct control measures e.g. the use of biological plant protection products like Novodor are justified. Novodor contains a bacterium, Bacillus thuringiensis tenebrionis (Bt), whose toxins (protein crystals) destroy the intestinal tract of potato beetle larvae.

**Outcome:**
The Bacillus thuringiensis has a selective effect and is not harmful to bees. Disadvantages: It only is effective against young larvae stages, it is very UV sensitive and its effect is reduced strongly in case of temperatures above 30 °C.

**Practical recommendation:**
Check the state of infestation. When the potato plants start to emerge, walk the field every 7 days in a straight line and check plants at regular intervals. If clusters of eggs are found on more than every third plant, apply Novodor four days after discovering the first clusters.

Apply the agent Dissolve 5 l of Novodor in 500 l of water per hectare of potatoes. Novodor can be applied together with copper products.

**Optimal conditions:**
The potato beetles are still in an early larval stage (L1 to L2). Temperature between 15 °C and 25 °C. Avoid direct sunlight: spray late in the evening or when the sky is overcast. No rain is due within 8 hours after spraying. Link: http://orgprints.org/31592/13/PA_031_Potato_beetle_control_final_QR.pdf [27]

Practice abstract 26

**Short title (native**
Problem: Maize is one of the most difficult field crops in terms of weed management. The low number of plants per m² and the relatively long time the crop requires to cover the soil surface encourage the growth of summer weeds and increase water evaporation.

Solution: Sowing maize in a no-till system into a mulched cover crop. This method requires mechanical termination of the cover crop that precedes the maize crop with a roller-crimper, and, for sowing maize, a no-till planter is needed. The mulch cover will control weeds during the initial growth phase of the maize crop and reduce water loss by evaporation. If leguminous cover crops are used, important amounts of nitrogen can be collected.

Outcome: In a Northern Italian context, a field pea cover crop was tested as mulch for the maize crop. The roller crimper effectively terminated the cover crop (15 t per ha of wet biomass). However, the mulch did not last long enough. The maize plants did not have enough time to develop and shade the entire soil surface. Weeds started to sprout through the decomposing mulch. For the test conditions, this cover crop has proven unsuitable as a long-lasting mulch to control weeds. With no fertilization and no irrigation applied, the maize yields amounted to about 5 t per ha.

Practical recommendations: The cover crop needs to be sown as accurately as the main crop. Poor cover crop stands do not result in good mulches. The effectiveness of the mulch depends on the amount of mulch biomass. However, more biomass also means more difficulty for the planter. On soils with low organic matter content, additional nitrogen fertilisation should be considered.

Link: [http://orgprints.org/32610/1/PA_020_AIAB_cover_crop_no_till_maize_final.pdf](http://orgprints.org/32610/1/PA_020_AIAB_cover_crop_no_till_maize_final.pdf) [28]

Practice abstract 27

Short title (native language): Cover crop mulches and no-till maize

Short summary for practitioners (native language):

Problem: Soybean is a challenging crop in organic systems due to its low ability to compete with weeds during growth. 2 to 4 hoeing passages with camera-controlled steering systems are an option, but they significantly increase production costs. Moreover, in the traditional Italian growing areas, irrigation is becoming a necessity to ensure good yields. However, not all areas can be irrigated at a reasonable cost.

Solution: As a solution, soybeans may be sown into mulched cover crop in a no-till system. The mulch cover suppresses the weeds during initial growth of the crop and reduces the amount of water lost by evaporation.

Outcome: Several methods of sowing into mulch were tested:

A) No-till sowing into a standing cover crop, then rolling the
cover crop with a roller crimper;
B) No-till sowing into a standing cover crop, then creating mulch by passing over it with a flail shredder;
C) No-till sowing into a standing cover crop, and no follow-up procedures;
D) Mulch obtained with a flail shredder, then no-till sowing with a tine air seeder; and
E) Roller crimper followed by no-till sowing with a tine air seeder.

All of these methods, except method B, have shown good results in terms of weed control, and preservation of soil water (even during the dry summer in 2016). Yields were comparable with those of the tilled fields, except for method C.

Practical recommendations
The cover crop needs to be sown as accurately as the main crop. Poor cover crop stands do not result in good mulches. The effectiveness of the mulch depends on the amount of mulch biomass. However, more biomass also means more difficulty for the planter.

Link: [http://orgprints.org/31044/7/PA_018_AIAB_SoybeanRollerCrimper_final_QUE...](http://orgprints.org/31044/7/PA_018_AIAB_SoybeanRollerCrimper_final_QUE...)

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**Practice abstract 28**

**Short title (native language):**
Managing docks with the WUZI dock cutter

**Short summary for practitioners (native language):**

**Problem:**
How can excessive levels of docks in pastures be avoided without ploughing and cultivating too often? There is a need for innovation, as no mechanical treatment seems sufficient.

**Solution:**
The WUZI dock-cutter is a good way of controlling weeds manually, as the drill terminates the dock and prevents regrowth.

**Outcome:**
For each year that ploughing of a pasture is postponed, organic matter in the soil can build up to 1000 kg N per hectare. Thus, the dock-cutter leads to a build-up of organic matter in the soil and effective termination of docks without ploughing.

**Practical recommendation:**
The mounting of the dock-cutter needs to be adjusted in order to fit mini-loader or a front-loader on a tractor. In Denmark, mini-loaders are already present on many farms. The docks are drilled by placing the drill on top of a dock and then using the oil pressure of the loader to turn on the cutter and terminate the dock. The cutter drills about 20 cm into the soil, which is enough to destroy the point of growth and thus prevent regrowth. The dock-cutter automatically plants grass seeds into the bare soil where the dock was treated. This is an important function, as the grass seeds will compete with docks germinating later in the growing season from seeds in the soil. Using the dock cutter is more convenient than forking- or digging-out the docks. However, it still needs 20 to 30 seconds per dock, one person and the machine. In a field with high dock infestation, the dockcutter is too time-consuming as it only drills out one dock at a time. In that case, it is recommended to plough the field or cut the docks before they set seeds (which means when the seeds are green).

Practice abstract 29

**Short title (native language):** Monitoring and comparing cover crop performances

**Short summary for practitioners (native language):**

**Problem:**
When farmers decide to implement cover crops on their farms, they usually lack available data regarding the performance of species and/or cultivars in their own pedo-climatic context.

**Solution**
Testing different species and/or cultivars of cover crops on the farm generates useful local data on the performance of species and/or cultivars. The French MERCI tool (Méthode d’Estimation & des Restitutions par les Cultures Intermédiaires) facilitates their evaluation.

**Outcome:**
The acquired information on biomass production and expected nutrient release of cover crop species and/or cultivars will provide greater certainty for the selection of suitable varieties and the estimation of fulfilment of the nutrient requirements of the subsequent crop.

**Link:** [http://orgprints.org/32611/1/PA_015_ITAB_monitoring_cover_crop_final.pdf](http://orgprints.org/32611/1/PA_015_ITAB_monitoring_cover_crop_final.pdf)

Practice abstract 30

**Short title (native language):** Monitoring weed regulation services by carabids

**Short summary for practitioners (native language):**

**Problem**
Weed pressure is one of the most limiting factors in organic arable crops with increasing weed seed bank in cereal crops.

**Solution**
In addition to mechanical weed control carabids can reduce weed seed bank in arable crops by predation. Carabid population is known to be higher in organic fields than in conventionally farmed fields.

**Outcome:**
Monitoring weed seed predation by carabids helps assessing predation potential and provides information for further improvement of their habitats (e.g. field margins).

**Practical recommendation:**

**Preparing the seed cards**
Prepare 10 sand paper cards (5 cm x 5 cm) per field and 10 predator exclusion cages with 1 cm squared metal net (Fig. 1) to avoid predation by mammals and birds.

**Glue 10 poppy seeds on each card and place each card within an exclusion cage.**

**Data collection**
Collect data twice during the crop cycle, preferably in spring for winter cereals (avoiding drought periods). Define two transects in the monitored field. Place 5 seed cards with
exclusion cage along each transect and nail them into the floor (day D). Remove them after 4 days of exposure to predators (D+4). Count the remaining seeds on each card.

Link: http://orgprints.org/31039/1/PA_033_ITAB_Seed_Card_final.pdf [32]

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**Practice abstract 31**

**Short title (native language):**
Multispectral remote sensing in participatory on-farm variety trials

**Short summary for practitioners (native language):**

**Problem**
In participatory on-farm variety trials, there is usually no possibility to set up a randomized, complete block design to collect eligible scientific results due to the lack of space, time and equipment of organic arable farmers.

