Programme overview

Achieve more with cover crops.

FIND OUT MORE:
WWW.PHPETERSEN.COM

SAATEN UNION
Züchtung ist Zukunft

viterra

Sorten greening

MAX

ÖKO

NEW
FOR FODDER AND BIOMASS

Cover crops from a reputable supplier

P. H. PETERSEN SAATZUCHT LUNDSGAARD

SAATEN UNION Züchtung ist Zukunft

P. H. PETERSEN is the market leader for cover crops, specialising in biological nematode control in Europe. Practice-orientated varieties and above-average seed quality come first.

In northern Schleswig-Holstein, P. H. PETERSEN develops cover crops, cereals, legumes and special varieties as well as seed blends with the highest-quality seeds.

By registering the world's first nematode-resistant varieties, P. H. PETERSEN redefined a completely new scope for cover crops. Since then, the company has remained a market leader in Europe, standing for innovative products. Extensive contact with research institutes, specialist consultants and forward-thinking farmers ensures the efficiency and actuality of variety development and practically applicable solutions.

Today, the P.H. PETERSEN breeding facility boasts around 60 hectares of land for nurseries, performance testing and the cultivation of preliminary crops. Climate-controlled greenhouses are available all year round for resistance testing and cultivation tests. Samples are prepared and tested at in-house laboratories. At over 15,000m^2 each, the storage and processing facilities in Lundsgaard, Schleswig-Holstein and Sárbogárd, Hungary, use state-of-the-art cleaning and processing systems as well as high-performance packaging systems. In all areas, motivated employees apply their experience to produce high-quality seeds.

The products are successfully marketed in Germany and Europe in collaboration with SAATEN-UNION GmbH, of which P.H. PETERSEN Saatzucht Lundsgaard GmbH has been a shareholder for many years now.

Today, this multi-faceted family company is run by Matz Petersen, the third generation. P. H. Petersen is the right place for excellent-quality, innovative and reliable cover crops.

You can find out more about us at **www.phpetersen.com.**

Contents

Achieve more with cover crops ..... from page 4

Recommended cover crops for your crop rotation ..... from page 8

- Sowing and use at a glance page 34
- Overview of viterra® cover crop blends page 37
- Advice and service page 72

Biological nematode control ..... from page 10

- Beet cyst nematodes impact yield page 10
- Ensure the success of your crop with the right variety page 11
- Nematode-resistant white mustard page 12
- Nematode-resistant oilseed radish page 13
- Multi-resistant oilseed radish page 15

More nematodes and diseases ..... from page 16

- Nematodes and diseases page 19
- Oilseed radish against Corky Ring Spot page 20
- Bristle oat against Root lesion nematode page 21

Cover crop diversity ..... from page 22

Legumes as cover crops ..... from page 26

Biomass and fodder ..... from page 30

Water protection and nutrient conservation ..... page 32

Extra high-quality seeds ..... page 33

viterra® cover crop blends ..... from page 36

- Soil fertility blends from page 39
- Special blends from page 62

SortenGreening® blends ..... from page 48

V-Max® fodder and biomass blends ..... from page 52

Organic blends ..... from page 58

Greening with cover crops ..... from page 66

Agricultural environmental and climate measures (AUKM) ..... from page 68

Achieve more with nutrient efficiency ..... page 70

Cultivation recommendation ..... page 71

Achieve more with cover crops

Winter turnip rape	Forage rye	Buckwheat	Sunflower	Blue lupin
Brassica rapa var silvestris	Secale cereale	Fagopyrum esculentum and Fagopyrum tataricum	Helianthus annus	Lupinus angustifolius

Targeted use of cover crops improves the main crop's yield and quality, retaining and improving soil fertility in the long term. Let us introduce you to the countless positive properties of cover crops that contribute to this effect. You'll also find the symbols throughout this whole document.

Roots open and stabilize the soil

Cover crops can grow through compacted soil thanks to intense rooting. In addition, they can line the loosened soil with a lot of root mass after mechanical tillage and thus stabilise it in the long term. When the roots rot in spring, hollows are created for better ventilation and heating. Water absorption capacity is increased and frost wedging creates additional tilth. Various root types complement each other: oilseed radish, broad bean and lupins form deep taproots, while bristle oat forms a network of roots in the topsoil. The cover crop roots therefore stabilise the topsoil and increase the soil's load-bearing capacity. Radish-forming oilseed radish STINGER is a one-off, as it perforates the topsoil with its strong taproots. The latest research is intensely concerned with the role of roots in humus production, nutrient management and supporting soil biology.

Improves soil fertility and encourage humus formation

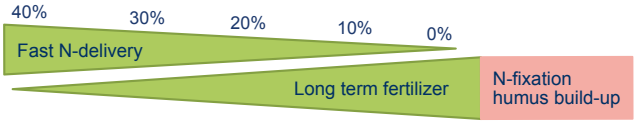
Cover crops deliver additional organic material to your soil as green manure. This means you can make the most of extra sunlight and heat for photosynthesis. In general, one kilo of plant biomass binds 2kg CO_2 and creates 1.5kg O_2. In the soil, the plant mass feeds soil life and supports the formation of humus.

As well as the amount of biomass from the cover crop, the ratio of carbon to nitrogen in the plant debris is important. Legumes have a close C/N ratio, so their biomass is easily digestible for soil life. Woody varieties such as early sown white mustard, oil flax and bristle oat have a higher C/N ratio, so are more resistant to degradation. This effectively contributes to the formation of long-lasting humus. Roots have a different C/N ratio than leaves and stems. So varieties with lots of underground biomass (such as oilseed radish and grasses) contribute a lot to lasting humus.

Improves water holding capacity of the soil and increases rain infiltration

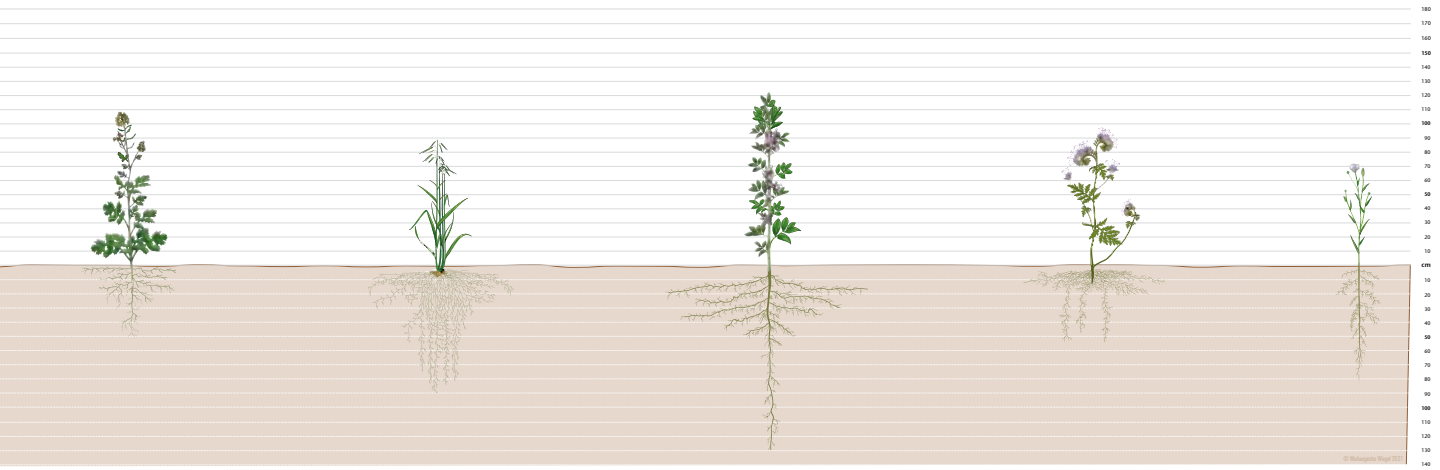
While the introduction of organic substances increases the soil's buffer capacity and water retention in the long term, cover crops also have a direct value as preceding crops. Root penetration of the soil increases the proportion of large and medium pores, which increase the soil's rain absorption and infiltration rate. This means that less rainwater flows off the surface without being used. The soil can then provide moisture for longer during dry spells. Half a percent more humus in the soil corresponds to a weight of around 22.5 tonnes more humus per hectare, i.e. a water storage capacity of 7 - 11 mm!

Nitrogen release (%) depends on C/N ratio and N content



C/N	7	10	13	17	20	25	50	100
Leg	green			mature				
Not Leg	good / weak	green	green		mature	mature		

The addition of sufficient organic substance is essential for the composition and maintenance of soil fertility, as humus plays a key role in nutrient release, soil structure and the soil's resistance to soil-borne diseases as well as weather damage.



White mustard
Sinapis alba

Bristle oat
Avena strigosa

Broad bean
Vicia faba

Phacelia
Phacelia tanacetifolia

Oil flax
Linum usitatissimum

Contains legumes that convert nitrogen in the air into nitrogen available to plants

Thanks to their symbiosis with rhizobia, legumes can fix nitrogen from the atmosphere and use it for plant growth. This means that legumes provide any following crops with additional nitrogen. Properly used, this reduces the need for mineral fertiliser and its energy-intensive production as well as increasing the cover crop blend's N-elasticity. See page 26 and onwards for more information on which legumes make the best cover crops.

Freezes off for easier soil preparation in spring

Cover crops that freeze off are easy to work in in spring, leaving optimal conditions to sow the summer crop. Mulch and direct sowing are easier with cover crops that freeze off. Varieties such as white mustard, bristle oat and phacelia generally freeze off in light frosts when sown at the right time. The choice of variety also has an impact. Oilseed radish COMPASS is more sensitive to frost than similar oilseed radishes (see page 13).

Nitrogen conservation in the soil and nitrogen binding over winter to prevent erosion into groundwater

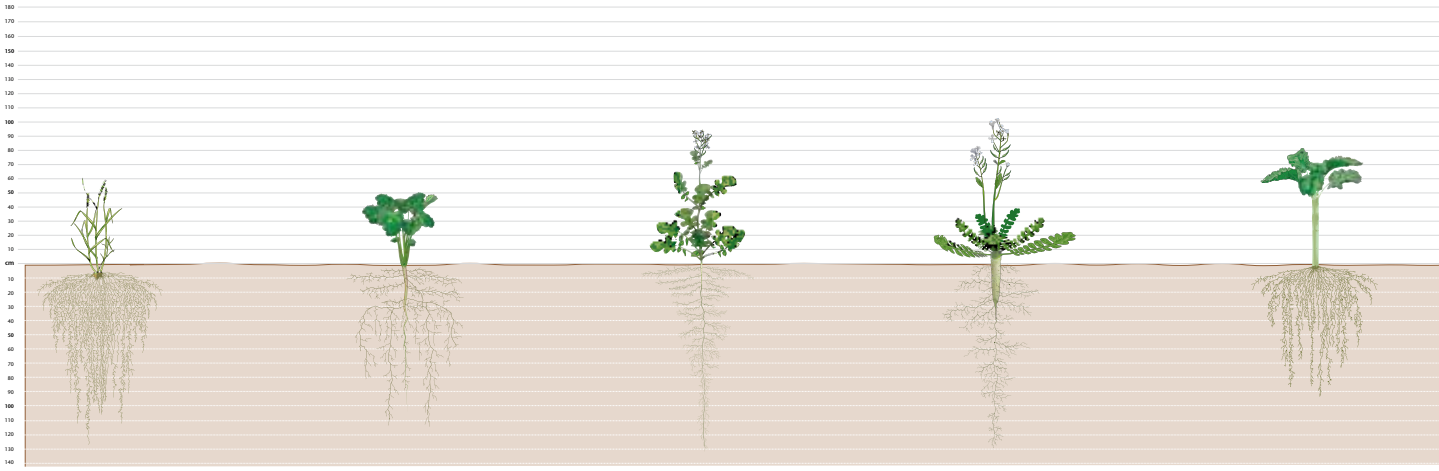
Cover crops can effectively collet nutrients in the autumn, store them in biomass and retain the top layer of soil. The nutrients remaining in the soil after harvest and that are mineralised from crop residue may be lost over winter as they are washed away or seep into surface run-off. Alongside easily displaced nitrogen, further key nutrients such as potassium, magnesium and sulphur may be washed away with leachate, depending on soil type and pH value.

Some cover crops also have the ability to bind nutrients, making them available for the following main crop. For example, phacelia binds organic phosphorous and buckwheat binds inorganic phosphorous, while oil flax mobilises silicon. Some plants enter into symbiosis with fungus to ensure an effective phosphate supply. These mycorrhiza fungi release phosphates from organic compounds, in return using the root exudates (organic carbon compounds) produced by plants. Other cover crops, such as oilseed radish and white mustard, don't need symbiotic fungus as they are able to produce enzymes to digest phosphates (phosphatases) themselves.

When working in green manure in the following spring, the nutrients stored in the cover crops are re-mineralised so can be made available to a main crop such as corn during peak growing season. Find out more about nutrients, fertilisation and water protection on pages 32, 50, 67 and 70.

Biologically tackles soil diseases and breaks development cycles

When used purposefully, cover crops improve field hygiene. This is explained in more detail on page 16 and onwards .



Annual and Italian ryegrass
Lolium multiflorum

Forage rape
Brassica napus spp. oleifera

Oilseed radish
Raphanus sativus
var. oleiformis

Taproot-forming radish
Raphanus sativus
var. longipinnatus

Marrow stem kale
Brassica oleracea
convar. acephala

Good ground coverage for fewer weeds and erosion protection for beneficial topsoil

A dense cover crop layer shades the soil and suppresses weeds. It also offers protection from abiotic stress: the topsoil is protected from overheating, and wind/water erosion is reduced. Cover crops not only take on this role when green, but also protect the ground as a dead mulch layer in preparation for the following main crop and facilitate mulch or direct sowing as well as regenerative farming methods.

Encourages useful soil life e.g. earthworms

A handful of topsoil is home to more soil organisms than there are humans on Earth. Soil life is incredibly diverse in terms of variety and forms. It includes bacteria, fungus, worms, arachnids, countless insects and more. Most of these soil dwellers feed on organic substances, so are the driving force behind all nutrient cycles. They ensure the soil is balanced and can act as a buffer.

Cover crops contribute to continuously supplying these small beings with sufficient nutrition. An easily visible example is the earthworm: it takes in plant residue as well as mineral soil elements, sticking them together and excreting highly stable particles.

Earthworm castings contain

5 x more nitrogen
7 x more phosphorous
11 x more potassium

than the surrounding soil

Worm farms make it very easy to see the clay-humus complexes and earthworm secretions within soil composition. Castings are 1mm to 5mm thick and are extremely water-resistant.

Winter-hardy for long-lasting protection of soil and soil life

Winter-hardy cover crops protect the soil and any fixed nutrients until spring. Even soil life is provided with constant nutrition. Depending on the use system and cultivation process, soil protection and biomass production can be combined. V-Max® blends LUNDSGAARDER GEMENGE and WICKROGGEN promote soil biology with their legume contents. V-Max® blends UNTERSAAT GRAS and UNTERSAAT KLEE PLUS are ideal for regenerative farming methods as they facilitate year-round greening to activate and strengthen the soil life associated with humus enrichment.

Can be used as biomass

Many cover crops produce biomass that can be used in biogas generators. Forage rye (e.g. PROTECTOR and TRAKTOR) in particular grows over winter and can be cut in spring. Fast-growing blends of summer grains such as V-Max® GRANOLEG and V-Max® GRANOPUR can also be cultivated after earlier cereals, facilitating another biomass harvest: see page 30.

Crimson clover
Trifolium incarnatum

Common vetch / fodder vetch
Vicia sativa/Vicia villosa

Field pea
Pisum sativum

Persian clover
Trifolium resupinatum

Egyptian clover
Trifolium alexandrinum

Closes fodder gaps

Cover crops offer you the opportunity to close cattle fodder gaps and produce more fresh fodder rations. Forage rape, rye grasses, legumes and cereals are suitable for this purpose. See page 24 and onwards. Grass blends with legumes, such as V-Max® LUNDSGAARDER GEMENGE and V-Max® FUTTER, can be harvested before or after winter, and encourage soil fertility through intense root formation, see page 54.

Annual blend V-Max® KLEEGRAS, a very dense blend with a high level of utilisation elasticity, is new this year.

Plenty of flowers to provide honey bees and other insects with nectar

Honey and wild bees have great ecological benefits and significance in society. Field greening with flowering cover crops can support bees and other insects by closing any gaps in crop cover. Farmers can have some of their additional expenses reimbursed by programmes to encourage flowered land. The annual agricultural flowering blends viterra® BIENE, viterra® BIENE PLUS and viterra® MULTIKULTI are ideal for fallow land with honey plants (ecological compensation factor 1.5) and various agricultural environmental measures: find out more on page 62. People also appreciate flowering varieties such as phacelia, sunflowers, Persian clover and more, resulting in an image boost for agriculture.

Provides a habitat and grazing for wild animals

Local big and small game will also benefit from cover crop cultivation. Wild forage blends viterra® HORRIDO and viterra® HOCHWILD have been especially designed for this purpose (page 64). They offer local wildlife cover, suitable grazing and protection from predators.

Ensures biodiversity

Cover crops offer the farmer an additional opportunity to expand diversity in subsequent crops. As well as diverse varieties especially developed for particular purposes and conditions, there are old varieties that are increasingly valued for their benefits. Depending on the subsequent crop, soil type and cultivation period, purposefully greened cover crop fields not only contribute to a high-yield main crop, but also improve soil fertility through managing and encouraging healthy soil life. See page 22 and onwards for the diversity of cover crops.

Recommended varieties

Nematode-resistant oilseed radish **from page 13**

level 1 AMIGO, COMET and more
level 2 DEFENDER, COMPASS, AGRONOM, CARUSO and more

Nematode-resistant white mustard **from page 12**

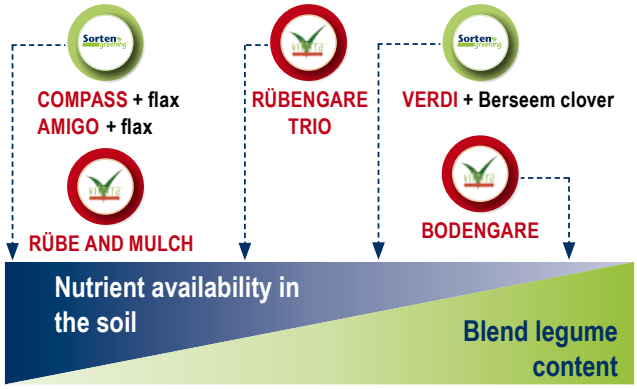
VERDI, MASTER, ACCENT, PROFI, SCOUT, TOPAS and more

Nematode-neutral

Bristle oat PRATEX, CODEX **page 21**

Phacelia ANGELIA **page 23**

Greening-compatible blends



Nematode-reducing

viterra® cover crop blends **from page 39**

viterra® RÜBE, viterra® MULCH, viterra® INTENSIV

Nematode-neutral

viterra® cover crop blends **from page 39**

viterra® RÜBENGARE, viterra® UNIVERSAL, viterra® BODENGARE, viterra® TRIO, viterra® RAPS and more

SortenGreening® Rübe **page 48**

Oilseed radish AMIGO + flax, oilseed radish COMPASS + flax, white mustard VERDI + Egyptian clover

Recommended varieties

Multi-resistant oilseed radish **page 15**

DEFENDER, CONTROL, ANGUS, CARUSO, CONTRA

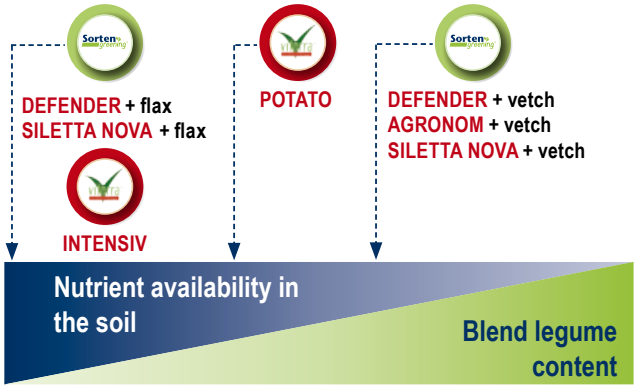
Oilseed radish against internal rust spot **page 20**

SILETTA NOVA, BENTO, AGRONOM

Oilseed radish SILETINA, AKIRO, INFORMER **page 22**

Bristle oat PRATEX, OTEX **page 21**

Greening-compatible blends



viterra® cover crop blends **from page 39**

viterra® INTENSIV, viterra® POTATO

SortenGreening® Kartoffel **page 48**

Oilseed radish SILETTA NOVA + flax,
ilseed radish DEFENDER + flax,

Oilseed radish DEFENDER + common vetch, oilseed radish AGRONOM + common vetch, radish SILETTA NOVA + common vetch,

Recommended varieties

Phacelia ANGELIA **page 23**

Bristle oat PRATEX, OTEX **page 21**

Ryegrass ALISCA, DIPLOMAT **page 29**

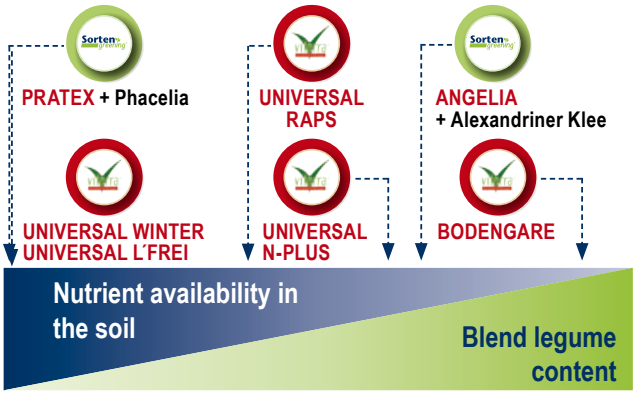
Rye **page 28**
OVID, MATADOR, PROTECTOR, TRAKTOR, LUNATOR

Oil flax JULIET, ZOLTAN **page 25**

Persian clover FELIX **page 26**

Egyptian clover OTTO **page 26**

Greening-compatible blends



viterra® cover crop blends **from page 39**

viterra® RAPS, viterra® BODENGARE, viterra® UNIVERSAL, viterra® UNIVERSAL WINTER and more

In wide rapeseed crop rotation (25% and below)

viterra® cover crop blends **from page 39**

viterra® INTENSIV, viterra® MULCH, viterra® TRIO, viterra® MAIS and more

SortenGreening® Kruziferenfrei **page 48**

Bristle oat PRATEX + Phacelia
Phacelia ANGELIA + Egyptian clover

Recommended varieties

White mustard ALBATROS, CLASSIC, COVER **page 23**

Oilseed radish SILETINA, AKIRO, INFORMER **page 22**

Taproot-forming oilseed radish STINGER, MINER **page 22**

Forage rape FONTAN 00, EMERALD and more **page 24**

Winter turnip rape JUPITER **page 24**

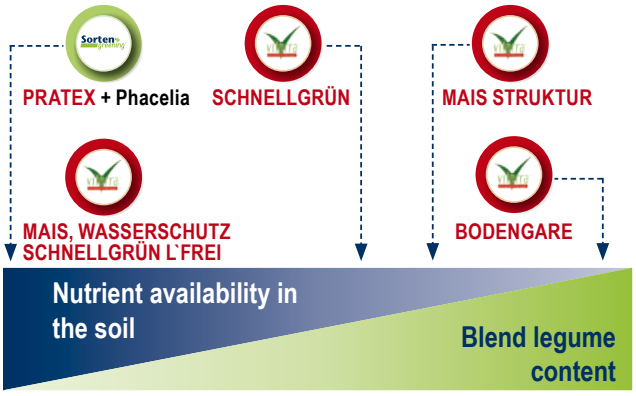
Phacelia ANGELIA **page 23**

Bristle oat PRATEX, OTEX **page 21**

Ryegrass ALISCA, DIPLOMAT **page 29**

Rye PROTECTOR, TRAKTOR and more **page 28**

Greening-compatible blends



viterra® cover crop blends **from page 39**

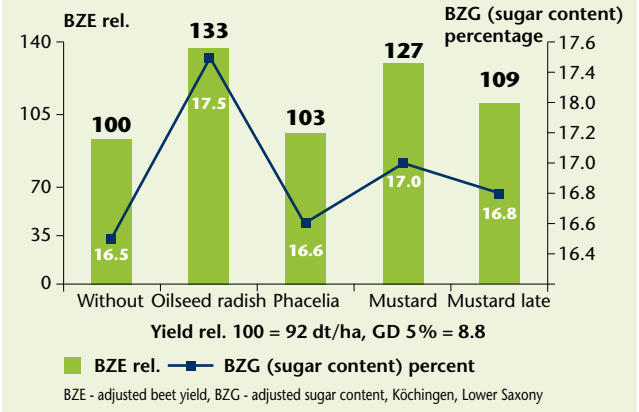
viterra® MAIS, viterra® WASSERSCHUTZ, viterra® MAIS STRUKTUR, viterra® SCHNELLGRÜN, viterra® SCHNELLGRÜN LEGUMINOSENFREI, viterra® UNIVERSAL WINTER, viterra® BODENGARE, viterra® MULCH and more

Biological nematode control

Beet cyst nematodes impact yield

Beet cyst nematodes (*heterodera schachtii*) are still the most important sugar beet pest economically. So, tackling nematodes in affected areas must be a top priority. Especially in tight sugar beet rotations, resistant cover crops contribute to forcing nematodes under the damage threshold and creating optimal growth conditions. Even when cultivating tolerant or resistant sugar beets, resistant cover crops not only reduce the nematode population, but also promote the long-term beet and sugar yield, and therefore the rentability of growing beets.

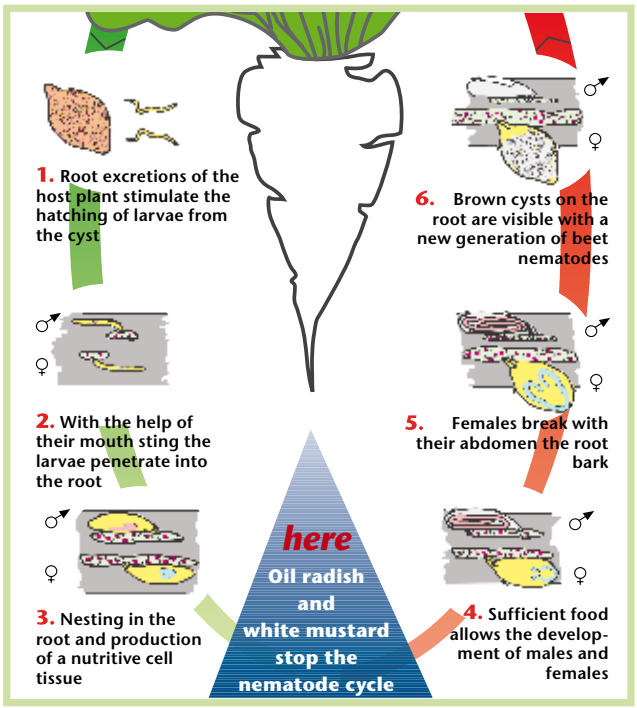
Impact of cover crops in sugar beet crop rotations



Source: dlz agrarmagazin, June 2010

Resistant oilseed radish and white mustard activate larval hatching and migration to the roots.

Unlike host plants, resistant plants restrict the formation of the nurse cell system. The nematodes cannot get sufficient nutrients, so the majority die prematurely. As the females require around 40 times more nutrition during their development than the males, the sex ratio is skewed in resistant plants to 100 (up to 1,000) males to 1 female. The lack of females leads to population decline.



Resistant cover crops are classified into resistance levels according to their reproduction rate (final population / initial population). Resistance level 1 entails a reduction of more than 90% (reproduction rate <0.1). Plants that can serve as host plants for nematodes increase nematode numbers by around 4 times in the same period. Among plants that are not host plants (neutral plants, such as phacelia or bristle oat), the nematode population decreases by around 30 percent annually.

Beet nematode cysts can survive in soil for more than 10 years, and can be found in deep layers of the ground.

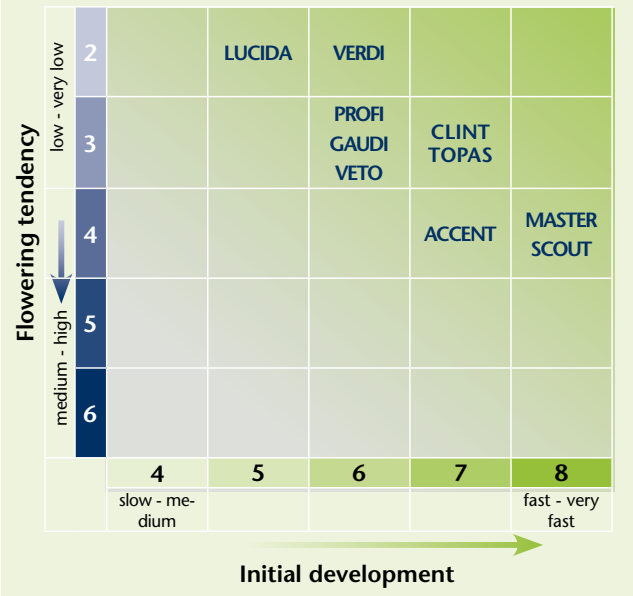
Even after 40 years of using resistant cover crops, and even in stress situations, no resistance-breaking nematodes have developed.

Ensure the success of your crop with the right variety

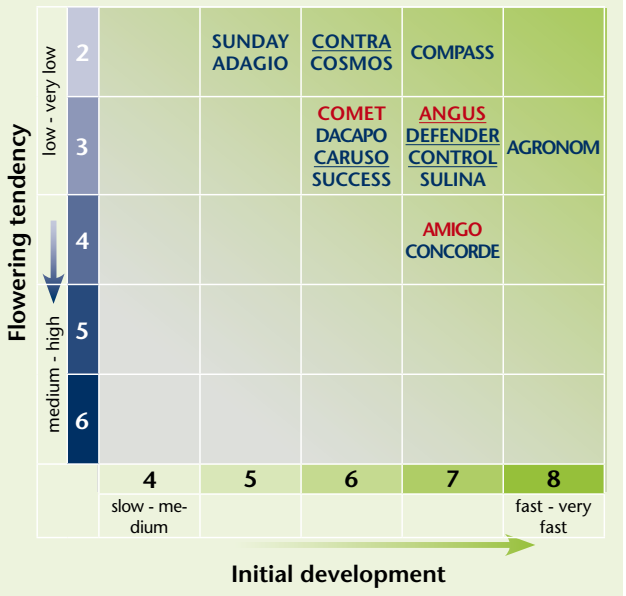
Nematode-resistant cover crops are exceptionally well suited to reducing beet cyst nematode infection in cover crop cultivation. Intense cultivation has led to a range of varieties suitable for individual use. Nematode resistance, initial development and flowering tendency are important criteria when choosing a variety:

Choose by	Choice of white mustard	Choice of oilseed radish
Sowing		
Early		Low flowering tendency
Medium	Low flowering tendency	All
Late	Medium flowering tendency	Rapid initial development and medium flowering tendency
Very late	Very rapid initial development	
White mustard has a strong reaction to day length so should not be sown too early. It can still build up good stock when sewn later, up to the second half of September. Good initial development not only ensures weed suppression through good coverage, but also creates soil tilth and evaporation protection.		
Nematode reduction		
Beets	Well suited for medium to low nematode infestation	Strong nematode reduction through better resistance and deeper root penetration
Stem nematodes	Avoid white mustard	No multiplication of *ditylenchus dipsaci*
Beet-potato crops	Avoid white mustard	Multi-resistant oilseed radish
Reduction caused by oilseed radish reaches even deep soil layers to more intensely promote natural defenders against beet cyst nematodes. Only oilseed radish can purposefully reduce more nematodes and diseases (see more nematodes and diseases, page 16).		
Dryness	White mustard is more tolerant to drought and able to turn lots of biomass into effective biomass with little water available.	
Nutrients	White mustard can build up dense crops in low-nutrient conditions	Oilseed radish can absorb a lot of nitrogen in a short time, preventing displacement.
Freezing off / mulch tilling	White mustard is not frost-hardy. More stable varieties dry out better and are suitable for mulch tilling as well as direct sowing	Varieties that are not very winter-hardy and those that have developed to the point of flowering freeze off more easily

Nematode-resistant white mustard



Nematode-resistant oilseed radish



Resistance level 1 to beet cyst nematodes Resistance level 2 to sugar beet nematodes

Underlined varieties also tackle *meloidogyne chitwoodi*

Nematode-resistant white mustard

VERDI

A CLASS OF ITS OWN

- Tested in France and allocated to resistance level H1 (over 90% reduction in sugar beet nematodes)
- Exceptionally low flowering tendency allows early sowing dates without the formation of mature seeds
- Easy sowing, fast ground cover and long vegetative growth phase

MASTER

RAPID START - STRONG FLOWERING DELAY

- Especially rapid initial development - highest classification in the recommended list
- Resistance level 2 in official tests in Germany
- Highly adapted to late sowing: good yield can still be achieved when sown up to mid September
- Weeds are effectively suppressed and valuable nutrients organically protected from displacement into deep soil layers

ACCENT

FIELD-TESTED HIGH LEVEL OF CONTROL

- Up to 90% reduction of nematodes in official tests - resistance level 2
- Quick and easy sowing, rapid and complete soil coverage

SCOUT

FLEXIBLE SOWING - EFFICIENT AGAINST NEMATODES

- Exceptionally rapid initial development (highest classification in the Descriptive List), good tolerance for late sowing with effective weed suppression
- Late bloomer

PROFI

PROFESSIONAL NEMATODE CONTROL

- The generous ground shade provided by PROFI white mustard intensively promotes weed suppression and tilth.
- Late flowers allow long vegetative development and long-lasting hatching stimulation

TOPAS NEW

GOOD NEMATODE REDUCTION THANKS TO LONG CONTROL PERIOD

- Combination of rapid initial development and late flowering ensures a long period of vegetative growth
- Reliably freezes off, ideal for mulch tilling

Variety	Profile
VETO	A good grower for good nutrient conservation
CLINT NEU	Impresses with exceptional initial growth

Variety	Profile
LUCIDA	The latest white mustard with high nematode resistance
GAUDI	A treat before sugar beet

Nematode-resistant oilseed radish

AMIGO

A SUGAR BEET'S BEST FRIEND

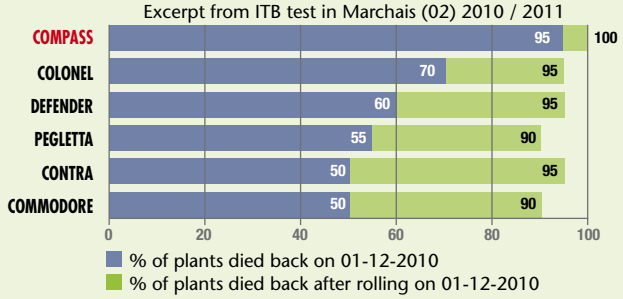
- Beet cyst nematode control at the highest level, over 90% reduction in *heterodera schachtii* (resistance level 1)
- AMIGO encourages beet cyst nematodes to hatch and actively reduces the population to under the damage threshold
- Improved initial development with fast ground cover for excellent tilth and effective weed suppression
- Dense root system fixes nutrients and prevents displacement into deep soil layers
- Plenty of organic mass promotes humus balance and activates soil life

COMPASS

THE OILSEED RADISH THAT FREEZES OFF MORE EASILY

- High resistance to beet cyst nematodes in the upper area of resistance level 2+
- Freezes off more easily and faster than traditional oilseed radish varieties
- Fast soil warming in spring due to the low mulch layer allows early sowing of sugar beet and maize
- No additional work or costs required to work in - ideal for mulching and direct sowing of following crop

Sensitivity to frost



Due to the low winter hardiness of COMPASS, a very high percentage of the plants freeze off during winter. The remaining plants can be destroyed cost-effectively by rolling the crop on frozen ground in a process that is both soil-friendly and environmentally-friendly. A clean crop in spring proves good weed suppression.

Nematode-resistant oilseed radish

AGRONOM*

THE SPECIALIST FOR SUGAR BEET AND POTATOES

- Fastest initial development and ground cover with delayed flowering of all oilseed radish varieties listed in Germany
- Resistance to beet cyst nematodes in the upper area of resistance level 2
- Offers good flexibility regarding sowing window
- Strong root penetration of the soil and good nutrient storage offer optimal starting conditions for the following crop

* In tests, AGRONOM has been shown to reduce viral rust spot.

COSMOS

HIGHLY RESISTANT LATE BLOOMER

- Low flowering tendency allows early sowing
- COSMOS is the ideal variety for effective nematode control in tight beet rotations
- Low growth for energy-saving mulching

COMET

BEST PERFORMANCE AGAINST BEET CYST NEMATODES

- Highest level 1 in nematode resistance, over 90% reduction in beet cyst nematodes in official tests
- Tetraploid variety with especially strong and leafy initial development for effective ground shade
- Thorough suppression of any weeds that could potentially host nematodes

SULINA NEW

EFFICIENT WITH NEMATODES AND NUTRIENTS

- Actively tackles beet cyst nematodes, level 2
- Strong initial development for quick ground cover and use of ground heat
- Mass-forming, long vegetative growth phase and intense soil rooting
- Efficiently uses up remaining nutrients and freezes off relatively easily

SUCCESS NEW

SUCCESSFUL BEET CULTIVATION

- Good weed suppression and robust initial development
- Strong rooting with reserved flowering tendency

SUNDAY NEW

COLD-TOLERANT AND EXTREMELY LATE-FLOWERING

- Very low to low flowering tendency, BSA level 2
- Low-growing for less work
- Ideal for long-term retention of nutrients over winter
- Intensive, deep roots thanks to extremely long vegetative growth phase

Resistance level 2	Profile
ADAGIO	Top variety for reliable nematode control
CONCORDE	Promotes beet yield and quality
DACAPO	For active biological nematode control

Multi-resistant oilseed radish

DEFENDER

BEST VARIETY FOR VEGETABLE AND ARABLE FARMING

- Disrupts disease cycles in vegetable, potato, sugar beet and cereal crops
- Up to 90% reduction of beet cyst nematodes (resistance level 2+)
- No multiplication of stem nematodes (*ditylenchus dipsaci*)
- Efficient reduction of root-knot nematodes and free-living nematodes
- Reduces viral internal rust spot in potatoes
- Strong initial development and rapid ground cover for thorough weed suppression
- Deep-reaching, fine root system improves soil structure
- DEFENDER has proven its top position in countless tests and practice cultivations

CONTROL

EFFECTIVE CONTROL OF VARIOUS NEMATODES AND DISEASES

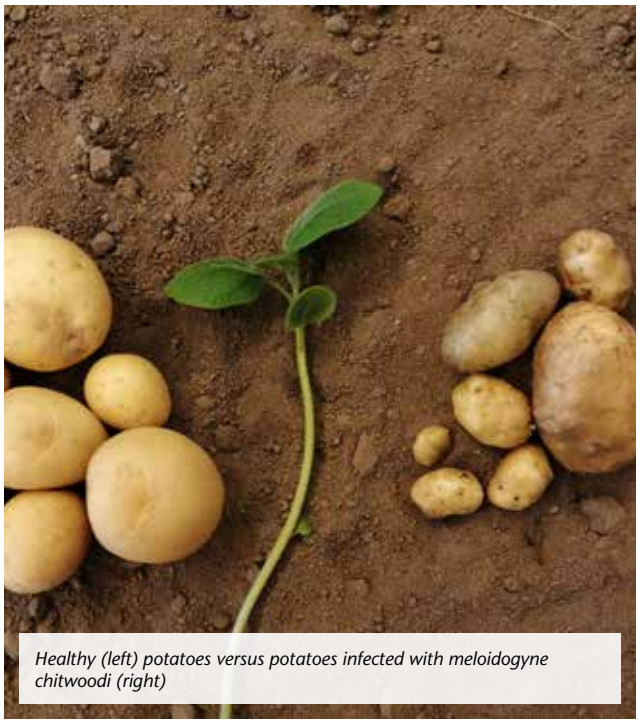
- Resistance to beet cyst nematodes in the upper area of level 2
- State-confirmed resistance to root gall nematodes
- Multi-resistant genes: developed from DEFENDER
- Excellent initial development with good soil coverage to supress weeds
- Strong vegetative growth with intense root formation
- No propagation of stem and bulb nematodes, reduces viral rust
- Selectively encourages positive soil life
- Worsens survival conditions for *rhizoctonia*
- Medium frost susceptibility for long-lasting nutrient binding and soil protection

ANGUS

MULTI-RESISTANT POWERHOUSE

- Multi-resistance - effective control of various nematodes and diseases e.g. *heterodera schachtii* and root-knot nematodes
- Rapid ground shade for effective suppression of secondary growth and weeds
- Fast, healthy initial development, increases organic substance and supports soil fertility
- Seep, intense root system

Variety	Profile
CONTRA	The specialist for vegetable crop rotation
CARUSO NEW	Exceptional before potatoes



Healthy (left) potatoes versus potatoes infected with meloidogyne chitwoodi (right)

More nematodes and diseases

As well as beet cyst nematodes, other nematodes are increasingly causing problems. Crop rotations with a high proportion of root crops and vegetables are especially affected. In addition to beet cyst nematodes, multi-resistant oilseed radish varieties also reduce other nematodes and have been tested for their impact on many diseases of the following crop.