**Solution**
We tested multicopters equipped with RGB and NIR cameras to assess field heterogeneity and crop health, to predict yield, and to identify N-efficient varieties within and between on-farm research sites. Our remote sensing tools were tested and successfully validated from 2014 to 2016 on conventional small plots of N-treatment trials. In order to compare results from remote sensing, standard sampling methods were applied.

**Outcome**
On the one hand, through the analysis of remote sensing images, it was possible to determine weed infestation, field heterogeneity and NDVI values/pixel (app. 1 cm per pixel). In some cases, we even discovered previously unknown underground field objects (e.g. a drainage system from the 1970s). On the other hand, NDVI data did not correlate with traditional sampling results (SPAD values and yield estimations), probably because the multicopter covered 100 % of the large plot area, while sampling only provided data from specific points (50 SPAD points/plot and three yield sampling quadrats/plot). We can thus assume that for large plot variety trials, remote sensing can give substantially more precise results than traditional sampling methods. Further tests are needed to prove this assumption. Link: http://orgprints.org/32539/1/PA_021_OEMKI_Remote_Sensing_final.pdf [33]

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**Practice abstract 32**

**Short title (native language):**
NDICEA - A digital tool to model nutrient balances across a crop rotation

**Short summary for practitioners (native language):**

**Problem:** Knowing the best way to address a negative nutrient balance in organic farming can be a challenge.
Solution: NDICEA allows farmers to model crop rotations at a field scale under a given management regime and observe the nutrient balance. Outcome: Using NDICEA, farmers can identify where problems with nutrient loss/imbalance occur. They can experiment with changes in rotation or management to find the most effective strategies to address nutrient imbalances and nutrient losses due to leaching. Practical recommendation: NDICEA is a freely available, computer-based nutrient budgeting tool developed by the Louis Bolk Institute (Netherlands). It takes data for an individual field, alongside data on climate, soil properties and management to map changes in soil nutrients over the course of the rotation. The tool was applied on seven organic farms in the UK. The only farm with positive levels for nitrogen and phosphorous achieved this through applications of either compost (35t per ha) or chicken manure (10-17t per ha) for six (out of eight) years of the rotation. In all cases, many of the nutrients were lost through leaching or harvest of the ley before being available to the commercial crop. This was especially the case where the ley was broken in autumn, leaving the soil susceptible to leaching and denitrification over winter. Breaking the ley in spring makes the nutrients available for the next crop rather than being lost. The biggest improvements to nutrient balance resulted from changing tillage practices to a reduced-till or, ideally, no-till system. For several cases, this change alone was enough to result in positive nutrient and organic nitrogen balances. 
Link: [http://orgprints.org/32609/1/PA_014_ORC_NDICEA_final.pdf](http://orgprints.org/32609/1/PA_014_ORC_NDICEA_final.pdf) [34]

Practice abstract 33

**Short title (native language):**
SEMINBIO®: Innovative seeder for weed control in cereals

**Short summary for practitioners (native language):**

**Problem:**
Weed competition is a crucial aspect in organic farming systems, especially for predominantly annual crops such as cereals and legumes. Sowing density and the spatial arrangement of plants play a crucial role in weed control.

**Solution:**
The seeder prototype SEMINBIO®, which was tested on durum wheat, optimises seed distribution in the three axes of space. This ensures a fast soil cover by the crop, a rapid and improved uptake of nutrients, and enhanced competitive ability against weeds.

**Outcome:**
Trials with the SEMINBIO® seeder in southern and central Italy showed that the seeder’s sowing layout increased wheat yield, irrespective of the weed presence, and decreased weed development, if weeds were present, compared to ordinary seeders.

Link: [http://orgprints.org/32604/1/PA_022_CONMARCHEBIO_seminbio_final.pdf](http://orgprints.org/32604/1/PA_022_CONMARCHEBIO_seminbio_final.pdf) [35]

Practice abstract 34

**Short title (native language):**
Using crop rotation to control wireworms
Problem:
Wireworms, the larvae of the click beetle, can cause severe damage to potatoes (and other susceptible crops). They burrow into the tubers and render them unsuitable to be marketed for consumption. Wireworms can also cause significant damage to sugar beet, cereal, maize, legumes and various vegetables. Usually, several types of wireworms with different characteristics are involved. In spring and autumn, the wireworms are usually found in the top soil layers, eating crop roots. In adverse conditions, the larvae retreat to deeper soil layers. In spring, the adult beetles lay their eggs into the loose, humid soil of permanent meadows and temporary grassland as well as cereals, but not in root crops. The beetles undergo a metamorphosis during 3-5 years with up to 15 larval stages. The larvae cause the most damage in their second and third year of metamorphosis. So far, a direct control for wireworms in or immediately before susceptible crops has not yet been achieved.

Solution:
Reduce the infestation risk by planning your crop rotation:
By cultivating a one-year grass-clover ley and by placing the potatoes after the third or even fourth year of ploughing the ley, the intensity of infestation can be considerably lowered.
Outcome:
Implementing a well-designed crop rotation has so far proven to be the most effective measure against wireworm damage. By minimising the share of grass-clover ley in the crop rotation, the metamorphosis of the larvae can be disturbed. In the fourth year after grass-clover ley or ploughing of soil, the risk of infestation is under 10%.

Link: [http://orgprints.org/31031/2/PA_027_Using_crop_rotation_control_wireworm...](http://orgprints.org/31031/2/PA_027_Using_crop_rotation_control_wireworm...)

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Practice abstract 35

**Short title (native language):**
Weed trimming in soybeans

**Short summary for practitioners (native language):**

Problem
In cases where general management measures (crop rotation, cover crops) and direct weed control measures (harrowing, inter-row hoeing) have not provided sufficient control of weeds, weeds may over-top soybeans in summer. This situation creates three major problems: a) competition for light, water and nutrients, b) an increase in the density of the soil weed seed bank, and c) a reduction in grain quality parameters (increased moisture and impurities) at harvest.

Solution
One or more passages with a weed trimmer machine during summer time, when the inflorescences of the weeds overtop the soybeans, resolves the problem.

Description
With one or more passages, weeds that overtop the soybean crop are trimmed, thus avoiding further competition, seed ripening and spreading of the weeds. The method is also effective...
on weedy sunflowers. When applied in winter cereals, the method helps to contain grain moisture, which is an important price parameter. Practical recommendations • The possibility to control some weeds in advanced growth stages with the weed trimmer does not replace the systematic application of preventive weed control measures. • Proper timing of weed trimming is essential. Trimming must be carried out before canopy closure, as it will be difficult to drive into the crop after canopy closure. • Large working widths reduce operational costs and damages on the crop by the tractor wheels, but they also reduce the cutting height accuracy.

http://orgprints.org/31045/7/PA_019_AIAB_Soybean_weed_trimmer_final_QR.pdf

Practice abstract 36

Short title (native language): Which harrow is suitable for weed control in organic cereals?

Short summary for practitioners (native language):

Problem
To achieve good yields and high grain quality, and to avoid increased weed pressure in subsequent crops, weeds must be controlled efficiently in organic cereal production. Different mechanical devices are available for weed control.

Solution
The tined harrow and the rotary hoe are two commonly used mechanical tools for weed control. In recent years, the Treffler Company re-invented the concept of the harrow and introduced the precision tined harrow. Inagro tested the tined harrow, the rotary hoe and the precision tined harrow to determine the most effective device.

Outcome
The precision tined harrow had the best impact on soil and weeds, as each tine leaves its own trace. The rotary hoe just created small holes, but broke up the soil crust. Two successive treatments doubled the efficiency against weeds.