The cultivation of cover crops must be carefully considered so that the cover crop varieties used do not exacerbate the infestation and endanger the main crop. A reduction in chemical treatment options and warmer climatic conditions are making the problem worse. Subsequent crop planning, cultivation and field hygiene form the basis for successful pest management.

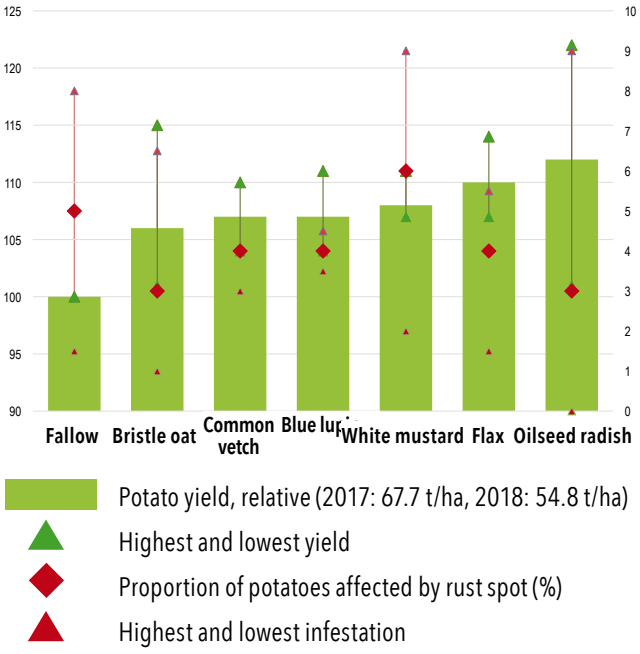
FLN and Corky Ringspot disease

As free-living nematodes, trichodorus are hard to treat directly as they are also found deep in the soil, waiting to attack new plants. Here, only rough classification of host plant status for plant varieties has been possible up to now. It is important to encourage the initial development of main cultures through optimal growth conditions so that they can quickly develop out of their vulnerable initial phase.

Cover crops can, however, transfer the tobacco rattle virus, which causes viral internal rust spot. In particular, the cultivation of oilseed radish has proven a very effective measure here. The trichodorus nematode loses the virus when a suitable cover crop is cultivated, so it is no longer able to spread internal rust spot.

As many weeds and self-seeded potatoes provide an opportunity for nematodes to reinfect themselves with the virus, these agricultural measures form the foundations of treatment. Cover crops with rapid ground cover and good weed suppression support these measures.

Impact of various cover crops on potato yield and infection of viral internal rust spot (private test carried out by LWK NRW)



Our recommended varieties against viral internal rust spot

Multi-resistant oilseed radish:
DEFENDER, ANGUS, CONTRA, CONTROL, CARUSO

Oilseed radish, resistant to beet cyst nematodes
COMPASS, AGRONOM

Oilseed radish, conventional: SILETTA NOVA, BENTO

More cover crops (blend partner for oilseed radish): Flax, bristle oat PRATEX and CODEX, common vetch and blue lupin.

Lesion nematodes (*pratylenchen ssp*)

These migratory root nematodes are often found in sandy soils and can lead to significant losses in potato, vegetable and grain yields. They usually form nests. Plants that are attacked experience stunted growth and are more susceptible to fungal infections such as *verticillium* and *fusarium*.

French marigold *tagetes patula* is a real specialist when it comes to reducing lesion nematodes, as it actively tackles the nematodes by excreting thioterpenes. Once *tagetes patula* has successfully established, the population will only slowly recover, so this impact lasts for several years. Seeds should be sown in June with special sowing machinery, which is relatively expensive. As French marigold multiplies internal rust spot, potato farmers have limited options.

The cultivation of bristle oat is a practical compromise. Bristle oat doesn't multiply lesion nematodes and reduces rust spot. It is an easy-going cover crop that suppresses weeds as an alternative host for nematodes with its plentiful foliage and roots, while stimulating positive soil life.

Multi-resistant oilseed radish is also a bad host for lesion nematodes. When infested with lesion nematodes, the components of seed blends should be carefully considered: even a small ratio of host plants can be used by nematodes for mass reproduction, endangering yield.

Root knot nematodes (*meloidogyne chitwoodi, meloidogyne hapla*)

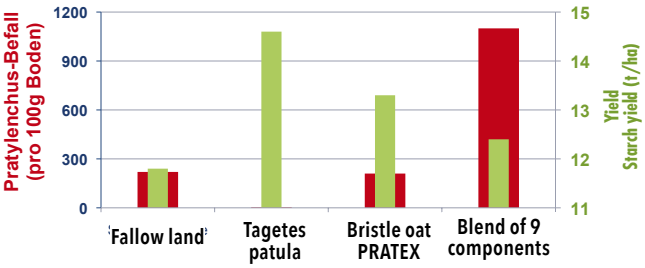
The **columbia root knot nematode** (*meloidogyne chitwoodi)* has an immensely large range of host plants and should not be underestimated, as this is a quarantine disease in Europe.

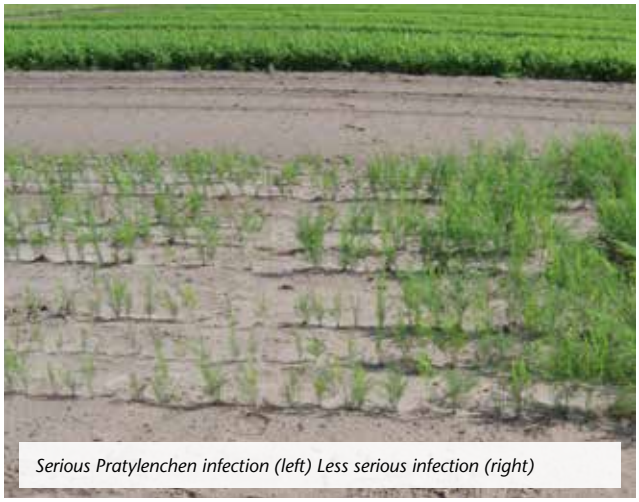
High-performance oilseed radish varieties are available that suppress infestation to under the detection level. The oilseed radish DEFENDER was selected in the EU Project DREAM (Durable Resistance Against Meloidogyne) and was the first oilseed radish used to reduce this quarantine-worthy pest. In the meantime, this property is being reviewed at official variety assessments in Germany and the Netherlands on request, and is documented in variety lists. Take the opportunity to regulate this pest with oilseed radish! Oilseed radish varieties with resistance to *Meloidogyne chitwoodi*: ANGUS, CARUSO, CONTRA, CONTROL, DEFENDER.

The **northern root knot nematode** (*meloidogyne hapla*) only attacks dicotyledonous plants. As legumes are good host plants, this pest is often found in organically cultivated soil. As well as the thorough avoidance of dicotyledonous plants, the CONTRA and ANGUS oilseed radish varieties can be used to suppress nematodes.

Both root knot nematodes need host plants to survive. A purposefully unsuitable cover crop can almost completely eliminate an infestation.

Impact of cover crops on *pratylenchus penetrans* and potato yield (PPS GROEN, Valthermond 2016-2017)





Serious Pratylenchen infection (left) Less serious infection (right)

Rhizoctonia

Fungal *Rhizoctonia* causes damage and loss of yield in potato, sugar beet, broad bean and soy crops.

Rhizoctonia can be split up into various host spectrums (anastomosis groups). Sugar beet, legumes, maize and grasses are mostly affected by group AG 2-2, while potatoes are mainly impacted by AG-3 and a more general group (AG-4) that only causes minimal damage.

All rhizctonia groups thrive in conditions including waterlogging and ground compaction, tight crop rotations and lots of unrotted, lignin-rich organic material.

Aside from the species' and varieties' susceptability to Rhizoctonia fungus, the proportion in a blend is a deciding criterion in the disease's occurance.

Cover crops that encourage root penetration and soil ventilation make it harder for this fungal disease to survive. Furthermore, many crucifers directly suppress rhizoctonia thanks to their distinct roots and sulphur content.

Clubroot

One particularly important disease that must be taken seriously in winter oilseed rape cultivation is clubroot (*plasmodiophora brassicae*). Clubroot is a slime mould and affects the roots of crucifer plants, on which it forms swollen masses (hernias). Clubroot can survive for up to 20 years in the soil, meaning complete carnage for winter oilseed rape.

If oilseed rape is cultivated in soil infected with clubroot, crucifers should not be used as cover crops as they can further exacerbate the infection. As well as white mustard, brown mustard and forage rape, camelina and cress are among the crucifers. Oilseed radish is less susceptible than other cover crops from the crucifer family, but even oilseed radish should only be used as a cover crop in later crop rotations without clubroot infection. The oilseed radish variety with the lowest clubroot infection rate is DEFENDER.

Cover crops that do not act as host plants for clubroot, such as phacelia, bristle oat, flax, legumes and others, avoid the risk of exacerbating a clubroot infection.

To sum it up:

Tackling individual nematodes and diseases requires targeted cultivation management, as nematodes don't usually appear as individual groups, rather as a mixture of various groups. In order to effectively reduce diseases with cover crops, it is helpful to know as much about the nematodes in the soil as possible. The best time to take soil samples is during a cool, moist phase (generally November to February). In warm and dry conditions, free and migratory root nematodes withdraw to deeper soil layers and cannot be seen. If you suspect pratylenchus, it is advisable to have plant roots tested, as nematodes can overwinter there. Many agricultural bodies carry out nematode tests. Some independent labs in the Netherlands have even specialised in soil samples before potato crops.

If the reduction of nematodes and disease is the focus when choosing a suitable cover crop, it is generally advisable to limit yourself to a few varieties. Within these varieties, take advantage of the immense progress made within cultivation. Even agronomic properties such as rapid initial development, late sowing suitability and easy freezing off can help to improve treatment. Diverse blends increase the risk that nematodes and diseases could use individual components to reproduce. It is therefore important to only use these if the subsequent crop is not vulnerable.

Overview: Effectiveness of cover crops against nematodes and diseases

Beet cyst nematodes
- Over 90% reduction of *heterodera schachtii* possible
- Tackles *heterodera betae*
- No formation of resistance-breaking nematodes
- Controls even in deeper soil layers

Root-knot nematodes
- Resistance to *Meloidogyne chitwoodi* officially tested
- Prevents the development of *M. fallax*
- For crop rotations with potatoes, vegetables and flowering bulbs

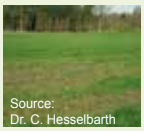
Northern root-knot nematodes
- Efficient control of *Meloidogyne hapla*
- For organic crop rotation with high clover content and carrot farming
- Also protects potatoes and sugar beet

Viral internal rust spot
- Reduces viral internal rust spot (tobacco rattle virus) in potatoes
- Suppresses free *trichodorus* nematodes that transfer the virus
- Tackles weeds through rapid ground cover

Rhizoctonia rot
- Reduction of yield and quality defects caused by rhizoctonia
- Controls root-killing disease and dry-core in potatoes
- Controls rhizoctonia in beets
- In lettuce, cabbage and many more crops including maize, grass, beans and flowering bulbs
- Promotes structure, pore volume and soil aeration
- Promotes natural antagonists

Southern root-knot nematodes
- *Meloidogyne incognita* and *M. javanica* are effectively reduced
- in greenhouse cultures and in peppers, tomatoes and pumpkins

Stem and bulb nematodes
- No multiplication of *Ditylenchus dipsaci* as cover crop
- in beet, vegetable and flowering bulb rotations



Lesion nematodes
- Poor host plants for *Pratylenchus* nematodes
- on sandy soil as a cover crop
- For crop rotations with potatoes, oilseed rape, cereals, vegetables and flowering bulbs

Pythium
- Reduces damage caused by *pythium* fungus
- In crop rotation with peas, potatoes and flowering bulbs

Clubroot
- No build-up of the clubroot pathogen *plasmodiophora brassicae* as a cover crop in crop rotations with oilseed rape and cabbage

Cereal crop rotation diseases
- Good disruption of the disease cycles in cereal crop rotations (e.g. blackleg)

Preceding crop impact of various cover crops:

	Sugar beet		Potatoes						Rapeseed
	Heterodera schachtii	*Ditylenchus dipsaci*	*Rhizoctonia*	*Trichodorus spp.*	*TRV*	*Pratylenchus spp.*	*Meloidogyne chitwoodi*	*Meloidogyne hapla*	Clubroot
Oilseed radish	Varieties				Varieties		Varieties	Varieties	Frequency
Tillage radish									
White mustard	Varieties								
Brown mustard									
Forage rape									
Turnip rape									
Bristle oat									
Ryegrass									
Forage rye									
Phacelia									
Buckwheat									
Berseem clover									
Persian clover									
Common vetch									
Blue lupin					Varieties				
Flax									
Sunflower									

Legend: positive | neutral | negative | no entry | Varieties react differently

Oilseed radish against Corky Ringspot

SILETTA NOVA

ÖKO

ALSO AVAILABLE AS AN ORGANIC PRODUCT

REDUCES CORKY RINGSPOT IN POTATOES

- Reliable and tested for quality potatoes
- SILETTA NOVA alleviates virus transfer by *trichodorus* nematodes
- Rapid and especially leafy ground shade suppresses weeds that the virus could use to multiply
- The organic matter vitalises soil activity, keeps nutrients in the topsoil and provides valuable humus
- The deep root system creates optimal soil conditions and reduces soil compaction
- **SILETTA NOVA contributes to long-term, sustainable potato yields**

BENTO

PROMOTES POTATO YIELD AND QUALITY

- Reduces Corky Ringspot disease
- Excellent vegetative growth
- High level of organic matter as additional contribution to humus formation
- Ideal protection from wind and water erosion and improvement of soil structure thanks to dense root penetration of the soil
- The practical farmer knows: closes early and flowers late!

Sticky nightshade against potato cyst nematodes

Sticky nightshade is resistant to *globodera rostochiensis* (pathotypes 1 to 4) and *globodera pallida* (pathotypes 2 and 3) and is part of the *solanaceaen* family (nightshades). Sow: Mid May to mid July.

WHITE STAR

- Dense root penetration to control globodera

DIAMOND

- Strong growth and strong control

Bristle oat against pratylenchus

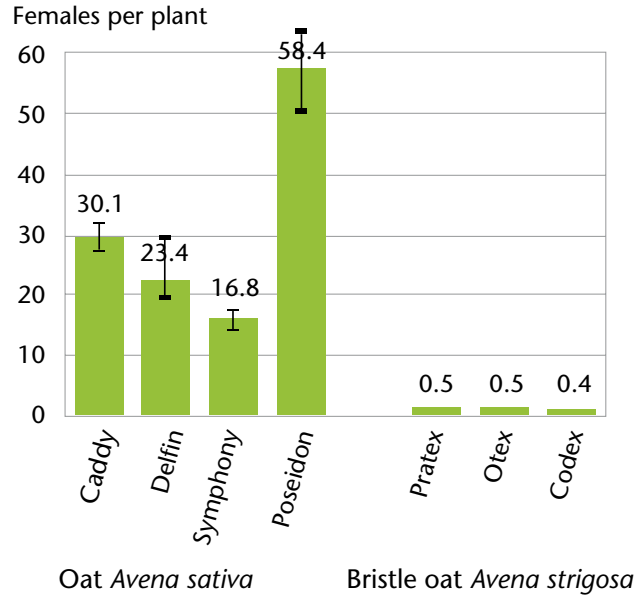
Bristle oat (*avena strigosa*) is a commonly used cover crop thanks to its undemanding nature. Grown for nematode reduction, erosion protection, as a biomass producer or in cover crop blends, it covers a large range of needs.

Especially in light soil, damage caused by *pratylenchus* can lead to considerable impact on quality and yield. Not only do the nematodes themselves damage the plants, but they also enable fungi such as *fusarium* and *verticillium* to easily access the plants. The large number of possible host plants includes both cultivation crops and weeds, which makes control even more difficult.

PRATEX has proven its suppression skills in many tests and practical planting. New bristle oat varieties CODEX, TRADEX and OTEX also reduce *pratylenchus penetrans*.

New knowledge from research: unlike standard oat varieties, PRATEX, OTEX and CODEX reduce cereal cyst nematodes (*heterodera avenae*).

Breeding of cereal cyst nematodes (*heterodera avenae*)



Source: P. H. PETERSEN, own research

PRATEX

ALSO AVAILABLE AS AN ORGANIC PRODUCT

CONTROLLING *PRATYLENCHUS PENETRANS*

- Tackles lesion nematodes (*pratylenchus penetrans*) without any multiplication of trichodoridus species
- Easily cultivated with simple sowing and as a cover crop without sacrificing the main crop
- Has very rapid initial development and good competition against weeds that could be potential multipliers for pratylenchus.
- High production of organic mass, dense root penetration of soil
- Cover crop that freezes off well

OTEX

COVER CROP WITH STRONG INITIAL DEVELOPMENT

- Flexible use - as green manure and for fodder production
- Rapid soil coverage and weed suppression

CODEX

THE LATE BRISTLE OAT

- Long vegetative growth phase through late ear emergence

LUNEX NEW

FOR SOIL IMPROVEMENT OR FODDER PRODUCTION

- Recovery crop for green manure or fodder production
- Rapid initial development and very early maturation make LUNEX very tolerant of late sowing

Cover crop diversity

Oilseed radish for green manuring

As a deep-rooting cover crop with rapid ground coverage, oilseed radish can be sown up to the beginning of September. Oilseed radish provides long-term soil shade, ensuring good soil tilth and weed suppression.

The abundance of organic matter supports humus formation and promotes positive soil microorganisms.

SILETINA

ALSO AVAILABLE AS AN ORGANIC PRODUCT

BIOLOGICALLY HIGHLY EFFECTIVE GREEN MANURE

- Biologically highly effective green manure
- Reliable and easy to grow - even when sown late and in unfavourable soil conditions
- Especially rapid initial development for effective weed suppression

Variety	Profile
AKIRO	Promotes soil structure and activates soil life
INFORMER NEW	Intensive promotion of soil life and good soil protection

Daikon radish

Daikon radish is used in blends to add structure.

STINGER

DAIKON RADISH TO IMPROVE SOIL

- Strong, distinct radishes
- Leafy initial development and low growth height
- The roots form large holes in the soil, encouraging spring soil warming.
- Radish dies off and rots over winter

MINER

DAIKON RADISH FOR GREEN MANURE

- Intermediary radish variety: fast development, forms radishes
- Burrows into the soil and improves soil structure
- Binds freely available nitrogen in autumn and prevents displacement

Variety	Profile
HANS NEW	WORLD FIRST: Resistant to beet cyst nematodes and radish-forming

White mustard for greening

White mustard is an undemanding greening plant that quickly achieves ground coverage and can be sown until the end of September (e.g. ALBATROS white mustard).

More benefits are its drought tolerance and reliable freezing off, making for ideal mulching conditions for maize. Late-blooming varieties such as COVER and CLASSIC are ideally suited to agricultural blends with other varieties.