Link: http://orgprints.org/32612/1/PA_026_INAGRO_harrow_cereals_final.pdf

Practice abstract 37

Short title (native language): Healthy Grassland Soils Pocketbook

Short summary for practitioners (native language):

Problem
How to assess grassland soils

Solution
Easy steps for assessment and recording or scores as well as suggestions how to avoid compaction and improve soil structure
Description
This pocketbook, based on work conducted by SRUC, Newcastle University and ADAS, aims to develop an industry-recognised method to assessing grassland soils and to provide guidance on soil biology. It contains easy-to-follow guidelines and effective visuals on assessing, maintaining and improving soil structure. This covers surface assessment, soil extraction, soil type, how to identify soil structure and guidance on how to score to the state of the soil with photographs showing soil structure types. It also covers management options for poor soil structures including surface slitting and sward lifting and ploughing, and preventative measures, such preventing compaction, soil testing, maintaining field drainage and improvements for the biological activity in the soil.
Link: https://dairy.ahdb.org.uk/non_umbraco/download.aspx?media=20833

Practice abstract 38
Short title (native language):
Spade test
Short summary for practitioners (native language):
Problem
In case of degraded soil structure (e.g. compaction) assessing soil quality is crucial to further adapt cropping practices in order to restore soil structure.
Solution
With a quick and reproducible method, the spade-test assesses soil structure in order to monitor soil quality.
Description
The spade test is a diagnosis tool to assess soil structure (scoring from 1 to 5 = very compacted). This tool is a simplified version of the soil profile diagnosis method that quickly provides information to the user and helps for decision making (e.g. tillage operations). The guideline document explains how to extract a soil block with a spade (20 cm * 20 cm * 25 cm or more) and interpret the observed soil structure. The spade test only requires a spade and a tarp. The leaflet contains an interpretation table for scoring the soil structure based on the observation of the clods. It also contains a notation sheet. The tool has been developed for organic agriculture but could be used in conventional agriculture. The test is applicable in all European pedo-climatic conditions. Link:

Practice abstract 39
Short title (native language):
Plant protection in organic farming
Short summary for practitioners (native language):
Missing plant protection measures at a municipality level.

A variety of plant protection measures are shown with appropriate crop and nutrient management and mechanical and biological control.

This brief presentation is devoted to an innovative development plan of plant protection measures in organic farming of a Polish municipality. It serves as a source of inspiration, listing overall points to consider in planning and suggests basic plant protection measures. Solutions, such as the right variety selection, crop rotation, nutrient management, pest control through homemade infusions, mechanical and biological control are presented, but need further reading and deeper knowledge when it comes to planning and implementation.

Link: http://www.sosnowica.pl/download/Agroekologia_B.Studzinska.pdf

Practice abstract 40

**Short title (native language):**
Grain legumes and soil fertility - Strategies for a successful cultivation

**Short summary for practitioners (native language):**

As a preceding crop, grain legumes have a positive effect and improve the soil quality. Unfortunately, the knowledge about their cultivation has been largely lost.

The guideline for the cultivation of grain legumes provides detailed recommendations on field selection, tillage, sowing, plant protection, fertilisation, weed management and the choice of variety and preceding crop.

The German Federal programme on organic farming and other forms of sustainable agriculture developed practical cultivation strategies with the aim of improving soil fertility and plant nutrition. During the five-year project, some new practical knowledge was gained. These findings are listed in the booklet. Reading this guideline should encourage farmers to intensify the cultivation of grain legumes. Link: http://orgprints.org/31992/1/1654-koernerleguminosen.pdf

Practice abstract 41

**Short title (native language):**
RotAB Weed toolbox

**Short summary for practitioners (native language):**

Problem
Weed control is a major issue in organic farming, especially in specialized arable cropping systems. To explore solutions, long-term experiment are set up. In order to assess weed control efficiency methods of weed monitoring are required.

Solution
The RotAB weed toolbox aims at identifying and describing existing weed monitoring methods: their objectives, applicability and detailed protocols.

Description
The toolbox is a handbook of methods for weed monitoring in organic long-term arable experiments. It has been developed based on the expertise of French agronomists in charge of such experiments. The toolbox is composed of an excel file (can be found on Organic Eprints orgprints.org/31937) that provides an overview of the methods and indicators to be calculated and 7 fact sheets detailing different weed monitoring methods. The tool has been developed for organic agriculture but could be used in conventional agriculture. The fact sheets are applicable in all European pedo-climatic conditions. Link: http://orgprints.org/31937/1/RotAB%20Weed%20toolbox.%20Bao-adventices.pdf [43]

Practice abstract 42

**Short title (native language):**
LeNiBa - app for nitrogen balancing of legumes

**Short summary for practitioners (native language):**

Problem
It is hard to estimate the positive effects of growing legumes on soil nitrogen levels.

Solution
The tool helps to calculate nitrogen balances depending on the site, the grown legume and the yield.

Description
With LeNiBa app it is possible to calculate nitrogen fixation and the N balance for different legumes, taking into account yield and site conditions. It is designed for both organic and conventional farmers and advisers who want to optimise the rotations for specific enterprises growing legumes. The tool can be used on any android mobile device and thus almost everywhere. Link: https://www.ktbl.de/inhalte/ktbl-apps/ [44]

Practice abstract 43

**Short title (native language):**
NDICEA - Nitrogen Planer - version 6.2

**Short summary for practitioners (native language):**

Problem
Understanding of the nitrogen (N) supply and organic matter (C) cycling in arable rotations
Insights into nitrogen supply and carbon storage on farm or field basis

NDICEA presents an integrated assessment of the question of nitrogen availability for organic crops. During the growing season, the model compares net available nitrogen from manures, crop residues, green manures, additional fertilisers and the soil, with the crop specific demand on a daily basis. The release of nitrogen from different types of organic matter in the soil is calculated, considering soil type, temperature, rainfall and losses due to leaching and denitrification. The NDICEA model has been developed, tested and used during more than 15 years by the Louis Bolk Instituut in the Netherlands. The interface is user-friendly, with complex calculations in the background. This offers an easy way to obtain a reliable indication of the nitrogen and organic matter dynamics on a specific farm. Calibrating the model with measured soil mineral N values (if available) will improve accuracy of the calculations.

Link: [http://www.ndicea.nl/](http://www.ndicea.nl/)
Identifying nutrient flows and potential deficits or surpluses on organic farms

Solution

The leaflet describes how nutrient budgets (mainly focusing on P, K and N) can be used in organic farming.

Description

The leaflet gives practical guidance on using data and calculating farm-gate nutrient budgets with sections on soil analysis, nutrient inputs, nutrient losses and flows, nitrogen fixation through leys and how inputs and outputs from organic manures and livestock feed can be recorded. It contains one example table of a farm-gate annual nutrient budget for a mixed cattle and arable farm. The tool is specific to organic farming. It was drafted for the UK but has relevance in other countries. Link:

http://orgprints.org/31654/1/a-guide-to-nutrient-budgeting-on-farms.pdf

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Practice abstract 46

**Short title (native language):**

Rape pollen beetle

**Short summary for practitioners (native language):**

Problem

The pollen beetle causes big yield losses in organic rape cultivation. As there is currently no permitted direct control measure, preventive measures have to be used.

Solution

First, the leaflet shows the biology of the pollen beetle. Afterwards, it informs about the control measures and the current state of the research.

Description

Organic rapeseed oils is in demand. But the organic rape cultivation is difficult. Especially the pollen beetle causes big yield losses. As there is currently no allowed direct control measure, preventive measures have to be used. The leaflet provides some information about the biology of the pollen beetle and about methods of identifying it. It also provides some information about monitoring and possible preventive measures. Since pollen beetles affect closed buds, supporting fast growth and flowering is an important measure. Finally, the current research is discussed. Link:


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Practice abstract 47

**Short title (native language):**

Crop rotation and its ability to suppress perennial weeds

**Short summary for practitioners (native language):**

Problem
The problem of perennial weeds in organic arable farming
Solution
A well-designed crop rotation system is the key to preventive control of perennial weeds.

Description
Weed-suppressing crop rotations are essential for sustainable organic arable farming. Preventing spread of perennial weeds will increase crop yields and quality. The tool is a factsheet created for all organic farmers as we all need renewed knowledge on weed-suppression and crop rotation from time to time. The factsheet provides practical recommendations on crop selection and composition of crop rotations in accordance to weed competitiveness and nitrogen demand. An appropriate combination of crops and green manures, designed specifically for the conditions and needs of individual fields, prevents spread of perennial weeds. The factsheet doesn’t only focus on prevention but also provides recommendations in case of high weed pressure. Example: Do not sow a winter crop after legumes, as winter crops leave perennial weeds undisturbed for a long period of time. Instead, undersow a cover crop in the legumes to hold back the nutrients and sow a competitive crop in spring. Link:
http://orgprints.org/31134/12/askegaard-2016-ok-net-arable-leaflets-saed... [49]

Practice abstract 48

Short title (native language):
Growing cover crops in organic arable crop rotations: best practices from Denmark

Short summary for practitioners (native language):

Problem
Reduced soil quality, soil erosion, nutrient losses/leaching, weed pressure.

Solution
Growing cover crops the right way, right timing, right position in the rotation.

Description
This tool is about growing cover crops in the best way in an organic arable crop rotation. Thus, the tool is for organic farmers and their advisors who want a successful implementation of and increased knowledge on growing cover crops – regardless of experience. Cover crops can if used properly have tremendous effect on soil quality, nutrient leaching/losses, weed pressure, and soil erosion – common challenges in arable farming. The tool helps to identify when to grow cover crops and where to position them in the rotation. Furthermore, it suggests cover crop species suitable for different soil types, degree of crop competition, existing N-pool in the field and how much seed is needed pr. ha. Structured as a factsheet, the tool provides examples/statements on where different cover crops fit in the rotation and why it should be considered. Example: it is important to grow cover crops both 1st and 2nd year after ploughing a field of clover-grass to avoid nitrogen losses. Link:
http://orgprints.org/31133/12/askegaard-2016-ok-net-arable-leaflets-efte... [50]

Practice abstract 49

Short title (native
Efficient nitrogen use from livestock manure

Problem
Nitrogen is often the yield limiting factor and therefore needs to be distributed according to crop-specific needs.

Solution
Knowledge on crop-specific N-demand, yield optimisation, and crop response to different amounts of ammonium-N in order to use nitrogen from livestock manure optimally.

Description
This tool is about efficient use of livestock manure, and how optimization will increase yields and reduce nitrogen losses. Thus, the tool is for farmers and their advisors who use livestock manure and higher yields. The tool can be useful regardless of experience. This factsheet is about optimizing the use of limited amounts of nitrogen from livestock manure. The yield response from applying different amounts of nitrogen differs, hence nitrogen needs to be applied with respect to crop, pre-crop, N-need, soil type, and climatic conditions. The result of optimal N-use is higher yields and less N losses. The factsheet provides recommendations on yield effective application of livestock manure in relation to nitrogen fixing crops, spring/winter crops, weed pressure etc. Example: applying livestock manure to a spring crop after nitrogen-fixing clover-grass is not yield effective and may bear the risk of leaching.

Link: [http://orgprints.org/31131/12/askegaard-2016-ok-net-arable-leaflets-udny...][51]

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Reduced Tillage

Problem
Soil degradation through ploughing

Solution
Reduced tillage, lower cultivation depth

Description
Reduced tillage can significantly contribute to soil quality and fertility. By avoiding a deep and intense loosening of the soil, the soil structure and soil biology is better conserved and humus decomposition is slowed down. Furthermore, the load capacity, erosion sensitivity and water household of the soil are improved. However, avoiding the use of a plough brings certain challenges, especially in organic farming. For example, weed pressure can increase or nutrient supply can become insufficient. This leaflet shows benefits and challenges of reduced tillage. It presents various methods, application examples and machines that are suitable for a sustainable soil treatment in organic farming.

Link: [https://shop.fibl.org/CHen/mwdownloads/download/link/id/666/?ref=1][52]
Practice abstract 51

**Short title (native language):**
SmartSOIL Tool

**Short summary for practitioners (native language):**

**Problem**
How to manage Soil C through cropping operations

**Solution**
Crop rotation improvement, catch crops and green manures use, organic matter application

**Description**
The purpose of the tool is to give guidance in the management of arable crops in order to maintain and increase soil C and consequently reduce climate change effects. It proposes changes in the crop rotation, the use of catch and cover crops, use of manure and other organic fertilizers and simulates the impact on yield. It is tuned for different areas and soil types. The SmartSoilTool is a DSS in 7 languages where the user can choose location, soil type, farming system etc. and the system simulates the effects on yield, profitability, soil C etc. It is useful for farmers and advisers, both newcomers and skilled and it is not specific for organic. It has specific soil and management infos for Denmark, Italy, Hungary, Spain and Poland. Other useful information and examples are available on the webpage. Link: [https://web04.agro.au.dk/projectnet/smartsoilDST/Default.aspx?Language=e...](https://web04.agro.au.dk/projectnet/smartsoilDST/Default.aspx?Language=e...)

Practice abstract 52

**Short title (native language):**
Composting leaflet – agroecological approach at your farm

**Short summary for practitioners (native language):**

**Problem**
At both stockless and mixed farms, on-farm composting helps close the nutrient cycle, increases soil fertility and avoids the spreading of weeds and pathogens.

**Solution**
The leaflet offers basic information and real-life examples about on-farm composting

**Description**
This leaflet will help organic farmers to overcome barriers and get started with on-farm composting. With minimal additional work, vegetable and arable farmers can upgrade crop residues to compost. Compost application can be integrated in the crop rotation and combined with reduced tillage. Also on livestock farms composting can offer added value. Composted manure is more stable, because the decomposition process has already partly taken place. By mixing other materials in the manure, the N/P ratio in the compost can be adjusted. Moreover, composting kills off the pathogens in manure. This leaflet gives an overview of the characteristics of good quality compost and the different steps of making compost. It provides an update of recent compost research in Flanders (Belgium) and examples of real farmers. There is also a section about the legal requirements of making and

Practice abstract 53

**Short title (native language):**
Organic Cultivation of Green Peas

**Short summary for practitioners (native language):**

**Problem**
Pests and pathogens of green peas

**Solution**
Biological pest control

**Description**
The leaflet addresses organic farmers who are cultivating green peas. The first article is about crop management from growing to harvesting. Afterwards, an overview about pests, diseases and biological pest control is provided, followed by a specific description of viruses and strategies to reduce nanoviruses. The last topics are aphid attacks and biological aphid control.

Link: [http://orgprints.org/31012/1/gruenerbsenanbau_1610.pdf](http://orgprints.org/31012/1/gruenerbsenanbau_1610.pdf)

Practice abstract 54

**Short title (native language):**
Organic quality wheat production - Results of long-term field trials of cultivation and selection of varieties

**Short summary for practitioners (native language):**

**Problem**
Challenges of cultivation of quality wheat

**Solution**
Solutions for the cultivation of quality wheat

**Description**
The leaflet addresses organic arable farmers. The first article is about quality parameters of organic quality weed, followed by a description of plant yield. Afterwards some seed-diseases are mentioned. Based on field trials the nutrient supply of wheat stock by crop rotation is explained. With the data of the field trials also recommendations for variety selection and mixtures of varieties are given. Further subjects are effects of stocking density and organic fertilization.

Practice abstract 55

**Short title (native language):**
Organic cultivation in autumn 2016 - Varieties, Seeds and Crop management

**Short summary for practitioners (native language):**

**Problem**  
Selection of varieties

**Solution**  
Recommendations on varieties, seeds and crop management based on recent field trials

**Description**  
The leaflet addresses organic arable farmers and contains a broad overview of varieties. Relevant characteristics of varieties for organic farming and the availability of organic seeds are listed. Additionally, the results of field trials all over the country with winter wheat, winter spelt, winter rye, winter triticale and winter barley are presented. Link:  
[http://orgprints.org/31009/1/bionet_bioherbstanbau_2016.pdf](http://orgprints.org/31009/1/bionet_bioherbstanbau_2016.pdf) [57]

Practice abstract 56

**Short title (native language):**
Organic Cultivation in Spring 2016 - Varieties, Seeds and Crop management

**Short summary for practitioners (native language):**

**Problem**  
Selection of varieties

**Solution**  
Recommendations about varieties, seeds and crop management based on recent field trials

**Description**  
The leaflet addresses organic arable farmers and contains a broad overview of varieties. Relevant characteristics of varieties for organic farming and the availability of organic seeds are listed. Additionally, the results of field trials with grain legumes, corn, soy and oil fruits all over the country are presented. Link:  
[http://orgprints.org/31008/1/bionet_biofruehjahrsanbau_2016.pdf](http://orgprints.org/31008/1/bionet_biofruehjahrsanbau_2016.pdf) [58]

Practice abstract 57

**Short title (native language):**
How to successfully convert to organic arable farming

**Short summary for practitioners (native language):**
Problem
Challenges of conversion to organic farming
Solution
Basic information about all aspects of conversion - cultivation, legal framework, funding opportunities
Description
The leaflet addresses farmers who are interested in conversion to organic arable farming. Information includes contact points for workshops and advisory services, legal provisions and organic certification bodies. The process of conversion has to be well organized; therefore, crop rotation and cultivation planning is described. Furthermore, readers will find initial information about nutrient supply and mechanical weed management. Finally, the basic funding opportunity for organic farming is presented. The leaflet provides an overview as well as many further links and contacts. Link: http://orgprints.org/31007/1/bio_umstellung_2015.pdf

Practice abstract 58
Short title (native language): Potato Crop Management
Short summary for practitioners (native language):
Problem
Potatoes are a popular, profitable crop, but their cultivation requires a lot of knowledge, planning and suitable material.
Solution
The brochure provides a good basis of information that enables farmers to cope with the challenges connected to potato growth.
Description
Potatoes are very suitable for direct marketing thanks to their diversity. Good yields are necessary to cover the high costs for cultivation and mechanisation. The very high-quality demands in every marketing sector require the most careful maintenance, which includes preparation of planting material, plant protection, nutrient and water supply as well as harvest and storage. This manual provides a good basis to achieve high-quality products. Experienced organic potato farmers can enhance their knowledge with specialist advice and additional literature. Link: http://orgprints.org/31006/1/1404-biokartoffel.pdf

Practice abstract 59
Short title (native language): Dock plant control (Use preventive possibilities)
Short summary for practitioners (native language):
Dock plants proliferate very easily and are also fairly robust.