ALBATROS

ALSO AVAILABLE AS AN ORGANIC PRODUCT

THE CLASSIC AMONG THE HIGH-QUALITY VARIETIES

- Rapid and strong initial development even when sown late for effective weed suppression
- Reliable freezing off in winter - plant remains provide good erosion protection even after dying off
- The nutrients conserved in the organic matter are protected from erosion during winter and are available in the following spring
- **Tried and tested for smooth mulch sowing - especially in maize rotations**

COVER

FLEXIBLE AND LATE-FLOWERING

- Intensive healthy initial development for a flexible sowing window

CLASSIC

THE RAPID STARTER WITH LATE BLOOMS

- Especially long vegetative growth phase due to good initial development and late flowers
- Recommended for water protection, mulch sowing and agricultural blends

Phacelia

As a neutral plant for beet nematodes and clubroot, phacelia is a suitable cover crop for beet crop rotation with rapeseed. In all crop rotations, phacelia impresses with its undemanding nature and drought tolerance.

As a popular pasture plant for bees, it improves the landscape when sown alone or as part of a floral blend, then reliably freezes off and protects the soil from erosion damage.

ANGELIA

ALSO AVAILABLE AS AN ORGANIC PRODUCT

STRIKING AND ATTRACTIVE FLOWERS

- High-yielding honey plants, can be used to fill the summer gap
- Leaves an easy-to-work and dark fine-stemmed mulch layer in spring that promotes soil warming
- Additional organic substance stabilises the soil's humus content
- Unlocks organically bound phosphorus

AMERIGO

- Dense growth
- Drought-tolerant

Forage rape

Forage rape is a tasty winter fodder for cattle. It offers very good green matter and dry matter yields with high a protein content. As green manure, the organic matter helps humus formation and promotes optimal soil quality. A high capacity to bind nutrients makes both winter and summer forage rape an excellent species for water protection. The network of fine roots covers large areas of soil, stabilising soil structure and promoting air exchange within the soil.

Winter forage rape

FONTAN 00

FAST-GROWING AND EFFICIENT SUPPLIER OF FEED

- Early fodder reserve
- High-quality protein fodder
- Fast ground cover as erosion protection

EMERALD

- Tasty, with high fodder value
- Effective green manure

PRESTIGE 00

- Fast-growing and leafy
- Can be sown early or late

Summer forage rape

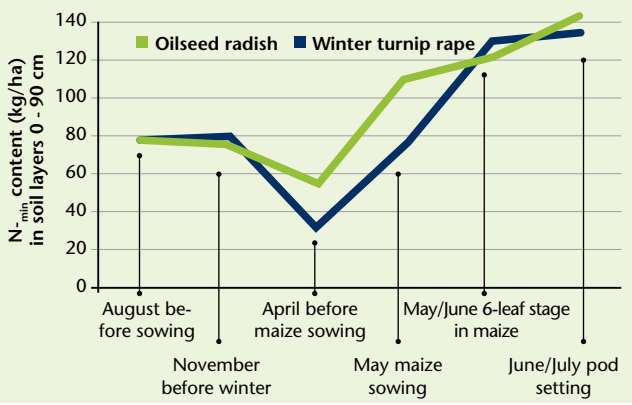
JUMBO 00

- Favourable leaf/stalk ratio
- Relatively frost-tolerant
- Good stability

Winter turnip rape

As a winter-hardy green manure for erosion protection and nitrate binding with dense root penetration and a high potential for nitrate return to the subsequent crop. It can be cut or grazed off.

Nitrogen storage and release
A comparison of oilseed radish and winter turnip rape



Source: Richter, 1992 -96

JUPITER

- Green fodder or fresh fodder
- Suitable for late sowing up to mid September
- When sown early, can first be used after 6-8 weeks
- High nutrient uptake capacity
- Effective water protection measure

Indian mustard - brown mustard

High levels of glucosinolates in the leaves and grains make this species (*brassica juncea*) excellently suited to use in biofumigation to combat soil-bound diseases.

TERRAFIT

- Fast young growth, earlier onset of flowering
- Very high active substance content

ENERGY

- Fast initial development, medium-early flowering
- High isothiocyanate content

Oil flax

This traditional plant for oil production is also excellently suited to growing as a cover crop. Oil flax is a fine-seeded, neutral plant in cover crop blends. Flax has deep root penetration and can develop silicon as a nutrient for the subsequent crop.

JULIET

- Easy and reliable cover crop
- Fine and drought-tolerant
- Established plants are frost-sensitive

ZOLTAN

- Undemanding with fine but deep-reaching taproots
- Good support plant for climbing legumes
- Striking flowers enhance the blend

Buckwheat

ALSO AVAILABLE AS AN ORGANIC PRODUCT

Buckwheat is a fast-growing cover crop that freezes off reliably. Thanks to its early flowers and seed ripeness, common buckwheat (*fagopyrum esculentum*) is often used in gameland blends. The control of buckwheat can be challenging in sugar beet crop rotations.

Common buckwheat

HAJNALKA

- Robust and neutral regarding subsequent crop

ESQUIRE NEW

- Very late to mature, versatile crop

ESKALAR NEW

- Fast-growing, also used to produce grains

Marrow stem kale

Marrow stem kale is used for cattle fodder, on gameland and in winter-hardy cover crop blends.

GRÜNER ANGELITER

PROTEIN-RICH AND VITAMIN-DENSE DAIRY CATTLE FODDER

- Very high mass yield with balanced leaf ratio
- High vitamin, nutrient and protein content
- Reliable basic feed up to autumn

ANGLIAN GOLD

- Fodder kale for game blends with exceptional frost resistance

CAMARO

- Protein-rich feed source for agriculture and gameland

Tartary buckwheat

Tartary buckwheat flowers significantly later than common buckwheat and contains bitterns.

TABEA NEW

- Flowers extremely late, stores phosphorous

TABOR NEW

- Good rapid ground cover, late flowering

Legumes as cover crops

Persian and Egyptian clover

These annual clovers are low-maintenance and fine. With rapid development, these clovers cover the middle to deep layers of blends, and actively contribute to the nitrogen supply. Clover flowers are also attractive nectar sources for honey production.

Persian clover
FELIX

FOR MAIN AND COVER CROP CULTIVATION

- FELIX provides very tasty and protein-rich green fodder and silage
- Dense crops that freeze off reliably for soil protection and improvement

Egyptian clover
OTTO

NITROGEN PROVIDER, VALUABLE AS A PRECEDING CROP AND FODDER

- New cultivar with good properties for green manure and fodder production
- OTTO is segmental and withstands gentle frosts down to -6°C

Crimson clover

Winter-hardy crimson clover is ideal in grassy blends for biomass production. Through symbiosis with rhizobiaceae, crimson clover delivers additional nitrogen, penetrates the soil densely with its roots and is therefore an excellent and impactful preceding crop.

KARDINAL

- Nitrogen fixing over winter
- Good soil loosening and structure thanks to deep-rooting taproots
- Well tolerated, protein-rich fodder

Alfalfa

This deep-rooting legume is known as the "queen of forage plants", as it is persistent and winter-hardy. Ideal as a blend partner for protein-rich fodder or cover crop

PROTEUS NEW

- Protein-rich and fine stems

POSEIDON NEW

- Versatile and high-yield

Broad beans for green manuring

Broad beans are impressive cover crops with great value as preceding crops: on one hand, broad beans fix nitrogen through symbiosis with root nodule bacteria; on the other, their strong taproots break up compacted soil and improve soil structure with their high root mass.

AVALON

EXTREMELY SMALL-GRAINED - IDEAL AS A COVER CROP

- Very low thousand kernel weight (300 - 350 g) allows a shallow sowing depth and sowing with other cover crops in a blend
- Also suitable as an additional component in a blend with winter rapeseed
- High N binding through symbiosis with rhizobia bacteria
- Strong taproot with high root mass for dense root penetration and improvement of soil structure
- Large rounded leaves for good weed suppression and encouraging tilth
- Improves stability as an additional component in cereal-legume WPS blends

Blue lupin

Their distinct taproots help these coarse legumes root through deep layers of the soil. A symbiosis with root nodule bacteria also encourages soil fertility.

As well as nitrogen, lupins are also good at absorbing potassium and phosphorus.

ILDIGO

STRONG GROWTH, IMPROVES SOIL WITH DEEP IMPACT

- Ideal plant for green manuring that can bind nitrogen in its root knot
- Can grow regardless of soil's nitrogen content and also provides neighbouring plants in the blend with the nutrient for growth
- Very valuable preceding crop

Rootstock

The most important cover crops at a glance

Order your German version via service@saaten-union.de

Vetches

Vetches are excellent fodder plants and blend partners. They produce better and are healthier when grown together with support crops. The multitude of vetch species contributes to biodiversity.

Common vetch

The heavily branched root system and the striking flowers, which are an important source of nutrition for wild bees, make common vetch a contributor in freezing-off cover crop blends.

Winter vetch

Winter vetch is mostly found in winter-hardy biomass blends such as V-Max® LUNDSGAARDER GEMENGE and V-Max® WICKROGGEN.

ARGON NEW

ALSO AVAILABLE AS AN ORGANIC PRODUCT

COMPACT-GROWING COVER CROP FOR BLENDS

- Voracious grower, compact growth and reliable protein provider
- Can grow regardless of soil's nitrogen content and also provides neighbouring plants in the blend with the nutrient for growth

LATIGO

EXCELLENT FOR GREEN MANURING AND FODDER

- Top variety with rapid initial development and flexible use
- Exceptional component in cover crop blends as non-legume partners are also provided with nitrogen.

Common vetch NEON NEW

RESISTANT AND HIGH-YIELD

- Resistant to *aphanomyces euteiches* (black leg in pulses)
- Ideal for producing fodder containing protein as it has the highest dry mass yield
- Partner for peas and oats as well as rye

Winter vetch BELLA NEW

STRONG GROWTH AND A HIGH YIELD - SOLO AND IN BLENDS

- Extremely winter-hardy, secure establishment in autumn
- Exceptional development in spring and good ground cover
- Grow well with good, protein-rich dry mass yields

Vetchling

Robust summer legumes with lots of biomass and a great ability to accumulate a lot of nitrogen within a short time. A valuable partner in blends and exceptional as a companion plant to oilseed rape. Reliably freezes off.

Vetchling ETERNA

- Colourful flowers to increase biodiversity and soil fertility

You can find more variety descriptions online at www.saaten-union.de.

Serradella

Serradella (*ornithopus sativus*) has an excellent ability to bind nitrogen, as it primarily serves as green manure but can also be used as a cover crop between root crops and cereals. For this purpose, it can also be used on wildlife food plots if the intention is to grow wild forage plants with a high nitrogen requirement in the following year. It is also popular as a pasture plant among livestock. Serradella is especially popular among herbivores on wild grazing land. Thanks to its high protein content, the plant serves as a good foundation in hoofed game for forming that all-important winter fat in the autumn. As a result, serradella makes a valuable contribution to avoiding seasonal damage caused by game animals, such as winter bark stripping by red deer.

Serradella's dense, fine root system contributes to soil loosening and therefore soil improvement. This protects the soil from drying out and stops nutrients being washed away.

Field peas

Field peas also grow in dry conditions, are more robust than winter peas and provide more biomass. When combined with support plants, field peas use any free space to suppress weeds and take advantage of sunlight.

Summer field pea RUBIN

- Rapid growth and very reliable
- Attractive, colourful-flowering legume with fine seeds
- Ample, deep root system encourages soil life

Winter field pea NS PIONIR

- Especially small seeds (field peas)
- Winter-hardy as an addition to cereal blends
- Valuable fodder and green manure plant

Biomass and fodder

Forage rye for biomass

Over the last few years, tight crop rotation with a high proportion of maize has caused a decrease in humus and therefore made our soils less able to provide a reliable yield. Innovative farmers recognised forage rye as a supplement to biomass crop rotations a few years ago.

Forage rye is suitable for use in fodder and biogas. It tillers more strongly and quickly begins to grow vigorously in spring so it can be harvested before the maize. Dense root penetration helps stabilise humus.

PROTECTOR

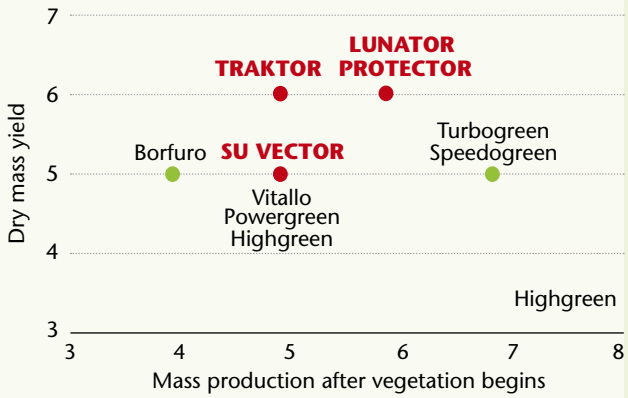
ALSO AVAILABLE AS AN ORGANIC PRODUCT

EUROPE'S LEADING FORAGE RYE

- Longstanding number 1 in German evaluations
- Biomass and fodder provider with excellent return on invested time
- Double usage: for cattle and biogas
- Excellent winter growth, exceptional erosion protection
- Very good tolerance to late sowing: up to late October for greening after maize

PROTECTOR – Top forage rye

Yield performance of winter rye varieties in cover crop cultivation



Source: from data from the Descriptive Variety List 2021

Wild rye

Ancient rye is growing in popularity, as it is not only suitable as a partner in wildlife feed plots, but also for producing grain for use in flavoursome, healthy baked goods.

JOHAN

- Small grains and strong tillers
- Extremely winter-hardy and persistent

Forage rye for biomass

TRAKTOR

MODERN FORAGE RYE FOR BIOMASS AND EROSION PROTECTION

- Modern forage rye for biomass and erosion protection
- Top performance in dry matter yield
- Good weed suppression and protection from wind and water erosion

ALSO AVAILABLE AS AN ORGANIC PRODUCT

Forage rye

LUNATOR

- High-yield and healthy
- Optimal for northern Germany

Greening rye

MATADOR

- Can be sown late, offers erosion protection
- Ideal as an overwintering cover crop after and before maize
- Efficient water protection measure

Summer forage rye

OVID

- Robust population rye
- Can be used as a main crop for grain production or as a secondary crop for WPS production

SU VERGIL NEW

- Healthy winter rye for use of grains and intercrop use
- Good health and stability

Annual and Italian ryegrass

As a fast-growing cover crop after the cereal harvest, luscious crops form just 6-8 weeks after the preceding crop is harvested. It can be used as fresh fodder or ensilaged and used in biogas plants. The dense roots provide additional organic matter to improve humus and stabilise the soil's structure.

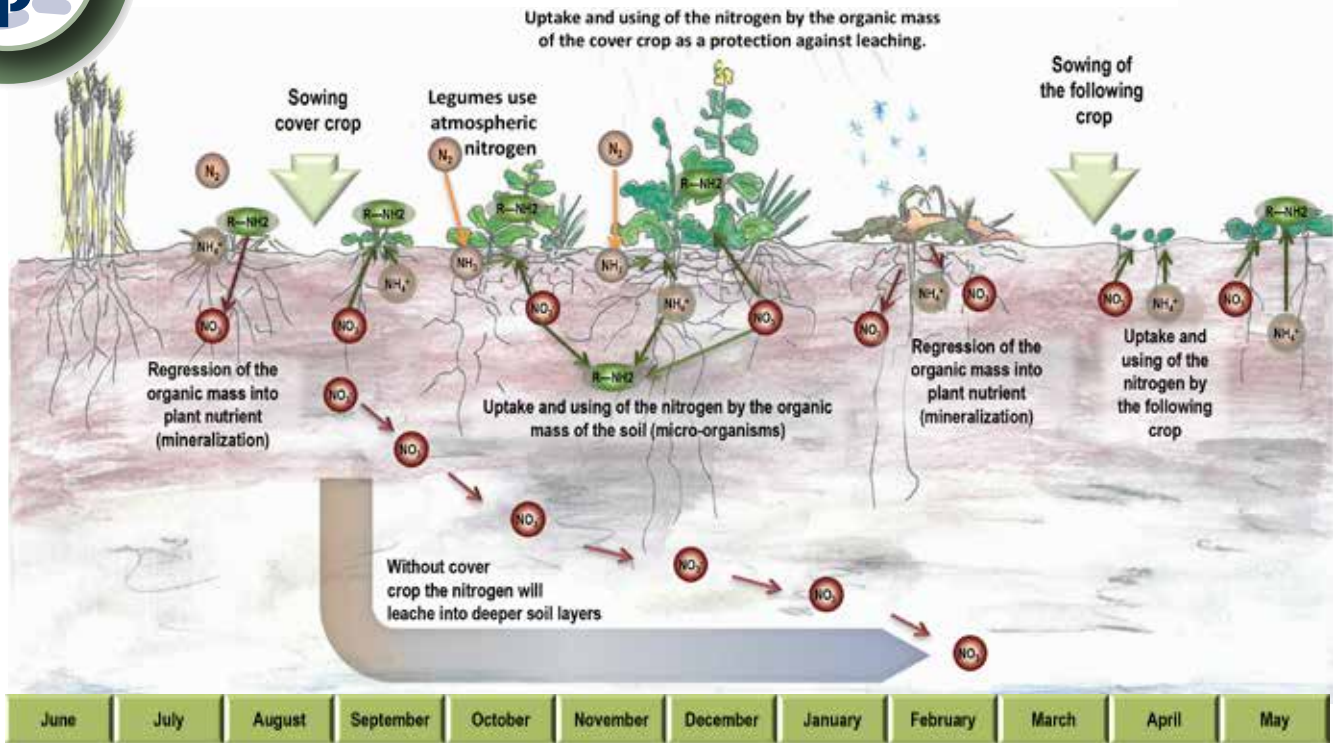
ALISCA tetraploid

- Medium late - very flexible harvest window
- High-yield and healthy

DIPLOMAT diploid

- Early and fast
- Upright growth for easy cutting

Water protection and nutrient conservation



The challenge - nitrogen

Nitrogen has long been a focus of agriculture not just because of its essential role as a plant nutrient but also as it's one of the main problems when it comes to water conservation.

The related restrictions regarding the amounts that may be spread are forcing farmers to effectively use the short supply of nitrogen in their agricultural system and retain it there.

Nitrogen enters the soil via mineral and organic fertilisers as well as the binding of atmospheric nitrogen. Nitrogen is available to the plants either as ammonia (NH_4) or nitrate (NO_3). Nitrate is considerably more mobile so is much more easily absorbed by the plants but can also be washed away much more easily under unfortunate conditions.

Weakly absorbent soils and high levels of precipitation encourage movement into deeper layers of the soil and the groundwater. As well as transport via seepage water, nutrients can also make it into surface water through erosion. The level of precipitation and relief as well the soil's infiltration capacity and structural stability play a role here. Levels of erosion loss over bare ground subject to increased precipitation over the winter months are considerably higher than in summer. Once the nitrate has made its way into deeper layers of soil, many plants can no longer reach it.

The solution - growing cover crops

Cover crops use free nutrients to form biomass and their good root penetration supports the soil's structural stability and ability to store water. The organic matter and shade prevent erosion and also encourage biological activity in the soil.

The different root shapes in viterra® cover crop blends intensively cover the soil's volume and ensure good nutrient uptake. Nitrogen is therefore efficiently protected from erosion until spring. The same applies to other nutrients. As well as nitrates, there are also ecological limits for phosphorous and sulphur. Due to the high biological activity of the soil, these nutrients are then available again to the subsequent crop. Suppressive soil like this also breaks down agricultural chemicals more quickly.

Vigorously growing cover crops are particularly suitable for water protection with their dense root systems and a certain level of resistance to cold temperatures. Our recommendations for effective water conservation are therefore:

viterra® WASSERSCHUTZ	For effective groundwater protection
viterra® MAIS STRUKTUR **V-Max® UNTERSAAT GRAS**	For maize sites with a high N supply potential
viterra® INTENSIV	Due to low N_{min} contents in late autumn
viterra® UNIVERSAL WINTER	Crucifer-free blend for close oilseed rape rotations
viterra® DEPOT ÖKO	Effective nutrient storage for organic farming

Extra high-quality seeds

Propagation

Only officially approved basic seeds are sown	Selection of suitable regions and plots	Intensive specialist propagation support	Field inspections by independent reviewers

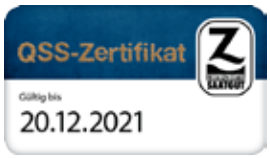
Cleaning

The latest, high-performance cleaning facilities	Efficient and gentle processing	Experienced and trained staff	High-performance packaging plant

Control and certification

In-house quality management from propagation to delivery	Official certification system	Organic certification in accordance with EU regulation no. 834/2007	QSS tested & certified

Seed production is subject to constant quality control. The latest cleaning and preparation equipment as well as high-performance packaging systems guarantee that seed is only delivered if it exceeds statutory norms.