The brochure provides information about critical peculiarities of the dock plant and effective methods to reduce the weed.

The dock plant suppresses pasture and arable crop plants, impedes the harvest, minimizes yields and is not consumed by animals on pastures. Its tremendous reproduction potential and tenacity against control attempts represent a major challenge on organic farms. This technical guide lists reasons for dock spreading on arable lands, offers proposals for their remediation, and demonstrates how docks can be consistently controlled on organic farms according to current knowledge. Link: [http://orgprints.org/31005/1/31005-ampferregulierung.pdf](http://orgprints.org/31005/1/31005-ampferregulierung.pdf)

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**Practice abstract 60**

**Short title (native language):**
Basics of soil fertility management

**Short summary for practitioners (native language):**

Problem
Soil health is crucial for successful (organic) agriculture, but not sufficiently considered.

Solution
The tool shows up ways to get in touch with the basics of agriculture, namely a good soil.

Description
The brochure highlights the soil fertility from various scientific and farming perspectives. Its aims to supplement practical observations of farmers, to encourage them to reconsider their relation to their soil and to practice a truly sustainable soil culture. The booklet tries to achieve this goal by providing information on soil matter such as important soil organisms and soil characteristics like root density, soil structure and alkalinity and by showing possibilities of how to assess and improve them. Link: [http://orgprints.org/31004/7/4002-soil-fertility.pdf](http://orgprints.org/31004/7/4002-soil-fertility.pdf)

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**Practice abstract 61**

**Short title (native language):**
Creeping thistle - Successful control in organic farming

**Short summary for practitioners (native language):**

Problem
The development of problematic weed in arable organic farming

Solution
It provides an introduction to the creeping thistle growth characteristics and suggests various measures to control them.

**Description**

In recent years, the creeping thistle has become a problematic weed, especially for organic arable farms with good soils. Wherever it grows, it is competing with crops for water and nutrients. Once established, the thistle can only be reduced to a tolerable density with a lot of patience. So far, there is no patent remedy for its control on organic farms. By abiding certain rules of plant cultivation in combination with direct methods, the thistle can be effectively controlled. Link: [http://orgprints.org/30989/13/1716-thistle.pdf](http://orgprints.org/30989/13/1716-thistle.pdf)

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**Practice abstract 62**

**Short title (native language):**

Agrometeo: decision support tool for pest prognosis and risk assessment

**Short summary for practitioners (native language):**

**Problem:** Pest and diseases in wheat, barley, potato (and fruit) production

**Solution:** Decision support tool and information material for an optimized use of plant protection measures in arable cropping systems

**Description:** Agrometeo is a platform offering information and decision support tools for an optimized use of plant protection measures in conventional viticulture, orchards and arable cropping based on microclimatic data from over 150 weather stations in Switzerland generating forecast models of pest and disease risk. Information material and control thresholds for wheat diseases (fusarium fungi), barley, potato (virus, late blight) and insect monitoring for European corn borer and pea moth is free for use. Control methods based on counting of infested main shots by eyespot, leaf diseases, septoria and DTR in arable crops, serve as monitoring device with updated regional data and alerts if control threshold are exceeded. Accordingly the farmers get informed if measures need to be taken. Documentation on control thresholds of pest for the main arable crops is attached with additional indication on control periods and methods. This helps farmers to self-assess the state of their own crops and a meaningful use of plant protection products. Further forecast models evaluate the spread and development, and its treatment date for mildew, grapevine moth, apple scab and fire blight. An insect-monitoring system is available for the European corn borer and pea moth throughout Switzerland based on data from observations on stubble, traps and flight curves.

Link: [http://www.agrometeo.ch/de](http://www.agrometeo.ch/de)

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**Practice abstract 63**

**Short title (native language):**

Nutrient management in farms in conversion to organic

**Short summary for practitioners (native language):**
Problem
Insufficient knowledge on nutrient management and potential sources for farms in conversion
Solution
Nutrient estimations, different N-calculation models and humus balance
Description
This report, adapted for Saxony, serves converting farmers supported by local advisors as a guideline for a balanced nutrient management at farm level. Essentials of nutrient supply and management measures to consider during the conversion are described to guarantee a successful farming with a naturally based nutrient management. Especially for the conversion phase it is recommended to calculate nitrogen balance after each crop rotation with the help of advisors. This report shows the methodology and frequency for assessing parameters, which result in an overall input-output nitrogen balance. The farmers will get estimations on long-term yielding, optimization potentials in crop rotation and improvements of fertilization strategies. To implement long-term planning and soil quality by humus balance, an adapted model (based on VDLUFA) is proposed which is not further explained in this tool.
Link: http://orgprints.org/30591/1/Naehrstoffmanagement_im_Umstellungsbetrieb.pdf

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Practice abstract 64

**Short title (native language):**
Pest and Disease Control in Grass and Forage Crops

**Short summary for practitioners (native language):**

Problem
Pest and diseases management of grass and forage crops.
Solution
Description and pictures of pests and diseases symptoms. Hints on non-chemical strategies to reduce pests and diseases incidence.
Description
Pest and diseases can have a significant effect on the establishment, yield and longevity of grass and forage crops. This tool is an atlas for the identification of the main pests regarding grass and forage crops. It has been written for Wales climates and it is not specific for organic farming. Nonetheless, the information contained, can be used by farmers, conventional or organic, skilled or newcomers, all over Europe. Besides pest descriptions, with pictures that facilitate the task of identification, it provides useful hints on preventive, non-chemical, practices to reduce pest incidence.

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Practice abstract 65

**Short title (native language):**
Sort Out Your Soil: A practical guide to green manures
Short summary for practitioners (native language):

Problem
Which green manure to select
Solution
Comparative assessment among the available species of green manures in UK and temperate environments.
Description
The booklet is a compendium of green manures species used in UK. The introduction explains the reasons why to grow green manures and the benefits they bring into the system. What follows is a guide to the choice of the species to use as green manure, with details per species (leguminous species and other species) and some comparative assessments among the species. It is focused on UK climate and farming systems but its contents can easily be used also in other temperate environments. The booklet is clear and has several photos. This tool can be used to adapt strategies for green manure to specific case. Link: [http://orgprints.org/30588/1/Sort%20Out%20Your%20Soil.pdf](http://orgprints.org/30588/1/Sort%20Out%20Your%20Soil.pdf)

Practice abstract 66

Short title (native language):
Risk management for small grains

Short summary for practitioners (native language):

Problem
How to obtain high quality grains
Solution
Strategies of weed management, pest and disease management and fertilization.
Description
Booklet on the risks that may occur in the production of small grains, from sowing till harvest and storage. Focus on Autumn and Spring cereals grown in Upper Middwest (USA) (conditions somehow similar to Central Europe). For each crop it illustrates the risk factors in the production phase and shortly highlights possible solutions. It includes weed management, pest and disease management, fertilization etc. down to storage conditions. The aim is to allow producers to obtain satisfactory productions and high quality of the grains. The main benefits of booklets is to provide detailed information on a specific issue, with a practical perspective. The risk management approach give to the users the possibility to be aware of the problems they can encounter in developing their strategies for organic grain production. It can be used in the phase of system redesign and planning of new crops to introduce in a farm. Link: [http://orgprints.org/cgi/users/login?target=http%3A%2F%2Forgprints.org%2...](http://orgprints.org/cgi/users/login?target=http%3A%2F%2Forgprints.org%2...)

Practice abstract 67

Short title (native
**Weed management on organic farms**

**Short summary for practitioners (native language):**

**Problem**
How to manage weeds in organic arable systems

**Solution**
How to implement successfully preventive measures and direct methods in several arable crops

**Description**
The booklet summarizes the scientific and practical knowledge on weeds on organic arable systems in USA. It includes preventive measures as well as direct methods and, review of available mechanical tools and specific farm experiences that offer examples of each topic implementation. Very good summary of weed characteristics and ecology that allows to understand their relationship with the crops and supports the choice of strategy to be used. Colors, pictures and tables facilitate the use of the booklet. Being produced in USA in includes some nonsynthetic herbicides not allowed in EU. The main benefit of this tool is to provide a complete overview on organic weed management. In particular the section on machineries and their technical characteristics provide practical information on what solutions have been developed by research.


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**Visual soil assessment: field guide for cropping**

**Short summary for practitioners (native language):**

**Problem**
Soil degradation (chemical, biological, physical), productivity loss

**Solution**
Visual assessment of origin of soil degradation and promotion of sustainable practices

**Description**
Visual assessments provide an immediate diagnostic tool to evaluate soil quality, as many physical, biological (and to a lesser degree chemical) soil characteristics show up as visual characteristics. Results are easy to interpret and understand. The Visual Soil Assessment (VSA) method has been developed to help land managers assess soil quality easily, quickly, reliably and cheaply on a paddock scale. It requires little equipment, training or technical skills. Part I, “VSA of soil quality under cropping” uses a score card for soil indicators and for plant indicators. The different indicators and states of condition are shown in photos which enables a direct and qualitative on-field scoring and assessment. Assessing and monitoring soil quality on your farm with VSA, and following guidelines for prevention or recovery of soil degradation, can help you develop and implement sustainable land management practices.

Link: [http://orgprints.org/30582/1/VSA_Volume1_smaller.pdf](http://orgprints.org/30582/1/VSA_Volume1_smaller.pdf)
Practice abstract 69

**Short title (native language):**
Soil quality test kit guide

**Short summary for practitioners (native language):**

Problem: Soil degradation (chemical, biological, physical), productivity loss
Solution: Local assessment of soil degradation and promotion of sustainable soil practices
Description: The Soil Quality Test Kit Guide offers multiple test procedures to measure the physical, chemical, and biological properties of soil, i.e. biological activity, infiltration rate, soil compaction, salt concentration, acidity/alkalinity, nitrate levels, aggregate stability, number of earthworms, soil structure and texture. In a second section, the interpretive guide helps to explain the obtained results of each test. The guide provides step-by-step instructions using pictures to allow a qualitative assessment of soil respiration, infiltration, bulk density, electrical conductivity pH, soil nitrate, aggregate stability, slake, earthworm, soil physical observation and estimation and water quality. It should be noted that for the conduction and analysis of certain tests special device is required. Support by experienced farmers or advisors is recommended. It is possible to make your own selection of tests from the Soil Quality Test Kit Guide.


Practice abstract 70

**Short title (native language):**
ROTOR: organic crop rotation planner

**Short summary for practitioners (native language):**

Problem
Insufficient N-supply, decrease of humus, weeds through mismanagement of the crop
Solution
Long-term planning at field level to enhance nutrient supply and regulate weeds and diseases
Description
ROTOR is a long-term planning tool at field level of organic crop rotations for farmers and advisors. The tool assists in the rotation planning for food and fodder provision, and considers furthermore weed management, phytosanitary restrictions in the rotation, helping to maximise N-fixation by legumes and to avoid N-losses by leaching. The newest version includes new crops such as soybean and new management options. ROTOR operates with two interfaces for data entry form and report of results. Basic and advanced data entry is possible. For a basic query site characteristics, the selection of crop sequences and organic fertilizers is needed. The query can be refined through the modification of advanced settings concerning, yield, manure type, soil condition, legume proportion, cover crops, cultivation breaks, weed control and other. Results can be used to compare between different crop rotation options aiming at ensuring provisioning, N supply, pest, disease and weed control. A
tool manual explains briefly how to use the planning tool and how to interpret the results. To go to ROTOR choose „Software for organic agriculture“ from the „Software-Downloads“. You will find ROTOR in the drop-down list. Restricted access: Password needed to open the tool, ask Johann Bachinger: jbachinger@zalf.de [72]. Link: http://www.zalf.de/en/forschung_lehre/software_downloads/Pages/default.aspx [73]

Practice abstract 71

**Short title (native language):**
The Muencheberg Soil Quality Rating (SQR)

**Short summary for practitioners (native language):**

Problem
Soil depletion and productivity losses

Solution
Evaluating soil properties and quality through visual assessment

Description
The Muencheberg Soil Quality Rating (M-SQR) is a simple and fast semi-quantitative method, which can be used by farmers and advisors. This field scoring method is used to analyse soil properties that limit crop yields and crop productivity potentials. Potential applications of the method are soil resource planning, guiding land purchase, and assessment of sustainability and environmental impacts of land use. Ratings of soil quality are made during common soil survey mainly by applying visual methods of soil quality. Only a minimum of equipment is required for the field assessment. A field manual provides rating tables based on response curves and thresholds for basic indicators and different hazard indicators (such as risk of drought). Finally, overall soil quality rating scores ranging from 0 (worst) to 100 (best) characterise crop yield potentials. The current approach is valid for grassland and cropland. The M-SQR matches with other dynamic soil quality assessments as VSA. This manual is not valid for some extremely particular soil and cropping conditions, as paddy rice systems and hazards as frost, fire and wind. Link: http://orgprints.org/30579/1/field_mueller.pdf [74]

Practice abstract 72

**Short title (native language):**
A farmer’s guide to organic fruit and vegetable production

**Short summary for practitioners (native language):**

Problem
Optimization strategies through the whole fruits and vegetable production chain

Solution
System-sound adaptations and recommendations in the whole fruit and vegetable production chain

Description
This guide is aimed at farmers who are considering diversification into horticulture. It assumes a sound and system-based understanding of agricultural systems, but limited knowledge of fruit and vegetable production. It gives a general introduction on organic systems and soil fertility components including factors and examples of successful crop rotation. For the main pests and diseases simple and system-based measures are highlighted, as e.g. considering the right timing of control measures, crop rotations and tillage. For weed management weeding machinery is briefly explained. Basic questions on how to choose the right variety and the equipment for weeding, harvest, and storage are discussed. Additionally, the guide gives a rough overview and understanding of energy and greenhouse gas emissions and possible adaptation measures on farm level. The economic aspect are separately highlighted with a given example. Summing up, horticultural farmers, get an overall guideline to establish a system sound production of field and fruit vegetables, including fertility building strategies and protective structures. Useful addresses of advice services, certification bodies and research Centres are listed up for Welsh farmers. Link: http://orgprints.org/30578/1/hortguide_eng.pdf [75]

Practice abstract 73

**Short title (native language):**
Description of biological control agents and agroenvironmental measures for plant protection

**Short summary for practitioners (native language):**

Problem
Pest control in organic agriculture
Solution
Potentials of biological control agents and agroenvironmental measures in organic plant protection
Description
This report enhances a general understanding on the importance, functions and benefits of biological control, its application and market availability of biocontrol agents in Poland. Newcoming organic farmers can get introduced by means of this report into general assumptions in biological control agents in organic farming. It offers a short description of the control measures of plant or animal origin as viruses, microorganisms and macroorganisms. Furthermore recommendations are given on how to promote biocontrol agents through land use management, as growing hedgerows and intercropping. This document serves as an introductory source to get hints and inspiration without going into practical details. Link: http://www.agengpol.pl/LinkClick.aspx?fileticket=Lz7TOROvhvA%3D&tabid=144 [76]

Practice abstract 74

**Short title (native language):**
Organic Cereals

**Short summary for practitioners (native language):**
Problem
Meet the demand of cereal production and limit harvest losses

Solution
Optimization in variety choice, crop rotation, pest and disease control, weed management, harvest of arable crops

Description
This leaflet gives detailed and condensed instructions for a successful cereal production for food and feed grain, i.e. summer and winter wheat, spelt, rye, barley, oat, triticale, emmer and einkorn. A Swiss farmer can learn how to improve its quality, with the given criteria in variety choice. Besides the protein content a producer should consider, wet gluten content, Zeleny-values and a high hectolitre weight for a high baking quality. Soil and climatic requirements, strengths and weaknesses are listed for each variety to help the farmer choose the appropriate one. Techniques and practical recommendations on crop rotations, nutrient supply, manuring, sowing, undersowing, pest and disease control, weed management, harvest, and storage are listed. Swiss farmers will find useful indications on price recommendations for trade and costs of variety conversion. The leaflet provides additional information and contacts on variety testing, seedbanks and breeding in the Swiss context. Link: [http://orgprints.org/30576/1/1011-biogetreide.pdf](http://orgprints.org/30576/1/1011-biogetreide.pdf) [77]

Practice abstract 75

**Short title (native language):**
Weed control in organic farming through mechanical solutions

**Short summary for practitioners (native language):**

Problem
Weeds and right choice of direct and indirect measures for its control

Solution
Illustration of agricultural machinery, direct and indirect measures, optimization of tillage and seedbed preparation for arable crops