Sowing and use at a glance

Species	Variety	Sowing window			Sowing density Pure seed kg/ha	Weight of a thousand seeds in g	Page
		July	Aug	Sep			
White mustard nematode resistance level 2*	**LUCIDA**, **VERDI** H1, **CLINT**, **TOPAS**, **PROFI**, **GAUDI**, **VETO**, **ACCENT**, **MASTER**, **SCOUT**				15 - 25	6 - 10	12
Oilseed radish nematode resistance level 1*	**AMIGO** **COMET**				20 - 30	10 - 15	13 14
Oilseed radish nematode resistance level 2*	**ADAGIO**, **DACAPO**, **SUNDAY** **AGRONOM** **COMPASS** **CONCORDE**, **SULINA** **COSMOS**, **SUCCESS**, **SULETTA**				20 - 30	10 - 15	14
Oilseed radish multi-resistant level 1*	**ANGUS**				20 - 30	10 - 15	15
Oilseed radish multi-resistant level 2*	**CONTROL** **DEFENDER** **CONTRA** **CARUSO**				20 - 30	10 - 15	15
Oilseed radish	**BENTO**, **SILETTA NOVA** **AKIRO**, **SILETINA**, **INFORMER**				20 - 30	10 - 15	20 22
White mustard	**ALBATROS** **COVER**, **CLASSIC**				15 - 25	6 - 10	23
Taproot-forming oilseed radish	**MINER**, **STINGER**, **HANS**				6 - 8	10 - 15	22
Bristle oat	**PRATEX**, **OTEX**, **LUNEX**, **CODEX**				60 - 80	15 - 30	21
Phacelia nematode-neutral	**ANGELIA**, **AMERIGO**				8 - 12	2	23
Summer forage rape	**JUMBO**				10 - 20	3 - 7	24
Winter forage rape	**EMERALD**, **FONTAN OO**, **PRESTIGE OO**				8 - 20	3 - 7	24
Marrow stem kale	**GRÜNER ANGELITER**, **CAMARO**, **ANGLIAN GOLD**				3 - 4	3.5 - 4.6	25

* Resistance levels are based on resistance to *heterodera schachtii* and were determined by way of official tests.

Fertilisation according to local recommendations.

Species	Variety	Sowing window			Sowing density Pure seed kg/ha	Weight of a thousand seeds	Page
		July	Aug	Sep			
Forage rye	**PROTECTOR**, **LUNATOR** **TRAKTOR**				120 - 180	27 - 35	30 31
Summer forage rye	**OVID**, **SU VERGIL**				120 - 160	27 - 35	31
Greening rye	**MATADOR**				90 - 150	27 - 35	31
Wild rye	**JOHAN**				140 - 150	17-18	30
Winter turnip rape	**JUPITER**				8 - 20	5 - 10	24
Annual Ryegrass	**ALISCA** tetraploid, **DIPLOMAT** diploid				40 - 45	2 - 4	31
Sticky nightshade	**WHITE STAR**, **DIAMOND**				3	3 - 4	20
Brown mustard	**ENERGY**, **TERRAFIT**				10-12	2 - 3	24
Oil flax	**JULIET**, **ZOLTAN**				20 - 30	7 - 8	25
Broad bean	**AVALON**				130 - 150	150 - 580	27
Persian clover	**FELIX**				15 - 20	1.3 - 1.8	26
Egyptian clover	**OTTO**				30 - 35	2.6 - 4	26
Crimson clover	**KARDINAL**				25 - 35	3 - 5	26
Buckwheat	**HAJNALKA**, **TABOR**, **ESQUIRE**, **ESKALAR**, **TABEA**				60 - 80	25 - 35	25
Common vetch	**ARGON**, **NEON**				100 - 130	50 - 62	28
Winter vetch	**LATIGO**, **BELLA**				80 - 160	20 - 50	28
Blue lupin	**ILDIGO**				160 - 180	160 - 200	27
Serradella					30 - 50	3 - 5	29
Alfalfa	**PROTEUS**, **POSEIDON**				25 - 30	1.5 - 2.5	26
Summer field pea	**RUBIN**				120 - 160	100 - 180	29
Winter field pea	**NS PIONIR**				120 - 160	100 - 180	29
Vetchling	**ETERNA**				90 - 120	90 - 130	29
Sunflower	**PEREDOVICK**				20 - 30	50 - 70	

Fertilisation according to local recommendations.

viterra® Zwischenfrucht-Mischungen

Strong varieties with special agronomical properties and the highest quality seed are the foundations for these blends **viterra®**, **SortenGreening®** and **V-Max®**.

The range has been adapted and expanded for 2021. Through practical Germany-wide investigations, we have tested the impacts of the tightened Fertilisation Act. The blends were tailored to the various conditions within and outside of the **red zones**. There are cover crop solutions for every scenario depending on the subsequent crop, nitrogen availability and use aim.

Strong varieties
+ Strong blends
= Strong soil

The new V-Max® range comprises all blends for fodder cultivation and biogas production. This means that tried-and-tested viterra® biomass blends can now be found under the brand name V-Max®. There are also new additions in this area: perennial clover grass and another undersowing blend. So we can offer additional opportunities to use the synergies of biomass production and soil improvement.

If you have any questions or suggestions, feel free to contact us. Our blends' components and compositions are openly declared.

Cover crop calculator

Working out which cover crop best suits your main crop and your business may quickly become a real challenge due to many different factors. But you don't have to make this decision alone: with our cover crop calculator, we ask you targeted questions regarding important framework conditions such as your subsequent crop, soil processing, nutrient availability and sowing windows.

Simly use the calculator online at saaten-union.de.

viterra® soil fertility blends

	Blend	Special feature	Suitable for crop rotation with: Maize	Cereals	Rapeseed	Sugar beet	Potatoes	Legumes	Intensive cultures	Contents as abbreviation	Seed quantity kg/ha	Scattering ability	April	May	June	July	August	September	October	Legume proportion, seeds %	Legume proportion, weight %	Greening	Page
Soil fertility blends	INTENSIVE	Healthy blend	+	+	+	++	++	+	++	HS, OR	40-50	–								0	0	G	39
	POTATO	Boosts potatoes	+	+	+	+	++			LUB, OR, HS, LN, WIS	50-60	–								24	64	G	40
	MULCH	Frost-sensitive blend without clover	++	+	+	++	+	+	+	HS, OR	40-50	–								0	0	G	40
	RÜBE	Professional against nematodes	+	+		++		+		OR, SF	20-25	+								0	0	G	41
	RÜBENGARE	The versatile beet blend	+	+		++				PHA, AKL, HS, SF, WIS, EF	30	–								24	66	G	41
	TRIO	Frost-sensitive blend with clover	+	+	+	++				PHA, AKL, OR,	18	–								24	66.5	G	42
	MAIZE	Fast-growing blend without legumes	++	+				+		LN, PHA, OR, HS, SOL	20	–								0	0	G	42
	MAIS STRUKTUR	Loosens stressed soil	++	+						RAS, HS, PHA, SOL, WIS, OR, IKL, RUW, PKL, LUB, HI, WKL	30	–								41	48	G	43
	SCHNELLGRÜN	Suitable for late sowing, with clover	++	+						SF, AKL, LND, SFB	15	+								24	17	G	43
	SCHNELLGRÜN LEGUMINOSENFREI	Suitable for late sowing, without clover	++	+				++		SF, LN, LND, SFB	15	+								0	0	G	44
	UNIVERSAL	Crucifer-free and drought-tolerant	+	+	++	+				HS, PKL, AKL, PHA	25	–								24	7	G	44
	UNIVERSAL LEGUMINOSENFREI	Crucifer-free and drought-tolerant	+	+	++	+		++		HS, PHA, LN	25	–								0	0	G	45
	UNIVERSAL N-PLUS NEW	Crucifer-free and nitro-gen-fixing	+	+	++	+				PHA, HS, AKL, WIS, EF	40	–								34	66	G	45
	UNIVERSAL WINTER	Crucifer-free and evergreen	++	+	++	+		+		WV, PHA, HS	25-45	–								0	0	G	46
	BODENGARE	A powerhouse for main crops	++	++	++	+				PKL, PHA, AKL, WIS, EF, HI, BA, LUB, SOL	50	–								72	93	G	46
	RAPS	Frost-sensitive blend without crucifers	+	++	++	+				PHA, LN, AKL, PKL	15	–								24	16	G	47
	WASSERSCHUTZ	For effective groundwater protection	++	++				+	+	RAW, WUR, KOF	10-12	+								0	0	G	47

SortenGreening®

viterra® special blends

	Blend	Special feature	Suitable for crop rotation with: Maize	Cereals	Rapeseed	Sugar beet	Potatoes	Legumes	Intensive cultures	Contents as abbreviation	Seed quantity kg/ha	Scattering ability	April	May	June	July	August	September	October	Legume proportion, seeds %	Legume proportion, weight %	Greening	Page
SortenGreening®	DEFENDER + FLAX	for potato crop rotation	++	++	+	++	++	++	++	OR, LN	25-30	+								0	0	G	49
	SILETTA NOVA + FLAX	for potato crop rotation	++	++	+		++	++	+	OR, LN	25-30	+								0	0	G	49
	DEFENDER + COMMON VETCH NEW	for potato crop rotation	++	++	+	++	++		+	OR, WIS	65 - 80	–								44	79	G	49
	SILETTA NOVA + COMMON VETCH NEW	for potato crop rotation	++	++	+		++		+	OR, WIS	65 - 80	–								44	79	G	49
	AGRONOM + COMMON VETCH NEW	for potato crop rotation	++	++	+	++	++		+	OR, WIS	65 - 80	–								44	76	G	49
	AMIGO + FLAX	for sugar beet crop rotation	++	++	+	++		++	+	OR, LN	25-30	+								0	0	G	49
	COMPASS + FLAX	for sugar beet crop rotation	++	++	+	++		++	+	OR, LN	25-30	+								0	0	G	49
	VERDI + EGYPTIAN CLOVER	for sugar beet crop rotation	++	++		++				SF, AKL	20	+								44	29	G	49
	PRATEX + PHACELIA	Blend without crucifers	++	+	++	+		++	++	HS, PHA	25	–								0	0	G	49
	ANGELIA + EGYPTIAN CLOVER	Blend without crucifers	++	++	++	+				PHA, AKL	15-20	–								44	56	G	49
Special blends	BIENE	Annual bee/honey fallow without crucifers	++	+	++	+				PHA, PKL, AKL, WIS, EF, RBL,LUB, SOL, SD, LUZ, DIL	25	–								70	82.5	G	62
	BIENE PLUS NEW	Annual flowering blend for colourful flowers	+	+	+	+				PHA, PKL, WIS, EF, RBL, LUB, SOL, SD, IKL, AKL, LUZ, DIL, MO, KBL	25	–								42	84.5	G	63
	MULTIKULTI	Annual bee and honey blend	++	+		++				PHA,PKL, AKL, LN, SF, IKL, SD, OR, WIS, LUB, SOL, BOR	25	–								41	59	G	63
	HORRIDO	Biennial gameland pasture blend	+	+						BW, HS, SD, WIW, AKL PKL, SOL, LN, OR, RKL, PHA, RAW, WR, KOF, BW, MAL, RAW, WSR, LUZ	25-30	–								54	20		64
	HOCHWILD	Biennial game pasture blend without crucifers	++	++	++					AKL, RKL, IKL, EF, WD, MKL, LUB, LUZ	25	–								100	100	G	64
	BLÜHZAUBER	The flowering meadow	Not recommended for arable farming							Over 40 flowering varieties	5-7g/m²	–								-	-		65

All information without guarantee. Changes reserved. As of May 2021

V-Max® biomass blends

	Blend	Special feature	Suitable for crop rotation with: Maize	Cereals	Rapeseed	Sugar beet	Potatoes	Legumes	Intensive cultures	Contents as abbreviation	Seed quantity kg/ha	Sowing window: March	April	May	June	July	August	September	October	Legume proportion, seeds %	Legume proportion, weight %	Greening	Page
V-Max® biomass blends	GRANOPUR	WPS use before winter	++	++	+	+	++	+	+	TIS, RS, HS, HA	135 - 150									0	0		52
	GRANOLEG	WPS use before winter with legumes	++	++	+	+				TIS, RS, HA, EF, HS	135 - 150									<10	16		53
	WICKROGGEN	Winter-hardy WPS blend	++	+	+	+				RW, WIW	100									<20	9		53
	LUNDSGAADER GEMENGE	Winter-hardy fodder blend for greening	++	++	++	+				WV, IKL, WIW, EF	50									48	70	G	54
	FUTTER	Grass-clover blend for harvest after winter	++	++	+	+	+		+	WV, IKL	35-40									46	50	G	54
	SOMMERFUTTER	Forage blend for harvest in year of growing	++	++	++	+				WV, WEI, PKL	25-30									48	25	G	55
	SOMMERFUTTER A2	Grass blend for harvest in growing year	++	++	++	+		+		WV, WEI	40 - 45									0	0		55
	KLEEGRAS NEW	Clover blend for perennial cultivation	++	++	++	+				WV, WD, RKL, WKL, WB	35									50	29		56
	UNTERSAAT GRAS	For sustainable maize cultivation	++							WV, WD	10 - 15			Depending on main crop						0	0	(G)	56
	UNTERSAAT KLEE PLUS NEW	Clover undersowing for cereals	++	++	++	+				WD, WKL	15			Depending on main crop						29	10	(G)	57

Organic blends

	Blend	Special feature	Suitable for crop rotation with: Maize	Cereals	Rapeseed	Sugar beet	Potatoes	Legumes	Vegetables	Contents as abbreviation	Seed quantity kg/ha	Sowing window: June	July	August	September	October	Page
V-Max® Öko	LUNDSGAARDER GEMENGE ÖKO	Evergreen grasses and legumes for fodder	++	++	++	+				WV, IKL, WIW, EF	50						58
	WICKROGGEN ÖKO	Winter-hardy blend for fodder or green manure	++	+	+	+				RW, WIW	100 - 120						59
	WICKROGGEN FUTTER ÖKO	Winter-hardy blend for fodder or green manure	++	+	+	+				RW, WV, IKL, WIW	100 - 120						59
viterra® organic blends	INTENSIV ÖKO	Health blend	+	+	+	+	++	+	++	OR, HS	40 - 50						60
	BODENGARE ÖKO	Nitrogen supplier	++	+	++	+				LUB, WIS, AKL, EF, PHA, BA	60-70						60
	DEPOT ÖKO	Nutrient reservoir	++	++				++		OR, HS, PHA, SOL, SF	20						61
	SPRINT ÖKO	The quick starter	++	++				++		OR, RAS, PHA, BW, SF	15						61

AKL Egyptian clover, BOR borage, BW buckwheat, DIL dill, EF field pea / winter field pea, ESP sainfoin, HA oat, HI sorghum, HS black/bristle oat, IKL crimson clover, KBL cornflower, KOF marrow stem kale, LN flax, LUB blue lupin, LND camelina, LUZ alfalfa, MAL malve, MKL Balansa clover, MO common poppy, OR oilseed radish, PHA phacelia, PKL Persian clover, RAW winter forage rape, RAS summer forage rape, RBL marigold, ROT red fescue, RS spring rye, RUW winter turnip rape, RW population winter rye, SD seradella, SFB brown mustard, SF white mustard, SOL sunflower, TIS spring triticale, WB hybrid ryegrass, WD German ryegrass, WEI annual ryegrass, WIS common vetch, WIW winter vetch, WKL white clover, WSR wild rye, WV Italian ryegrass

All information without guarantee. Changes reserved. As of June 2021

viterra® soil fertility blends

viterra® soil fertility blends contribute to humus formation and improve soil fertility. Blend partners with various root profiles allow deep soil penetration by the roots, offering protection from erosion. Nitrogen and other nutrients are fixed over winter and remain available in the top layers near the roots. Additional organic mass also encourages humus and soil life.

Our soil fertility blends can do more: Tailored to the subsequent crop, they are an important component in tackling diseases in the main crop. All of these features lead to an increase in the main crop's quality and yield.

All viterra® soil fertility blends fulfil greening requirements.

viterra® INTENSIV

ALSO AVAILABLE as an organic blend (see page 60)

The health blend

- Controls migratory root nematodes (pratylenchus) and reduces viral internal rust spot in potatoes with multi-resistant oilseed radish DEFENDER and bristle oat PRATEX
- Fast-growing with intensive weed suppression
- Plenty of organic matter vitalises soil life
- The fibrous roots of PRATEX and taproots of DEFENDER complement each other in root penetration of the entire soil
- In trials, water protection advisors were won over by **viterra® INTENSIV** and its very low N_{min} content in late autumn

RECOMMENDATION	SUITABLE FOR CROP ROTATION WITH						
	Maize	Cereals	Rapeseed	Sugar beet	Potatoes	Legumes	Intensive cultures
INTENSIVE	XX	X	X	XX	XX	X	XX
Seed proportions	56 % bristle oat PRATEX, 44 % multi-resistant oilseed radish DEFENDER						
Sowing	Mid July to early September						
Sowing density	40 - 50 kg/ha						
Legume proportion according to DüV: 0 seed % / 0 weight %							

The weight and seed proportions of the individual components may vary slightly due to different TKWs. If unavailable, varieties may be replaced by varieties of equal value.
Suitable for fulfilling AUM requirements.

viterra® POTATO

The boost for potatoes

- Substantial blend to improve soil and enrich humus in potato and sugar beet crop rotations
- **Red zones**: also suitable for sites with low nitrogen availability
- Blue lupin ILDIGO and multi-resistant oilseed radish CONTROL penetrate large volumes of soil rapidly with their deep roots, improving the structure of the soil
- Oilseed radish CONTROL and bristle oat PRATEX have rapid initial development and offer soil protection as well as tilth
- Excellent erosion protection, not winter-hardy

Optimised 2021 blend

RECOMMENDATION	SUITABLE FOR CROP ROTATION WITH						
	Maize	Cereals	Rapeseed	Sugar beet	Potatoes	Legumes	Intensive cultures
POTATO	✗	✗	✗	✗	✗✗		
Seed proportions	43% oilseed radish CONTROL, 18% bristle oat PRATEX, 15% flax JULIET, 19% common vetch, 5% blue lupin ILDIGO						
Sowing	Mid July to mid August						
Sowing density	50 - 60 kg/ha						
Legume proportion according to DüV: 24 seed % / 64 weight %							

viterra® MULCH

The frost-sensitive blend without clover

- Blend with oilseed radish COMPASS, which freezes off easily, and frost-sensitive bristle oat PRATEX
- Especially recommended for direct and mulch sowing, especially before maize and sugar beets
- The root channels allow rapid deep root formation in maize
- Activates soil life, loosens and aerates soil for the following crop
- **viterra® MULCH** binds nitrogen over winter and protects it from displacement
- Bristle oat promotes mycorrhizal fungi to stabilise soil structure

RECOMMENDATION	SUITABLE FOR CROP ROTATION WITH						
	Maize	Cereals	Rapeseed	Sugar beet	Potatoes	Legumes	Intensive cultures
MULCH	✗✗	✗	✗	✗✗	✗	✗	✗
Seed proportions	56 % bristle oat PRATEX, 44% nematode-resistant oilseed radish COMPASS						
Sowing	Mid July to early September						
Sowing density	40 - 50 kg/ha						
Legume proportion according to DüV: 0 seed % / 0 weight %							

The weight and seed proportions of the individual components may vary slightly due to different TKWs. If unavailable, varieties may be replaced by varieties of equal value.
Suitable for fulfilling AUM requirements.

viterra® RÜBE

Professional against nematodes

- High-performance blend of two nematode-resistant oilseed radishes (AMIGO and COMPASS) and white mustards (VERDI and MASTER).
- Sufficient plant density of more than 160 plants/m² allows active nematode control at the highest level
- Better growing security and better pest control thanks to complementary varieties and dense roots
- **viterra® RÜBE** is suited to mid-early to late sowing and suitable for any site conditions
- Oilseed radish roots penetrate deep into the lower layers of soil to reduce nematodes even deep down

RECOMMENDATION	SUITABLE FOR CROP ROTATION WITH						
	Maize	Cereals	Rapeseed	Sugar beet	Potatoes	Legumes	Intensive cultures
RÜBE	✗	✗		✗✗		✗	
Seed proportions	30% nematode-resistant oilseed radish COMPASS, 26% nematode-resistant oilseed radish AMIGO, 24% nematode-resistant white mustard VERDI, 20% nematode-resistant white mustard MASTER						
Sowing	Mid July to early September						
Sowing density	20 - 25 kg/ha, can be scattered						
Legume proportion according to DüV: 0 seed % / 0 weight %							

viterra® RÜBENGARE

The versatile beet blend

- No multiplication of beet cyst nematodes
- **Red zones**: also suitable for sites with low nitrogen availability
- Intensive root penetration of the upper soil through complementary root shapes of deep, flat and cordate rooting plants
- Provides easily digestible organic material to activate and strengthen soil life
- Reliably freezes off so that dead plant matter protects soil from wind and water erosion over winter
- Creates optimal conditions for sugar beet mulch seeding

Optimised 2021 blend

RECOMMENDATION	SUITABLE FOR CROP ROTATION WITH						
	Maize	Cereals	Rapeseed	Sugar beet	Potatoes	Legumes	Intensive cultures
RÜBENGARE	✗	✗		✗✗			
Seed proportions	51% phacelia ANGELIA, 14% Egyptian clover OTTO, 13% bristle oat PRATEX, 12% white mustard VERDI, 8% common vetch, 2% summer field pea RUBIN						
Sowing	July to late August						
Sowing density	30 kg/ha						
Legume proportion according to DüV: 24 seed % / 66 weight %							

The weight and seed proportions of the individual components may vary slightly due to different TKWs. If unavailable, varieties may be replaced by varieties of equal value.
Suitable for fulfilling AUM requirements.

viterra® TRIO

The frost-sensitive blend with clover

- **viterra® TRIO** including oilseed radish COMPASS, Egyptian clover and phacelia ANGELIA for easy freezing off
- Beet cyst nematodes cannot multiply due to resistant oilseed radish COMPASS and neutral plants
- Fast initial development and dense penetration of soil with thick and thin roots
- Bees and insects use the late phacelia flowers
- Delicate mulch base offers good erosion protection until spring sowing

RECOMMENDATION	SUITABLE FOR CROP ROTATION WITH						
	Maize	Cereals	Rapeseed	Sugar beet	Potatoes	Legumes	Intensive cultures
TRIO	✗	✗	✗	✗✗			
Seed proportions	52% phacelia ANGELIA, 24% Egyptian clover, 24% nematode-resistant oilseed radish COMPASS						
Sowing	Early-mid July to late August						
Sowing density	18 kg/ha						
Legume proportion according to DüV: 24 seed % / 66.5 weight %							

viterra® MAIS

Fast-growing blend without legumes

- Fast ground cover with vigorously growing components
- Good processor of slurry and other nutrients, excellent erosion and water protection
- Combination of deep and flat roots for thorough root penetration and stabilisation of soil structure
- The root channels allow rapid deep root formation in maize
- Soil loosening and aeration for optimal maize crops
- Bristle oat promotes mycorrhizal fungi to stabilise soil structure
- Improves image thanks to sunflowers and phacelia flowers

RECOMMENDATION	SUITABLE FOR CROP ROTATION WITH						
	Maize	Cereals	Rapeseed	Sugar beet	Potatoes	Legumes	Intensive cultures
MAIS	✗✗	✗				✗	
Seed proportions	35% oilseed radish SILETINA, 31% phacelia ANGELIA, 18% bristle oat PRATEX, 16% flax JULIET, <1% sunflower						
Sowing	Mid July to late August						
Sowing density	20 kg/ha						
Legume proportion according to DüV: 0 seed % / 0 weight %							

The weight and seed proportions of the individual components may vary slightly due to different TKWs. If unavailable, varieties may be replaced by varieties of equal value.
Suitable for fulfilling AUM requirements.

viterra® MAIS STRUKTUR

Loosens stressed soil

- The combination of winter-hardy components and varieties that freeze off fixes nutrients and protects the soil into spring.
- The tapestry of wide and deep roots, along with the enormous taproots of the STINGER daikon radish, leaves looser soil with increased infiltration
- **Red zones**: also suitable for sites with low nitrogen availability
- Common vetch, lupin and clover are high-quality legumes that will provide subsequent crops with new nitrogen
- The diversity of chosen varieties reinvigorates the soil and encourages the development of organic substances
- With 40% winter-hardy components

Optimised 2021 blend

RECOMMENDATION	SUITABLE FOR CROP ROTATION WITH						
	Maize	Cereals	Rapeseed	Sugar beet	Potatoes	Legumes	Intensive cultures
MAIS STRUKTUR	XX	X					
Seed proportions	20% phacelia ANGELIA, 19% Persian clover FELIX, 14% winter turnip rape JUPITER, 13% white clover, 11% crimson clover, 10% bristle oat PRATEX, 4% daikon radish STINGER, 3% summer forage rape JUMBO, 3% common vetch 2% sorghum, 1% blue lupin ILDIGO, 1% sunflower PEREDOVICK						
Sowing	Mid July to late August						
Sowing density	30 kg/ha						
Legume proportion according to DüV: 100 seed % / 0 weight % 41 %							

viterra® SCHNELLGRÜN

Suitable for late sowing, with clover

- Fast greening thanks to especially fast-growing components: ALBATROS white mustard and ENERGY brown mustard make for excellent tolerance to late sowing
- Brown mustard contains valuable glucosinolates, which break down into isothiocyanates to tackle soil-borne diseases
- Non-hardy varieties make mulch sowing the following crop much easier in spring
- Ideal before maize and also suitable as a cover crop after early maize harvests
- Low demands on the seedbed and scatter capability make for cheap and easy sowing

RECOMMENDATION	SUITABLE FOR CROP ROTATION WITH						
	Maize	Cereals	Rapeseed	Sugar beet	Potatoes	Legumes	Intensive cultures
SCHNELLGRÜN	XX	X					
Seed proportions	43% white mustard ALBATROS, 24% Egyptian clover, 18% camelina, 15% brown mustard ENERGY						
Sowing	Early August to mid-late September						
Sowing density	15 kg/ha, can be scattered						
Legume proportion according to DüV: 24 seed % / 17 weight %							

The weight and seed proportions of the individual components may vary slightly due to different TKWs. If unavailable, varieties may be replaced by varieties of equal value.
Suitable for fulfilling AUM requirements.

viterra® SCHNELLGRÜN LEGUMINOSENFREI

Suitable for late sowing, without clover

- Fast greening thanks to especially fast-growing components
- Good convertor of slurry and other nutrients
- ALBATROS white mustard and ENERGY brown mustard make for excellent tolerance to late sowing
- Brown mustard contains valuable glucosinolates, which break down into isothiocyanates to tackle soil-borne diseases
- Non-hardy varieties make mulch sowing the following crop much easier in spring
- Ideal before maize and also suitable as a cover crop after early maize harvests
- Low demands on the seedbed and scatter capability make for cheap and easy sowing

RECOMMENDATION	SUITABLE FOR CROP ROTATION WITH						
	Maize	Cereals	Rapeseed	Sugar beet	Potatoes	Legumes	Intensive cultures
SCHNELLGRÜN LEGUMINOSENFREI	XX	X				X	
Seed proportions	39% white mustard ALBATROS, 21% flax, 21% cameline, 19% brown mustard ENERGY						
Sowing	Early August to mid-late September						
Sowing density	15 kg/ha, can be scattered						
Legume proportion according to DüV: 0 seed % / 0 weight %							

viterra® UNIVERSAL

Crucifer-free and drought-tolerant

- Can easily be added to rapeseed crop rotations, disrupts disease cycles
- Thanks to drought-tolerant components, suitable for universal use
- Quick shade retains tilth and ensures good weed suppression
- **viterra® UNIVERSAL** is offered as **viterra® UNIVERSAL LEGUMINOSENFREI** and **viterra® UNIVERSAL N-PLUS** without legumes / with coarse legumes
- Phacelia and clover flowers attract countless insects

Optimised 2021 blend

RECOMMENDATION	SUITABLE FOR CROP ROTATION WITH						
	Maize	Cereals	Rapeseed	Sugar beet	Potatoes	Legumes	Intensive cultures
UNIVERSAL	X	X	XX	X			
Seed proportions	49% phacelia ANGELIA, 27% bristle oat PRATEX, 12% Egyptian clover, 12% Persian clover FELIX						
Sowing	Early July to early September						
Sowing density	25 kg/ha						
Legume proportion according to DüV: 24 seed % / 7 weight %							

The weight and seed proportions of the individual components may vary slightly due to different TKWs. If unavailable, varieties may be replaced by varieties of equal value.
Suitable for fulfilling AUM requirements.

viterra® UNIVERSAL LEGUMINOSENFREI

Crucifer-free and drought-tolerant

- Can easily be added to legume crop rotations, disrupts disease cycles
- Good convertor of slurry and other nutrients
- Binds nitrogen left in the soil and other nutrients in zones around the roots
- Thanks to drought-tolerant components, suitable for universal use
- Quick shade retains tilth and ensures good weed suppression
- **viterra® UNIVERSAL LEGUMINOSENFREI** is also available with clover as **viterra® UNIVERSAL**

RECOMMENDATION	SUITABLE FOR CROP ROTATION WITH						
	Maize	Cereals	Rapeseed	Sugar beet	Potatoes	Legumes	Intensive cultures
UNIVERSAL LEGUMINOSENFREI	✗	✗	✗✗	✗		✗✗	
Seed proportions	45% phacelia ANGELIA, 29% bristle oat PRATEX, 26% flax ZOLTAN						
Sowing	Early July to early September						
Sowing density	25 kg/ha						
Legume proportion according to DüV: 0 seed % / 0 weight %							

viterra® UNIVERSAL N-PLUS NEW

Crucifer-free and nitrogen-fixing

- Can easily be added to rapeseed crop rotations, disrupts disease cycles
- **Red zones**: also suitable for sites with low nitrogen availability
- For locations with low nutrient availability
- Fixes nitrogen for the subsequent crop
- Drought-tolerant components
- **viterra® UNIVERSAL N-PLUS** is offered as **viterra® UNIVERSAL** and **viterra® UNIVERSAL LEGUMINOSENFREI** without legumes / with coarse legumes
- Phacelia and legume flowers feed bees and other insects

RECOMMENDATION	SUITABLE FOR CROP ROTATION WITH						
	Maize	Cereals	Rapeseed	Sugar beet	Potatoes	Legumes	Intensive cultures
UNIVERSAL N-PLUS	✗	✗	✗✗	✗			
Seed proportions	48% phacelia ANGELIA, 25% Egyptian clover OTTO, 19% bristle oat PRATEX, 6% common vetch, 3% summer field pea RUBIN						
Sowing	Early July to mid August						
Sowing density	40 kg/ha						
Legume proportion according to DüV: 34 seed % / 66 weight %							

The weight and seed proportions of the individual components may vary slightly due to different TKWs. If unavailable, varieties may be replaced by varieties of equal value.
Suitable for fulfilling AUM requirements.

viterra® UNIVERSAL WINTER

Crucifer-free and evergreen

- As an evergreen cover crop with the option of using as your own initial spring fertiliser
- Free from crucifers so can easily be used in oilseed rape crop rotations
- Various blend partners allow a broad spectrum of use
- Evergreen ryegrass increases erosion protection and stabilises soil structure up to the subsequent crop
- Binds nitrogen remaining in the soil and protects groundwater

RECOMMENDATION	SUITABLE FOR CROP ROTATION WITH						
	Maize	Cereals	Rapeseed	Sugar beet	Potatoes	Legumes	Intensive cultures
UNIVERSAL WINTER	XX	X	XX	X		X	
Seed proportions	46% Italian ryegrass, 44% phacelia ANGELIA, 10% bristle oat PRATEX						
Sowing	Early July to mid September						
Sowing density	25 - 45 kg/ha						
Legume proportion according to DüV: 0 seed % / 0 weight %							

viterra® BODENGARE

A powerhouse for main crops

- Promotes soil structure, revegetation and crumb formation to improve soil fertility
- **Red zones**: also suitable for sites with low nitrogen availability
- After early preceding crop (e.g. WPS) as a summer cover crop for soil regeneration, free from grasses
- Existing tilth encourages aeration and water flow, preventing capping
- Enriches plant life and habitats for many insects and beneficial organisms
- Crucifer-free, especially suitable for oilseed rape crop rotation
- Contains structure-generating broad bean AVALON with especially fine seeds

ALSO AVAILABLE AS AN ORGANIC BLEND (see page 60)

Optimised 2021 blend

RECOMMENDATION	SUITABLE FOR CROP ROTATION WITH						
	Maize	Cereals	Rapeseed	Sugar beet	Potatoes	Legumes	Intensive cultures
BODENGARE	XX	XX	XX	X			
Seed proportions	38% Persian clover FELIX, 26% phacelia ANGELIA, 25% Egyptian clover OTTO, 5% common vetch, 2% summer field pea RUBIN, 2% sorghum, 2% blue lupin ILDIGO, 1% broad bean AVALON, 1% sunflower PEREDOVICK						
Sowing	Early June to mid August						
Sowing density	50 kg/ha						
Legume proportion according to DüV: 72 seed % / 93 weight %							

The weight and seed proportions of the individual components may vary slightly due to different TKWs. If unavailable, varieties may be replaced by varieties of equal value.
Suitable for fulfilling AUM requirements.

viterra® RAPS

Frost-sensitive blend without crucifers

- Crucifer-free blend of phacelia ANGELIA, oil flax JULIET, Persian and Egyptian clover
- Undemanding blend, no relation to main cultures
- Ideal for cereal and rapeseed crop rotations, as changing the crop type disrupts disease cycles
- Undemanding and drought-tolerant blend
- Dense root penetration improves the soil's structure and encourages air exchange in the soil
- Phacelia and flax flowers offer nectar for bees and other insects
- Components that reliably freeze off allow easy sowing of the subsequent culture

Optimised 2021 blend

RECOMMENDATION	SUITABLE FOR CROP ROTATION WITH						
	Maize	Cereals	Rapeseed	Sugar beet	Potatoes	Legumes	Intensive cultures
RAPS	✗	✗✗	✗✗	✗			
Seed proportions	53% phacelia ANGELIA, 23 % oil flax ZOLTAN, 15.5% Persian clover FELIX, 8.5% Egyptian clover OTTO						
Sowing	Early July to late August						
Sowing density	15 kg/ha						
Legume proportion according to DüV: 24 seed % / 16 weight %							

viterra® WASSERSCHUTZ

For effective groundwater protection

- High nitrogen absorption capacity and good nutrient storage potential in the winter-hardy varieties
- Winter forage rape EMERALD and winter turnip rape JUPITER quickly root into deep soil layers and absorb freely available nutrients
- These nutrients are released at the following maize's main growth time from June
- Marrow stem kale variety ANGLIAN GOLD is winter-hardy and makes the blend an attractive source of nutrition for game as an especially tasty variety
- Suitable for AUM AL 2.2: 'Cultivation of winter-hardy cover crops' in Lower Saxony

RECOMMENDATION	SUITABLE FOR CROP ROTATION WITH						
	Maize	Cereals	Rapeseed	Sugar beet	Potatoes	Legumes	Intensive cultures
WASSERSCHUTZ	✗✗	✗✗				✗	✗
Seed proportions	43% winter forage rape EMERALD, 39% winter turnip rape JUPITER, 18% marrow stem kale ANGLIAN GOLD						
Sowing	Mid July to late September						
Sowing density	10 - 12 kg/ha, can be scattered						
Legume proportion according to DüV: 0 seed % / 0 weight %							

The weight and seed proportions of the individual components may vary slightly due to different TKWs. If unavailable, varieties may be replaced by varieties of equal value.
Suitable for fulfilling AUM requirements.

SortenGreening®

SortenGreening® allows the use of tried-and-tested quality varieties on ecological compensation land or in red zones where autumn fertilisation is no longer permitted. In locations with plenty of nitrogen availability, a main variety is combined with one small-seeded blend partner, e.g. flax. In locations with too little nitrogen supply, certain oilseed radish varieties can be encouraged to grow in combination with common vetch.

Therefore, SortenGreening® offers solutions for target-orientated farmers to get the most out of top varieties despite greening and fertiliser bans.

Subsequent crop	Main component (Seed proportion 56%)		Blend partners (Seed proportion 44%)	Sowing density	Can be scattered	Sowing windows	Legume content seed %	Legume content weight %
POTATOES	Multi-resistant OILSEED RADISH	DEFENDER	Flax	25 – 30 kg/ha	+	Late July to early September	0%	0%
	OILSEED RADISH	SILETTA NOVA	Flax	25 – 30 kg/ha	+	Late July to late August	0%	0%
	Multi-resistant OILSEED RADISH	DEFENDER	Common vetch NEW	65 - 80 kg/ha	–	Early August to late August	44%	79%
	OILSEED RADISH	SILETTA NOVA	Common vetch NEW	65 - 80 kg/ha	–	Early August to late August	44%	79%
	Nematode-resistant OILSEED RADISH	AGRONOM	Common vetch NEW	65 - 80 kg/ha	–	Early August to early September	44%	76%
SUGAR BEET	Nematode-resistant OILSEED RADISH	AMIGO	Flax	25 – 30 kg/ha	+	Late July to early September	0%	0%
	Nematode-resistant OILSEED RADISH	COMPASS	Flax	25 – 30 kg/ha	+	Late July to late August	0%	0%
	Nematode-resistant WHITE MUSTARD	VERDI	Berseem clover	20 kg/ha	+	Early August to mid September	44%	29%
CRUCIFER-FREE	BRISTLE OAT	PRATEX	Phacelia	25 kg/ha	–	Early August to late August	0%	0%
	PHACELIA	ANGELIA	Berseem clover	12 kg/ha	–	Early August to late August	44%	0%

Blend partners

Berseem clover: The white mustard varieties in two-component blends are complemented by small-grained Egyptian clover, which freezes off.

Phacelia is an easygoing cover crop used in rapeseed and cereal crop rotations, and can release organically bound phosphorous to make it available to plants.

Oil flax: Flax is used in blends with oilseed radish. Its growth is narrow, it has deep taproots and it requires relatively little water and nutrients. It's especially suitable for SortenGreening® as it is very neutral regarding the subsequent crop. This makes it an ideal greening partner for potato and sugar beet rotations.

Common vetch is the solution for sites that cannot be fertilised yet have a low nitrogen supply. Oilseed radish is a considerably more voracious grower when grown in symbiosis with common vetch. Despite a lack of nutrients, this approach provides reliable ground cover and weed suppression. The subsequent crop also benefits from additional nitrogen. Common vetch is less neutral than oil flax if the subsequent crop is potatoes but it is the best choice among the legumes.

Potato crop rotations

For sufficient nitrogen availability

Oilseed radish **DEFENDER** + flax

- Multi-resistant oilseed radish with neutral flax
- Reduces viral internal rust spot as well as other potato pests such as pratylenchus nematodes
- Also reduces beet nematodes
- Rapid initial development and good weed suppression

Oilseed radish **SILETTA NOVA** + flax

- TRV-reducing oilseed radish with neutral flax
- Low-growing and late-blooming
- Especially leafy

For low nitrogen availability

Oilseed radish **DEFENDER** + common vetch NEW

- Multiresistant oilseed radish with common vetch
- Top variety for potato farming
- Also reduces beet nematodes
- Rapid initial development and good weed suppression

Oilseed radish **SILETTA NOVA** + common vetch NEW

- TRV-reducing oilseed radish with common vetch
- Low-growing and late-blooming
- Especially leafy

Oilseed radish **AGRONOM** + common vetch NEW

- TRV-reducing oilseed radish with common vetch
- Also reduces beet nematodes
- Reliable ground cover, shade, weed suppression thanks to fastest initial development

Sugar beet crop rotations

Oilseed radish **AMIGO** + flax

- Highest resistance for active nematode control
- Rapid ground shade, deep and intense rooting

Oilseed radish **COMPASS** + flax

- More frost-sensitive than standard varieties
- Ideal for mulching and direct sowing

White mustard **VERDI** + Berseem clover

- High resistance to beet cyst nematodes (H1 in France - highest resistance class)
- Easy to sow and rapid ground cover
- Freezes off reliably

Crucifer crop rotations

Bristle oat **PRATEX** + phacelia

- Ideal for oilseed rape crop rotation
- Drought-tolerant
- Good erosion protection, freezes off over winter

Phacelia **ANGELIA** + Berseem clover

- ANGELIA is a high-yielding honey plant and can be used to fill the summer gap
- Leaves an easy-to-work and dark fine-stemmed mulch layer in spring that promotes soil warming

The weight and seed proportions of the individual components may vary slightly due to different TKWs. If unavailable, varieties may be replaced by varieties of equal value.
Suitable for fulfilling AUM requirements.