Description
Based on the experience from science and practice, the handbook aims to present and discuss direct and indirect mechanical weed control. In the Introductory section the reader gets an overview of different machinery, mechanical, thermal and system-based methods to control weed. The farmer learns which factors contribute to soil compaction and gets advice how to avoid it. Furthermore, direct measures during seedbed preparation and tillage to control weeds as the creeping thistle and vetches on arable crops and vegetable crops are proposed. Finally, the development and the potential of future machinery is presented. Link: [http://orgprints.org/30574/1/2657_Handbuch%20Unkraut%20LR.pdf](http://orgprints.org/30574/1/2657_Handbuch%20Unkraut%20LR.pdf) [78]
Green manure and cover crops in organic agriculture: guide to the choice of the species

Short summary for practitioners (native language):

Problem
How to manage cover crops and how to choose them.
Solution
Indication of how to choose, how to manage and how to terminate species for cover crops and green manure.
Description
It is the second of 2 dossiers: a detailed description of each species that can be used, to guide farmers choice. It is a practical but detail description of each species to be used as green manure, with assessment of all aspects (economic included) of demands and outputs of the crop. It is well illustrated and the synthesis is very efficient. Easy and ready for use.
Link: http://orgprints.org/30573/12/Fiches_Especes_EngraisVerts_ENG_2018.pdf [79]

Practice abstract 77

Short title (native language):
Green manure and cover crops in organic agriculture: general introduction
Short summary for practitioners (native language):

Problem
How to manage cover crops and how to choose them.
Solution
Indication of how to choose, how to manage and how to terminate species for cover crops and green manure.
Description
It is the first of 2 dossiers: a general introduction to the use of green manures and cover crops in arable systems; it summarizes the reasons why cover crops and green manures are important in organic farming, from N-leaching prevention to all other benefits (weed management, organic matter production, pest and diseases management, soil fertility improvement etc. What follows is a real support to farmer in each decision to be taken during the implementation of a cover crop, from which species (or mixture) to choose, how to sow it, when, how and when to terminate it and how better place it in the crop rotation. It is very easy to use as schemes and tables facilitate a practical approach. Some real farm examples help to understand constrains and advantages of several choices. Link: http://orgprints.org/30572/12/Cahier%20Couverts_ENG_2018.pdf [80]

Practice abstract 78

Short title (native language):
Mechanical weeding in arable crops

**Short summary for practitioners (native language):**

**Problem**
How to manage weeds in organic arable farming systems

**Solution**
Agronomic and mechanical tools to control weeds on a crop per crop and system per system basis

**Description**
The guidelines are a comprehensive and practical review of the techniques an organic farmer can use in order to manage weeds in arable systems. The first part deals with the preventive measures that are valid for all crops and in any condition and offers examples of crop rotations, guidance in decision making, description of machinery available (very up-to-date and with precise description of pros and cons of specific pieces of the machinery) and other practical hints. It reports energy consumption, advantages of different choices depending on soil type and weather conditions etc. The second part gathers practical experiences of the implementation and applications, analysing its success and failure factors. Additionally, economic and environmental data per each farm case are available. The approach and the structure allows to assess the potentials to transfer the experiences in other farms, environments and farming systems. Very good pictures and tables allow to identify rapidly the topic of interest. Link: [http://orgprints.org/30571/1/dm-brochure_culture-web.pdf](http://orgprints.org/30571/1/dm-brochure_culture-web.pdf)

**Practice abstract 79**

**Short title (native language):**
FusaProg: risk assessment of fusarium and mycotoxin infestation in wheat production

**Short summary for practitioners (native language):**

**Problem**
Fusarium and mycotoxin (DON) infestation in wheat crops

**Solution**
Local prognosis model, data and maps for risk assessment

**Description**
FusaProg and FusaProg Light are prognosis models in conventional wheat production to assess the risk of infection by fusarium and mycotoxins in Switzerland. FusaProg Light is freely accessible and offers the farmer a quick risk assessment for day to day weather conditions. FusaProg is an extended version, only for registered users, with a tailor-made risk assessment and detailed prognosis evaluation for local conditions. FusaProg offers downloadable data and maps on the infection risk and mycotoxin (DON) forecast for registered wheat crops in Switzerland related to weather conditions. The optimization of the wheat cultivation systems and extension by the model helps to avoid the overuse of toxins in conventional farming. Organic farmers may use the prognosis model to decide whether intervention of organic agents are needed. Data on infection risk per variety is provided for the user. Link: [http://www.fusaprog.ch/](http://www.fusaprog.ch/)
Short title (native language):
Regionally adapted humus balance in organic farming

Short summary for practitioners (native language):

Problem
Nutrient deficiencies, soil degradation, mismanagement due to lack of knowledge in calculation of humus balance

Solution
Humus balance offers a crop and crop rotation based estimation for nutrient supply

Description
This report examines the practical application of humus balance for farms (stockless and with livestock), being crucial for soil quality and productivity. Productivity in organic agriculture depends on the capacity to convert organic matter in the soil, which supply can be determined using a humus balance. The humus balance is an appropriate method to adjust farm nutrient management which should be a common method for farmers. Tables of stockless farms and farms with livestock are provided in this report to calculate humus balances of main arable crops in different soil types and manure applications. This gives recommendations for farmers on how to overcome nutrient deficiencies. The report displays examples of adapted humus balance helping at promoting its local adaptation to close the nutrient cycle by experienced practitioners, extension and trainers. Link:
http://orgprints.org/30568/1/LfULG-Bericht_A4_Humusbilanzierung_oeko4.pdf

Practice abstract 81

Short title (native language):
Earthworms: architects of fertile soils

Short summary for practitioners (native language):

Problem
Soil compaction and depletion

Solution
Provides recommendations in soil tillage and fertilization practices to promote earthworms

Description
This technical guide shows the impact of earthworms on soil quality, their interactions with other soil organisms and the influence of farming practices on their population. The guide is directed to all farmers, aiming to understand the detrimental effects of heavy machinery, intensive tillage and use of pesticides. It provides an overview of the biology, ecology and multiple services of earthworms and recommendations of their promotion in agricultural systems. The leaflet points out how earthworms maintain ecosystem services (aeration, water infiltration, biocontrol, nutrient supply) and how they benefit from soil fertility and vice-versa. Agricultural practices are proposed to enhance earthworms as alternative to intensive soil tillage and the use of ploughs, to minimize ground pressure and soil compaction. A
farmer can find therefore practical advice on adequate tillage periods, machinery, soil conditions, adapted fertilization and diversification of crop rotation. Finally, a method for estimating earthworms in a soil offers a quick self-assessment of the state of soil quality on a particular crop. Link: http://orgprints.org/30567/1/1629-earthworms.pdf [84]

Practice abstract 82

**Short title (native language):**
Practical advice for organic production of lupines

**Short summary for practitioners (native language):**

**Problem**
Poor soils due to nitrogen and phosphorus-deficiencies. Need for alternative protein sources.

**Solution**
Lupin cultivation has a high preceding crop effect as it fixes nitrogen, is tolerant to poor soils and high in protein which is used as green manure and stock feed.

**Description**
This brief and practical information leaflet for blue, yellow and white lupins serves a farmer to get introduced to its cultivation. Aim is to promote the cultivation of lupins due to its beneficial effects as precrop, as it fixes nitrogen, makes phosphorus available and is high in proteins. This leaflet describes soil properties, water supply and weed pressure conditions for a successful cultivation of each lupin species. Furthermore recommendations in variety choice, crop rotation, mixed cropping are given i.e. soil tillage, vaccination, sowing, fertilization, mechanization and weed control by hoeing and harrowing, harvesting, processing (for animal feed and human food), economic assessment. As conclusion the most important pros and cons of lupin production is listed. This tool gives basic information and benchmarks on lupin production for newcoming farmers. Link: http://orgprints.org/30564/1/Anbautelegramm_Lupinen_ko.pdf [85]

Practice abstract 83

**Short title (native language):**
Cover crop and living mulch toolbox

**Short summary for practitioners (native language):**

**Problem**
Nutrient deficiencies, soil degradation

**Solution**
Promotion of innovative cropping systems throughout Europe by using cover crops and living mulches

**Description**
The toolbox aims at making scientific literature and technical information on cover crops and
living mulches widely available. It furthermore promotes the current knowledge and impact of innovative subsidiary cropping systems and potential solutions to ecological problems. The tool takes the user, being a new or experienced farmer, through a series of questions, helping determine the crop's requirements in relation to geographical region, soil, and crop characteristics and use. This will generate a set of plant profiles that fall within the specifications and allow a comparison of the properties of different species. It identifies suitable cover crop and living mulch species and varieties, appropriate species mixtures, provides information on appropriate machinery, on best current practical advice about management issues and includes economic considerations of subsidiary crop based systems for individual farms. The resulting species list contains all species in the database ordered by their relevance to the users’ requirements; i.e. the most relevant species will appear on the top, the least relevant at the end of the list. The data has been collated from published literature, existing databases, and from the OSCAR database. Link: https://web5.wzw.tum.de/oscar/toolbox/database/intro.html [86]

Practice abstract 84

**Short title (native language):**
Nitrogen budget calculator

**Short summary for practitioners (native language):**

**Problem**
How to calculate N budget in organic forage systems in Baltic Regions

**Solution**
Suggestions on forage composition, management strategy and harvesting tips

**Description**
The purpose of the tool is to help farmers in estimating the N content of forages based on the percentage of legumes, the management and harvesting method. It is based on an Excell file that uses two databases containing information on site specific forages. It is a Decision Support Tool (DSS) in 2 languages, easy and fast to use. It is complemented by other tools (on crop rotation, legume content estimation) available on the web page and by other information materials. To go to the tool please go to "Software Tools Ökolandbau" and then "Stickstoff-SaldoRechner". To Switch to the German version, go to the top of the page and click on "DE". Link: http://www.zalf.de/en/forschung_lehre/software_downloads/Pages/default.aspx [73]

Practice abstract 85

**Short title (native language):**
Plant breeding with farmers. A technical manual

**Short summary for practitioners (native language):**
Problem
World food supply depends on few cultivated varieties. This has lead to a reduction of the agro-biodiversity.

Solution
Participatory plant breeding introduce more actors into the variety selection process. This leads to an enhanced agro-biodiversity.

Description
Participatory plant breeding (PPB) is defined as a type of plant breeding in which farmers, as well as other partners, such as extension staff, seed producers, traders and NGOs, participate in the development of a new variety. In PPB programs farmers play a more important role than in conventional plant breeding (CPB). Both PPB and CPB are based on the same scientific background and are not mutually exclusive. This tool describes how to organize a PPB programme in self-pollinated, cross-pollinated and vegetatively propagated crops, how to design the trials, collect, organize and analyse the data, and eventually how to use and share the information generated by a PPB. The manual is addressed to all those involved in planning and implementing participatory breeding activities. This includes research centres, universities, non-governmental organizations (NGOs), farmer associations and government extension officials.

Link: [http://orgprints.org/32587/17/techmanual_ceccarelli.pdf](http://orgprints.org/32587/17/techmanual_ceccarelli.pdf) [87]

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Practice abstract 86

**Short title (native language):**
Controlled traffic farming: A new track for soil and weed control in organic farming

**Short summary for practitioners (native language):**

Problem
Each passage with the tractor on the field results in at least superficial soil compaction. In compacted soil, the growth of crops is inhibited and the soil processes are disturbed.

Solution
With controlled traffic farming (CTF) using real-time kinematic positioning, it is possible to drive on the same track for all operations and create tramlines. Real time kinematic positioning is a technique that enhances the navigation-precision by means of satellite-based positioning systems (like GPS). The approach can be adapted to the specifics of a farm (existing equipment, land, crops, etc.).

Outcome
The soil between the tracks remains undisturbed. Its structure is crumbly and thus optimal for plant growth.

Practical information
• Controlled traffic farming is a system approach that has an effect on the entire farm. Good preparation is necessary.
• Depending on the farm and the available mechanization, there are several ways to work with tramlines. Examples are bed-cultivation with a 1.5 to 3.2 m track width or a default track-width (often 1.5 m) with standardized, often wide machines (3 to 9 m in width).
• Use standard equipment and standard working widths that are used on your own and on neighbouring operations. Also, bear future developments of your own operation in mind.
Practice abstract 87

Short title (native language):
Quick test for infiltration of arable soils

Short summary for practitioners (native language):

Problem
Driving on arable land with heavy machinery while the soil is too moist leads to soil compaction, which severely impairs airflow and drainage. Especially crops in heavy soils react to this situation with yield losses.

Solution
With the aid of a simple quick test, water infiltration – as one of the characteristics of soil compaction in the field – can be clearly examined. The quick test is also easy to understand and helpful for non-scientists. It is particularly suitable for training farm apprentices and employees, and raising their awareness on the issue.

Advantages
The quick test uncovers the consequences of soil compaction on water infiltration and the yield of arable crops. It promotes an understanding of the effects of soil compaction and the importance of soil conservation.

Practical recommendation
For training purposes, a direct comparison of several quick tests should be carried out at different areas on the same field. The comparison of tests taken in the tramlines, on the headland and in the non-trafficked area might be particularly interesting. In addition, one might also select areas where the crop grows particularly well or poorly in order to check whether the growth of the crop is related to soil compaction.

The moisture status of the soil prior to the test time has a major influence on the ability of the soil to absorb more water. This limits the comparability of the results to a single point in time. To increase comparability, the soil can be thoroughly watered 12-48 hours in advance.

Link: http://orgprints.org/32722/13/PA_028_infiltration_test_final_en.pdf [89]
Problem
The growing demand for protein-rich feed has so far been largely met by imported soya. This contradicts the sustainability principle of organic farming. The cultivation of soy and other grain legumes in monoculture is difficult in Switzerland.

Solution
As practical trials conducted by the Research Institute of Organic Agriculture FiBL have shown, mixed farming can significantly improve the yield reliability and cost-effectiveness of local protein production. This leaflet summarises the current state of knowledge on the cultivation of grain legumes in mixed crops with cereals and provides recommendations for a successful cultivation in Switzerland.

Description
This leaflet describes the suitability of the most promising grain legume/cereal mixtures that were tested in field trials, and provides in-depth information on the cultivation, economic efficiency and use of proven mixtures in Switzerland. Link: http://orgprints.org/32816/1/1670-koernerleguminosen-mischkulturen.pdf

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**Short title (native language):**
Simple building blocks for improved soil fertility – Look and judge yourself

**Short summary for practitioners (native language):**
Problem
How to judge my soil and my soil management myself?

Solution
The guide describes some simple tools to evaluate soil fertility and soil management that easily can be done by farmers.

Description
The guide describes in a practical way and in four steps how farmers can evaluate their soil fertility and soil management: (1) Look to the field and (2) soilsurface, (3) dig a small pit and look and if interested, do (4) some small and simple additional tests such as pricker-test and counting earthworms. The tool is relevant for all people that want to be aware of their soil and it can be used by farmers individually or in discussion with their adviser. With some experience doing these tests becomes second nature. Link: http://orgprints.org/32814/6/Eenvoudige%20bouwstenen%20voor%20een%20bete...
Organic farming has seen substantial growth in the EU. The organic area in the EU has almost doubled since 2004. In 2016, 6.7% of EU agricultural land was under organic management. Organics farmers rely on biological processes for building soil fertility and controlling pests and diseases. They use multiple and diverse crops and work to close systems and minimise use of external inputs. This allows organic farmers not to synthetic pesticides and fertilisers, which means greater biodiversity of insects, plants and birds; less pollution entering groundwater and watercourses; better ecosystem and soil health. Organic farmers try to strike a balance between productivity and care for the environment. Yields are on average around 20 per cent lower on organic than on conventional farms for crops such as cereals, legumes and oil seeds. Organic farmers do not have to accept this gap: Crop yields on organic farms vary depending on
the farmer’s knowledge and experience. Evidence shows that the more experienced the farmer is, the higher the yield. Organic farmers have to refer multiple observations of their farming system (soils, climates, crops and livestock) when developing a sound management plan, without being able to use quick fixes such as pesticides. But knowledge about organic agriculture practices on soil fertility, nutrient management, and weed, pest and disease control is not widely available and time consuming to acquire. Also, the knowledge gap between organic farmers across Europe is considerable. By spreading knowledge and good practice and supporting exchange through the knowledge platform, OK-Net Arable is helping organic farmers across Europe to improve yields, both in terms of productivity and quality.

Source URL:

Links
[2] mailto:bram.moeskops@ifoam-eu.org
[22] http://orgprints.org/31053/1/PA_038_Crop_Rotation_QR.pdf
[34] http://orgprints.org/32609/1/PA_014_ORC_NDICEA_final.pdf
[37] http://orgprints.org/31045/7/PA_019_AIAB_Soybean_weed_trimmer_final_QR.pdf
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