Benefit in red zones

Sorten greening®

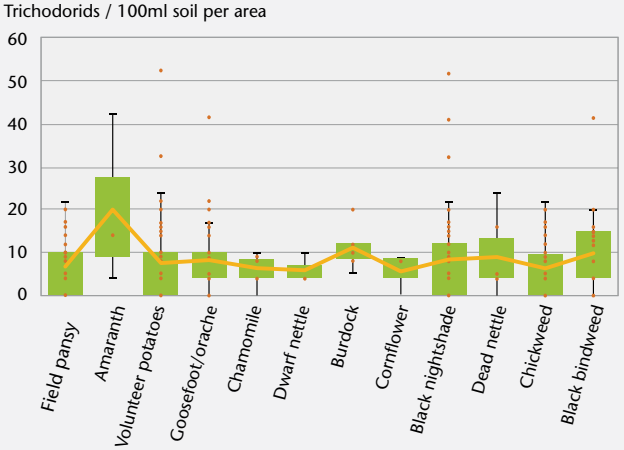
Oilseed radish DEFENDER + vetch
Oilseed radish AGRONOM + vetch
Oilseed radish SILETTA NOVA + vetch

Adding common vetch into a blend helps oilseed radish to retain sufficient nutrients for vegetation even if nitrogen supplies are low when used as a cover crop. The oilseed radish is consistently supplied by the common vetch, and the combination covers the ground during the entire vegetation phase, suppressing unwanted plants that could serve as hosts for plant diseases. The plants also intensively root through the soil, encouraging tilth.

Up to now, the old lay opinion was always that the nitrogen is bound by the legumes and only released into the soil upon their death. New technologies (marked N) have now been used to prove that the nitrogen is directly transferred from the legumes to the non-legumes.

The continuous supply of nitrogen to the oilseed radish lets them grow constantly without stress, so they are unable to build up stress tolerance and will freeze off more easily when winter temperatures hit.

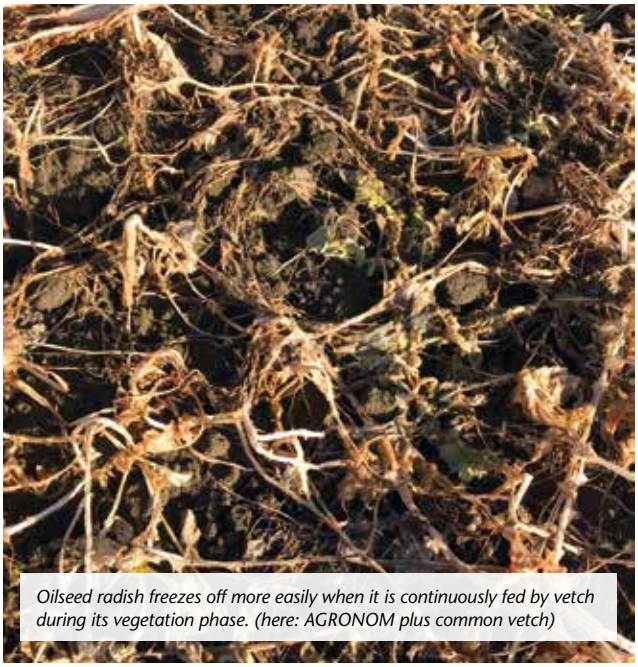
Overview 1
Trichodorids dependent on type of weed



Δ In the middle, the most trichodorids appeared in areas with amaranth and burdock.

Source: LWK North Rhine-Westphalia / processed by top agrar

Oilseed radish and vetches complement each other during vegetation (here: DEFENDER plus common vetch)



Oilseed radish freezes off more easily when it is continuously fed by vetch during its vegetation phase. (here: AGRONOM plus common vetch)

Variety information

Varieties:

AGRONOM, **DEFENDER** and **SILETTA NOVA** are special varieties that are proven to reduce viral internal rust spot. This is a variety characteristic that is especially important when cultivating quality potatoes.

Viral internal rust spot is spread by trichodorid nematodes, and only certain oilseed radishes are able to tackle nematodes carrying the tobacco rattle virus.

Sowing density:

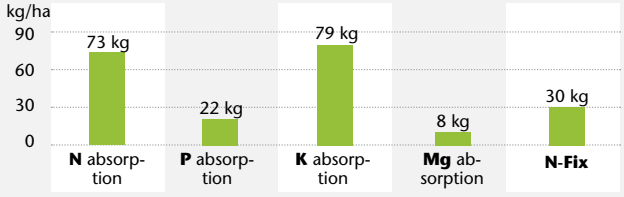
To achieve optimal impact through optimal rooting, around 160 oilseed radish plants should grow per square meter. Depending on the TKW and germination rate, you will need around 18 to 22 kg of oilseed radish.

If the mixture has to be supplemented for greening space, a partner with at least 40% seed content must be added. For common vetch, this is around 60kg. In total, this results in an optimal sowing density of around 80 kg/ha for oilseed radish with common vetch. Slightly reduced seed densities may be possible in optimal conditions.

Additional benefits:

The addition of common vetch not only encourages the growth of the oilseed radish, which is an absolute specialist when it comes to nitrogen conservation. Investigations have shown that new nutrients are also generated for the subsequent crop.

Main nutrient found in AGRONOM + common vetch
160 dt/ha FM/ha



Supposition: 60% allowability for subsequent crop

Price: 1.10 €/kg N (calcium ammonium nitrate)
103 kg N x 60 % x 1.10 € → 68 €/ha

Price: 0.5 €/kg K (60s potassium sulphate)
79 kg K x 60% x 0.5 € →24 €/ha

- **plus increased growth reliability**
- **plus less weed competition**
- **plus more soil fertility**
- **plus freezing off reliably**

Source for nutrient contents: Bayrisches Landesamt für Landwirtschaft
Nutrient contents of secondary crops and cover crops

Overview 2
Impact of cover crop species and varieties

Cover crop before potatoes	Trichodorids in the soil	TRV in the soil	Viral rust spot in potatoes	at 80 kg/ha N for CC[1]	no fertiliser for CC[1]
Fallow land	xx	xx	xxx	0	0
Oilseed radish 1 Toro	xx	xxx	x	xx	–
Oilseed radish 2 Black Jack	x	xxx	x	x	x
Oilseed radish 3 Defender	xx	xxxx	xxx	xxxx	xx
Oilseed radish 4 Farmer	xxx	xxxx	xx	xxx	xx
Oilseed radish 5 Valencia	xxx	xxx	xx	xx	xx
Oilseed radish 6 Tajuna	xx	xx	x	xx	x
Oilseed radish 7 Compass	xx	xxx	xx	x	xxx
Oilseed radish 8 Agronom	x	0	xx	xxx	0
Oilseed radish 9	only tested as an annual				
Oilseed radish 10 Angus	xx	x	xxx	xx	x
Oilseed radish 11	only tested as an annual				
Oilseed radish 12	only tested as an annual				
Bristle oat 1 Pratex	xx	xxx	xxx	xx	–
Bristle oat 2	0	xxx	xx	x	xx
Bristle oat 3	only tested as an annual				
Bristle oat 4	0	xxx	x	x	x
Bristle oat 5	only tested as an annual				
Bristle oat 6	only tested as an annual				
Flax Juliet	xxx	xx	xx	xx	x
Blue lupin Karo	xx	xxx	xx	xx	x
Common vetch 1 Mery	xxxx	xxxx	x	xx	
Common vetch 2	only tested as an annual				
Common vetch 3	only tested as an annual				
Mustard[2] 1 Forum	xxx	xx	xx	xx	
Mustard[2] 2 Master	only tested as an annual				
Clover [3] 1 Axi	xxx	xx	xx	–	– –
Clover [3] 2 Alex	xx	0	0	xx	
Niger	xx	xx	x	xx	–
Phacelia Angelia	only tested as an annual				

Evaluation					
Final infestation comparison (Spring) at initial infestation (autumn), effectiveness in %		Average for variant/year = 0%, effectiveness in %		Bare fallow = 100%, potato yields relative in %[4]	
xxxxx	81 - 100 %	xxxxx	81 - 100 %	xxxxx	121 - 125 %
xxxx	61 - 80 %	xxxx	61 - 80 %	xxxx	116 - 120 %
xxx	41 - 60 %	xxx	41 - 60 %	xxx	111 - 115 %
xx	21 - 40 %	xx	21 - 40 %	xx	106 – 110 %
x	1 - 20 %	x	1 - 20 %	x	101 - 105 %
0	0%	0	0%	0	100%

[1] CC = cover crop; [2] white mustard; [3] Egyptian clover;
[4] evaluation: – = 95 to 99 %, – – = 90 to 94 %
Source: LWK NRW; from Benker in top agrar 01/2021

You can find the latest order form for SortenGreening® blends in the download centre at www.saaten-union.de.

V-Max® overview

V-Max® blends are ideal for biomass production for biogas facilities or for cattle fodder. There's always the right blend to suit the purpose and subsequent crop. Summer cereal blends are suitable as secondary crops after early harvest grains. Winter-hardy blends, on the other hand, can provide biomass as a cover crop or main crop.

Blends with legumes are suitable for location with low N availability and increase the value of fodder as a valuable protein component. Pure cereal blends, however, are very well suited to potato crop rotations. Fodder gaps can be effectively closed with V-Max® grass blends. Nurse crops for subsequent maize and cereal crops are also included.

V-Max® KLEEGRAS for multiple main crop years is new to the range.

V-Max® GRANOPUR

WPS use before winter

- For biomass production after whole plant silage or an early cereal harvest with cutting before winter
- Increased cultivation reliability thanks to a balanced composition of various cereal components
- Soil tilth is maintained over summer
- **V-Max® GRANOPUR** is a cereal blend so very well suited to subsequent potato crops

RECOMMENDATION	SUITABLE FOR CROP ROTATION WITH						
	Maize	Cereals	Rapeseed	Sugar beet	Potatoes	Legumes	Intensive cultures
GRANOPUR	XX	XX	X	X	XX	X	X
Weight percentages	38 % spring triticale, 18 % spring rye OVID, 21% bristle oat PRATEX, 23 % oat APOLLON						
Sowing	Late March to late May or early July to early August						
Sowing density	135 - 150 kg/ha						
Harvest window	June/July when sown in spring, October/ November when sown in summer						
Harvest	From existing crop to kernel dough stage						
Legume proportion according to DüV: 100 seed % / 0 weight % 0 %							

The weight and seed proportions of the individual components may vary slightly due to different TKWs. If unavailable, varieties may be replaced by varieties of equal value.
Suitable for fulfilling AUM requirements.

V-Max® GRANOLEG

WPS use before winter with legumes

- For biomass production after whole plant silage or an early cereal harvest with cutting before winter
- **V-Max® GRANOLEG** contains summer field pea, which provides additional nitrogen for stressed soil and keeps crop greener for longer (optimised harvest window)
- Increased cultivation reliability thanks to a balanced composition of various cereal components
- Good shade promotes tilth and keeps soil life thriving

RECOMMENDATION	SUITABLE FOR CROP ROTATION WITH						
	Maize	Cereals	Rapeseed	Sugar beet	Potatoes	Legumes	Intensive cultures
GRANOLEG	XX	XX	X	X			
Weight percentages	30% spring triticale, 19% spring rye OVID, 24% summer oat APOLLON, 16% summer field pea RUBIN, 10% bristle oat PRATEX						
Sowing	Late March to late May or early July to early August						
Sowing density	135-150 kg/ha						
Harvest window	June/July when sown in spring, October/ November when sown in summer						
Harvest	From existing crop to kernel dough stage						
Legume proportion according to DüV: 100 seed % / 0 weight % : < 10%							

V-Max® WICKROGGEN

ALSO AVAILABLE AS AN ORGANIC BLEND (see page 59)

Winter-hardy WPS blend

- Winter-hardy biomass legume blend
- For high-yield WPS use with high protein and energy content
- 25 - 40 t/ha WPS FM-yields possible depending on location
- Winter-hardy vetch delivers additional nitrogen
- Excellent erosion protection
- Binds valuable nitrogen and converts it into climate-friendly biomass

RECOMMENDATION	SUITABLE FOR CROP ROTATION WITH						
	Maize	Cereals	Rapeseed	Sugar beet	Potatoes	Legumes	Intensive cultures
WICKROGGEN	XX	X	X	X			
Weight percentages	90 % winter rye MATADOR 10 % winter vetch						
Sowing	Mid September to mid October						
Sowing density	100-120 kg/ha						
Harvest window	Dough stage, mid to late June						
Harvest	From standing crop, side knives recommended						
Legume proportion according to DüV: 100 seed % / 0 weight % : < 20%							

The weight and seed proportions of the individual components may vary slightly due to different TKWs. If unavailable, varieties may be replaced by varieties of equal value.
Suitable for fulfilling AUM requirements.

V-Max® LUNDSGAARDER GEMENGE

ALSO AVAILABLE AS AN ORGANIC BLEND (see page 58)

Winter-hardy fodder blend for greening

- Suitable for producing fodder of exceptional quality
- Suitable as a winter cover crop for green manuring and soil improvement
- Balanced combination of nitrogen collectors and consumers has a positive impact on plant growth and soil life
- Italian ryegrass uses growth phases over winter, while winter vetch and winter field pea are valuable protein components in fodder
- High agricultural value thanks to large array of flowers
- Excellent for undersowing with maize at reduced seed concentration (15 - 20 kg/ha)

RECOMMENDATION	SUITABLE FOR CROP ROTATION WITH						
	Maize	Cereals	Rapeseed	Sugar beet	Potatoes	Legumes	Intensive cultures
LUNDSGAARDER GEMENGE	XX	XX	XX	X			
Seed proportions	52 % Italian ryegrass, 43 % crimson clover, 4 % winter vetch, 1 % field pea NS PIONIR						
Sowing	Late August to mid September or in spring as an undersown crop with maize						
Sowing density	50 kg/ha						
Harvest window	April to early May						
Harvest	As green fodder with silage trailer, for silage use with silage trailer or harvester after pre-wilting phase						
Legume proportion according to DüV: 100 seed % / 0 weight % 48%							

V-Max® FUTTER

Grass clover blend for harvest after winter

- Stable yield for fodder and biogas
- Suitable for dual-culture use systems in combination with maize or millet
- Nutrient uptake before the winter pause and in early spring prevents loss
- Organic substances from roots and stubble improve humus balance and ensure good pre-crop value
- Not recommended for dry sites and soils with low water storage capacity

RECOMMENDATION	SUITABLE FOR CROP ROTATION WITH						
	Maize	Cereals	Rapeseed	Sugar beet	Potatoes	Legumes	Intensive cultures
FUTTER	XX	XX	X	X	X		X
Seed proportions	54 % Italian ryegrass, 46 % crimson clover						
Sowing	Mid to late September as a winter cover crop, late July to early August as a summer cover crop						
Sowing density	35 - 40 kg/ha						
Harvest window	April to early May, can be cut before winter if sown early						
Harvest	As green fodder with silage trailer, for silage use with silage trailer or harvester after pre-wilting phase						
Legume proportion according to DüV: 100 seed % / 0 weight % 46 %							

The weight and seed proportions of the individual components may vary slightly due to different TKWs. If unavailable, varieties may be replaced by varieties of equal value.
Suitable for fulfilling AUM requirements.

V-Max® SOMMERFUTTER

Feed mix, can be used in growing year

- Provides additional quality fodder when used as a summer cover crop
- Annual ryegrass provides sufficient structure, the Persian clover provides a high protein content
- The vigorous Italian ryegrass allows winter greening after the harvest
- High preceding crop value thanks to good root penetration and tilth
- This blend is also available without Persian clover as **V-Max® SOMMERFUTTER A2**

* Only greening-compatible when used in sowing year with exceptional approval from the Chamber of Agriculture

RECOMMENDATION	SUITABLE FOR CROP ROTATION WITH						
	Maize	Cereals	Rapeseed	Sugar beet	Potatoes	Legumes	Intensive cultures
SOMMERFUTTER	XX	XX	XX	X			
Seed proportions	23 % Italian ryegrass (tetraploid), 29 % annual ryegrass (diploid/tetraploid), 48 % Persian clover FELIX						
Sowing	Late June to late July (for greening, up to late Aug)						
Sowing density	25 - 30 kg/ha						
Harvest window	October						
Harvest	As green fodder with silage trailer, for silage use with silage trailer or harvester after pre-wilting phase						
Legume proportion according to DüV: 100 seed % / 0 weight % 48 %							

V-Max® SOMMERFUTTER A2

Grass blend for harvest in growing year

- Composition as recommended quality standard blend A2
- Provides additional high-quality fodder when used as a summer cover crop
- Combination of annual and Italian ryegrass delivers well-structured fodder for ruminants
- The vigorous Italian ryegrass allows winter greening after the harvest
- High preceding crop value thanks to good root penetration and soil tilth
- This blend is also available with Persian clover as **V-Max® SOMMERFUTTER**

RECOMMENDATION	SUITABLE FOR CROP ROTATION WITH						
	Maize	Cereals	Rapeseed	Sugar beet	Potatoes	Legumes	Intensive cultures
SOMMERFUTTER A2	XX	XX	XX	X		X	
Weight percentages	67% Italian ryegrass (tetraploid), 33% annual ryegrass (diploid/tetraploid)						
Sowing	Late June to late July (for greening, up to late August)						
Sowing density	40-45 kg/ha						
Harvest window	October						
Harvest	As green fodder with silage trailer, for silage use with silage trailer or harvester after pre-wilting phase						
Legume proportion according to DüV: 100 seed % / 0 weight % 0 %							

The weight and seed proportions of the individual components may vary slightly due to different TKWs. If unavailable, varieties may be replaced by varieties of equal value.
Suitable for fulfilling AUM requirements.

V-Max® KLEEGRAS NEW

Clover blend for perennial cultivation

- One to two main production years and more
- Suitable for pasture and cut use
- Dense growth with a high level of utilisation elasticity
- Very low costs per cut as annual sowing is not necessary
- Dense, hardwearing turf
- Strong humus-forming properties
- Few location requirements
- When red clover dies down in the second year, white clover makes more of a contribution
- According to the recommendation of the North German Chamber of Agriculture

RECOMMENDATION	SUITABLE FOR CROP ROTATION WITH						
	Maize	Cereals	Rapeseed	Sugar beet	Potatoes	Legumes	Intensive cultures
CLOVER GRASS	XX	XX	XX	X			
Weight percentages	21 % Italian ryegrass (tetraploid), 21% hybrid ryegrass, 29% German ryegrass, 17% red clover, 12% white clover						
Sowing	Direct sowing: August to mid September						
Sowing density	35 kg/ha for direct sowing						
Harvest window	April to late September						
Harvest	As green fodder with silage trailer, for silage use with silage trailer or harvester after pre-wilting phase						
Legume proportion according to DüV: 100 seed % / 0 weight % 50%							

V-Max® UNTERSAAT GRAS

For sustainable maize cultivation

- Grass blend of Italian (tetraploid) and German (diploid) ryegrass for undersowing in maize crops
- Vigorous Italian ryegrass combined with late German ryegrass ensures good reliability
- After the maize harvest, the grass continues to develop and binds freely available nitrogen
- The humus balance is stabilised in tight maize crop rotations
- Effective protection from wind and water erosion over winter
- The soil's load capacity is increased and road pollution reduced by harvest

* only greening-compatible when undersown

RECOMMENDATION	SUITABLE FOR CROP ROTATION WITH						
	Maize	Cereals	Rapeseed	Sugar beet	Potatoes	Legumes	Intensive cultures
UNTERSAAT GRAS	XX						
Weight percentages	60 % Italian ryegrass (tetr.) 40 % German ryegrass (diploid, mid-late, fodder variety)						
Sowing	6-8 weeks after maize sowing, at 6-leaf to 8-leaf stage in maize						
Sowing density	10 - 15 kg/ha						
Legume proportion according to DüV: 100 seed % / 0 weight % 0%							

The weight and seed proportions of the individual components may vary slightly due to different TKWs. If unavailable, varieties may be replaced by varieties of equal value.
Suitable for fulfilling AUM requirements.

V-Max® UNTERSAAT KLEE PLUS NEW

Clover undersowing for cereals

- Very rapid ground cover after harvest for reliable erosion protection
- Good weed suppression thanks to dense grass cover
- High level of nitrogen fixing for the subsequent crop
- Can be used for grazing or cutting
- Good winter hardiness for more lasting usage options
- Lots of underground mass stabilises the soil's structure
- German ryegrass' strong rooting habit significantly improves humus content while clover improves nitrogen supply
- Also suitable as green manure or green fallow

* only greening-compatible when undersown

RECOMMENDATION	SUITABLE FOR CROP ROTATION WITH						
	Maize	Cereals	Rapeseed	Sugar beet	Potatoes	Legumes	Intensive cultures
UNTERSAAT KLEE PLUS	XX	XX	XX	X			
Weight percentages	90 % German ryegrass, 10% white clover						
Sowing	Undersowing with summer cereals: 2-leaf stage up to approx. 2 weeks before gaps between rows are covered Undersowing with winter cereals: from the last frost						
Sowing density	15 kg/ha (undersowing), 40 kg/ha (direct sowing)						
Legume proportion according to DüV: 100 seed % / 0 weight % 29%							

Undersowing

Why undersow?

- Contributes to humus formation, especially in humus-centric cultures such as maize and cereals (200 kg/ha humus)
- Effective weed regulation through timely ground cover
- Protection from water and wind erosion
- Nutrient storage and protection from erosion
- Year-round ground cover and tilth improvement
- Improves the soil's capacity and makes it easier to drive over
- Time and cost savings through undersowing a planned cover crop or field fodder crop in spring
- Greening-compatible in certain circumstances

How?

The seeds can be sown using a manure spreader or sown into existing crops with a drill machine. A pasture harrow fitted with sowing equipment can also be used to undersow. It can also be spread together with slurry using a muck spreader.

What to keep in mind?

Adjusted plant care is required so that undersown plants can establish well. Individual strategies and products can be used to easily tackle weeds among cereals as well as maize. The choice of sowing window should depend on the main crop, the variety and the location so that the undersown crop can develop well without competing too much with the main crop. A weak competitor in its youth, maize will benefit from a head start of several weeks when grown with fast-growing grasses. When undersowing with cereals, it may make sense to reduce the sowing density of the main crop by around 20 - 30 %. In order to not impair the development of the undersown crop, sturdy cereals should be chosen and the straw whacked. If the undersown plants are to be used to fulfil greening requirements, biogas or fodder use is only permitted from the 16th of February in the following year.

The weight and seed proportions of the individual components may vary slightly due to different TKWs. If unavailable, varieties may be replaced by varieties of equal value.
Suitable for fulfilling AUM requirements.

Organic blends

The demand for organically grown foods has grown significantly over the last few years. The number of organic farms has grown, along with the demand for suitable organic varieties with special characteristics.

viterra® organic blends are a valuable basis for good crop rotation in organic farming. The main focus is on optimising the flow of nutrients within crop rotations. The need for good weed suppression is met by fast-growing components in the reliable blends. Cover crop blends with nectar and pollen plants encourage biodiversity and increase agroecological value.

SAATEN-UNION offers varieties as well as blends for use as cover crops and in forage production.

V-Max® LUNDSGAARDER GEMENGE ÖKO

Evergreen grasses and legumes for fodder

- Suitable as a winter cover crop for green manuring and soil improvement or for fodder production
- Balanced combination of nitrogen collectors and consumers has a positive impact on plant growth and soil life
- Italian ryegrass uses growth phases over winter
- Winter vetch and winter field pea are valuable protein suppliers in fodder
- Increase of agricultural value thanks to large quantity of flowers

RECOMMENDATION	SUITABLE FOR CROP ROTATION WITH						
	Maize	Cereals	Rapeseed	Sugar beet	Potatoes	Legumes	Vegetables
LUNDSGAARDER GEMENGE ÖKO	XX	XX	XX	X			
Weight percentages	31 % Italian ryegrass, 29 % crimson clover, 20 % winter vetch, 20 % winter field pea NS PIONIR						
Sowing	Late August to mid September or in spring as an undersown crop with maize						
Sowing density	50 kg/ha						
Harvest window	April to early May						
Harvest	As green fodder with silage trailer, for silage use with silage trailer or harvester after pre-wilting phase						

The weight and seed proportions of the individual components may vary slightly due to different TKWs. If unavailable, varieties may be replaced by varieties of equal value.
Suitable for fulfilling AUM requirements.

V-Max® WICKROGGEN ÖKO

Winter-hardy blend for fodder or green manure

- Winter-hardy blend including high-yield, stable and healthy population rye INSPECTOR and winter vetch
- Winter vetch binds nitrogen from the air, contributing to the following crop's nutrient supply
- Additional fodder source with high protein and energy content
- Winter-hardy vetch provides nectar and pollen, increasing biodiversity
- **V-Max® WICKROGGEN ÖKO** helps keeps plot free from weeds and improves soil structure

RECOMMENDATION	SUITABLE FOR CROP ROTATION WITH						
	Maize	Cereals	Rapeseed	Sugar beet	Potatoes	Legumes	Vegetables
WICKROGGEN ÖKO	XX	X	X	X			
Weight percentages	90% winter rye INSPECTOR, 10% winter vetch						
Sowing	Mid September to mid October						
Sowing density	100 - 120 kg/ha						

V-Max® WICKROGGEN FUTTER ÖKO

Winter-hardy blend for fodder or green manure

- Winter-hardy blend including high-yield, stable and healthy population rye INSPECTOR and winter vetch
- Winter vetch binds nitrogen from the air, contributing to the following crop's nutrient supply
- Additional fodder source with high protein and energy content
- Winter-hardy vetch provides nectar and pollen, increasing biodiversity
- Contains crimson clover and Italian ryegrass, which supply additional yield over summer after a WPS harvest and ensure ongoing greening up to the following crop

RECOMMENDATION	SUITABLE FOR CROP ROTATION WITH						
	Maize	Cereals	Rapeseed	Sugar beet	Potatoes	Legumes	Vegetables
WICKROGGEN FUTTER ÖKO	XX	X	X	X			
Weight percentages	67% winter rye INSPECTOR, 13% Italian ryegrass, 12% crimson clover, 8% winter vetch						
Sowing	Mid September to mid October						
Sowing density	100 - 120 kg/ha						

The weight and seed proportions of the individual components may vary slightly due to different TKWs. If unavailable, varieties may be replaced by varieties of equal value.
Suitable for fulfilling AUM requirements.

viterra® INTENSIV ÖKO

The health blend

- Controls migratory root nematodes (pratylenchus) and reduces viral internal rust spot in potatoes with multi-resistant oilseed radish DEFENDER and bristle oat PRATEX
- Fast-growing with intensive weed suppression
- Plenty of organic matter vitalises soil life
- The fibrous roots of PRATEX and taproots of DEFENDER complement each other in root penetration of the entire soil
- As the nematode-resistant oilseed radish DEFENDER is used, the blend is also suitable as a cover crop preceding sugar beet

RECOMMENDATION	SUITABLE FOR CROP ROTATION WITH						
	Maize	Cereals	Rapeseed	Sugar beet	Potatoes	Legumes	Vegetables
INTENSIV ÖKO	✗	✗	✗	✗	✗✗	✗	✗✗
Weight percentages	70% bristle oat PRATEX 30% multi-resistant oilseed radish DEFENDER						
Sowing	Mid July to early September						
Sowing density	40 - 50 kg/ha						

viterra® BODENGARE ÖKO

The nitrogen supplier for subsequent crops

- Delivers essential nitrogen through symbiotic nitrogen binding for plant growth
- Increased availability of main and trace nutrients through stabilisation in the soil
- Stimulates the activity of soil life with resulting soil bioengineering for improved soil fertility
- Complementary and varied root types encourage soil quality and structure
- After an early preceding crop as a summer cover crop for soil regeneration
- Crucifer-free, so especially suitable for oilseed rape crop rotation
- Contains structure-generating broad bean AVALON with fine seeds

Optimised 2021 blend

RECOMMENDATION	SUITABLE FOR CROP ROTATION WITH						
	Maize	Cereals	Rapeseed	Sugar beet	Potatoes	Legumes	Vegetables
BODENGARE ÖKO	✗✗	✗	✗✗	✗			
Weight percentages	30% field pea, 27% broad bean AVALON, 21% common vetch, 14% blue lupin, 6% Egyptian clover, 3% phacelia ANGELIA ÖKO						
Sowing	Mid June to mid August						
Sowing density	60-70 kg/ha						

The weight and seed proportions of the individual components may vary slightly due to different TKWs. If unavailable, varieties may be replaced by varieties of equal value.
Suitable for fulfilling AUM requirements.

viterra® DEPOT ÖKO

The nutrient reservoir

- Vigorous varieties bind nutrients, storing them during the winter and making them available to the following crop
- Efficient suppression of weeds thanks to rapid initial development
- Daikon radish STINGER loosens the top soil layer and allows rapid ground warming in spring
- Excellent root penetration of the soil by deep and flat rooters stabilises soil structure and improves the soil's infiltration capacity
- Especially suited to crop rotations with legumes as the main crop

RECOMMENDATION	SUITABLE FOR CROP ROTATION WITH						
	Maize	Cereals	Rapeseed	Sugar beet	Potatoes	Legumes	Vegetables
DEPOT ÖKO	XX	XX				XX	
Weight percentages	48% bristle oat PRATEX, 25% daikon radish STINGER, 10% phacelia ANGELIA ÖKO, 13% white mustard, 4% sunflower PEREDOVICK						
Sowing	Late July to late August						
Sowing density	20 kg/ha						

viterra® SPRINT ÖKO NEW

The quick starter

- Excellently rapid ground cover, so suitable as a cover crop before winter cereals
- Forms a lot of organic mass over a short vegetation period
- Effective ground cover suppresses weeds and protects the soil's surface
- SILETINA has some of the fastest initial development of all oilseed radishes
- Allows nutrient release management from autumn to spring
- All varieties have a high ecological value for bees and other insects

RECOMMENDATION	SUITABLE FOR CROP ROTATION WITH						
	Maize	Cereals	Rapeseed	Sugar beet	Potatoes	Legumes	Vegetables
SPRINT ÖKO	XX	XX				XX	
Weight percentages	40% phacelia ANGELIA ÖKO, 25% summer forage rape JUMBO, 15% oilseed radish SILETINA ÖKO, 12% white mustard, 9% buckwheat HAJNALKA						
Sowing	July to early September						
Sowing density	15 kg/ha						

The weight and seed proportions of the individual components may vary slightly due to different TKWs. If unavailable, varieties may be replaced by varieties of equal value.
Suitable for fulfilling AUM requirements.

Special blends

viterra® special blends are blends for special applications such as flower blends or wild forage blends. Goals are to improve the landscape visually, species conservation and gamekeeping native animal species.

A varied composition means that these blends offer long-term nutrition for lots of beneficial animals, and encourage biodiversity. Our wild forage blends have been designed for biennial cultivation so that they are also available in winter as grazing and cover for wild game.

Our flowering blends can also be used as honey fallow for ecological compensation land or to fulfil certain agricultural environmental measures.

viterra® BIENE

Annual bee/honey fallow without crucifers

- Top recommendation as fallow with honey plants for creating ecological compensation area (greening)
- Crucifer-free blend with eleven components
- Use of fallow land with honey plants
- Flowering blend with long flowering phase for good biodiversity and positive impact on agricultural image
- Roots penetrate different soil levels and stabilise soil structure
- Grass-free for easy control in subsequent culture
- Buckwheat-free

Optimised 2021 blend

RECOMMENDATION	SUITABLE FOR CROP ROTATION WITH						
	Maize	Cereals	Rapeseed	Sugar beet	Potatoes	Legumes	Intensive cultures
BIENE	XX	X	XX	X			
Seed proportions	30% Egyptian clover, 26% Persian clover, 19% phacelia ANGELIA, 9% dill, 7% alfalfa, 3% serradella, 2% common vetch, 1% marigold, 1% field pea RUBIN, 1% blue lupin ILDIGO, 1% sunflower PEREDOVICK						
Sowing	Early March to mid August (please see AUM sowing requirements)						
Sowing density	25 kg/ha						
Legume proportion according to DüV: 100 seed % / 0 weight % 70%							

The weight and seed proportions of the individual components may vary slightly due to different TKWs. If unavailable, varieties may be replaced by varieties of equal value.
Suitable for fulfilling AUM requirements.

viterra® BIENE PLUS NEW

Annual flowering blend for colourful flowers

- Cornflower, common poppy and crimson clover turn viterra® BIENE into viterra® BIENE PLUS
- 14 different bee-friendly plants
- Contrasting flower shapes and colours
- Contributes to a more positive view of agriculture among the general public
- Long flowering period into autumn for a good contribution to the ecosystem
- Free from crucifers, buckwheat and grasses
- Suitable for honey fallow as ecological compensation land (greening)

RECOMMENDATION	SUITABLE FOR CROP ROTATION WITH						
	Maize	Cereals	Rapeseed	Sugar beet	Potatoes	Legumes	Intensive cultures
BIENE PLUS	✗	✗					
Weight percentages	22% phacelia ANGELIA, 16% Persian clover FELIX, 14% crimson clover, 12% dill, 6% Egyptian clover, 5% serradella, 5% cornflower, 5% common poppy, 5% alfafa, 3% common vetch, 3% marigold, 3% blue lupin ILDIGO, 2% field pea, 1% sunflower						
Sowing	from early April						
Sowing density	25 kg/ha						
Legume proportion according to DüV: 100 seed % / 0 weight % 42%							

viterra® MULTIKULTI

Annual bee/honey fallow

- Top recommendation for honey fallow (greening) and agricultural environmental measures
- Blend of 12 components for honey plants/fallow greening application
- Blooming blend for good biodiversity and versatile usage
- Roots penetrate different soil levels and stabilise soil structure
- Grass-free for easy control in subsequent culture
- Effective protection from erosion and drying out
- As a cover crop after WPS or cereal harvest or as border greening for maize and other cultures

RECOMMENDATION	SUITABLE FOR CROP ROTATION WITH						
	Maize	Cereals	Rapeseed	Sugar beet	Potatoes	Legumes	Intensive cultures
MULTIKULTI	✗✗	✗		✗			
Seed proportions	33% phacelia ANGELIA, 15% Persian clover, 16% Egyptian clover, 12% nematode-resistant white mustard GAUDI, 5% serradella, 11% nematode-resistant oilseed radish AGRONOM, 3% common vetch, 1% blue lupin, 1% sunflower, 1% borage, 1% summer field pea RUBIN, <1% buckwheat HAJNALKA						
Sowing	Early April to late August (please see AUM sowing requirements)						
Sowing density	25 kg/ha						
Legume proportion according to DüV: 100 seed % / 0 weight % 41%							

The weight and seed proportions of the individual components may vary slightly due to different TKWs. If unavailable, varieties may be replaced by varieties of equal value.
Suitable for fulfilling AUM requirements.

viterra® HORRIDO

Biennial gameland pasture blend

- Tested in the hills of LJV Schleswig-Holstein
- Suitable for all native game
- Flowers attract lots of insects
- Also suitable for wildlife pasture on agricultural land
- Winter-hardy components offer grazing and cover even in winter and during frosts

Cultivation tip: Sow part of the area with a double gap between cereals to create attractive free space for pheasants and partridges.

Optimised 2021 blend

RECOMMENDATION	SUITABLE FOR CROP ROTATION WITH						
	Maize	Cereals	Rapeseed	Sugar beet	Potatoes	Legumes	Intensive cultures
HORRIDO	X	X					
Weight percentages	27% wild rye, 25% buckwheat, 10% bristle oat PRATEX, 6% serradella, 6% sunflower PEREDOVICK, 4% winter vetch, 3 % Egyptian clover, 3% Persian clover, 3% common mallow, 2.5% winter forage rape FONTAN, 2% oil flax ZOLTAN, 2% red clover, 2% alfalfa, 1.5% phacelia ANGELIA, 1% oilseed radish SILETINA, 1% winter turnip rape JUPITER, 1% marrow stem kale GRÜNER ANGELITER						
Sowing	March to June						
Sowing density	25 - 30 kg/ha						
Legume proportion according to DüV: 54 seed % / 0 weight %							

viterra® HOCHWILD

Biennial game pasture blend without crucifers

- Tested in the hills of LJV Schleswig-Holstein
- Suitable for wild forage on areas that are not used for agriculture
- Returning clover species can be used to prevent docks growing as weeds
- Excellent wild grazing with tasty protein plants
- Robust and winter-hardy varieties ensure long-lasting stock
- Varieties rich in nectar and pollen nourish insects, using all flora and fauna

Cultivation tip: If the seeds are scatted by hand, sand can be mixed in to prevent segregation.

Optimised 2021 blend

RECOMMENDATION	SUITABLE FOR CROP ROTATION WITH						
	Maize	Cereals	Rapeseed	Sugar beet	Potatoes	Legumes	Intensive cultures
HOCHWILD	XX	XX	XX				
Seed proportions	44% Balansa clover, 16% red clover, 15% alfalfa 13% Egyptian clover, 9% crimson clover pea, 2% winter field pea, 1% sweet lupin						
Sowing	March to June						
Sowing density	25 kg/ha						
Legume proportion according to DüV: 100 seed % / 0 weight %							

The weight and seed proportions of the individual components may vary slightly due to different TKWs. If unavailable, varieties may be replaced by varieties of equal value.
Suitable for fulfilling AUM requirements.

viterra® BLÜHZAUBER

The flowering meadow

- Visually pleasing with a range of more than 40 flowering varieties with different colours and petal shapes
- Source of pollen and nectar for bees, bumble bees, butterflies and many other insects
- Continuous flowering period from late May into autumn
- Larger quantities for councils available on request
- Improves the image of agricultural landscapes

Cultivation tip: Sawdust or sand can be added to easily increase volume and improve seed distribution

RECOMMENDATION	SUITABLE FOR CROP ROTATION WITH						
	Maize	Cereals	Rapeseed	Sugar beet	Potatoes	Legumes	Intensive cultures
BLÜHZAUBER	Not recommended for arable farming						
Varieties	Marigold, Mexican aster, California poppy, yellow toadflax, baby blue eyes, leucanthemum, field poppy, sunflower... and many more						
Sowing	April to mid June						
Sowing density	5 - 7 g/m²						

Custom blends

Our flowering blends are also available in small packs of 150g, 500g and 1kg

Using flowering strips

Insect conservation plays an important role in the societal debate surrounding climate and environmental conservation. It has been claimed that intensively farmed countryside lacks suitable flowering plants and shelter for insects, especially in summer. Many farmers are therefore willing to set up wildflower patches.

Examples for the use of flowering strips:

- Buffer strips along bodies of water where fertiliser and plant conservation are severely limited.
- On slopes, flowering strips offer erosion protection.
- Strips along the edge of woodland, which often have less yield than the rest of the land with the same production costs.
- Partial areas such as peaks and bays or very small areas that can only be farmed with broad modern machinery with a disproportionate amount of time and effort.
- If wild boars are a problem, hunting aisles with flowering blends may be helpful.

Cover crops to suit you? Saaten-Union special blends.

We'll mix your own special blend! From an order volume of 1,500kg, we can prepare your own custom blend, allowing at least 3 weeks lead time before shipping.

Please send us your components and percentages or your precise blend composition to **spezialmischung@saaten-union.de** or get in contact with your local sales representative.

The weight and seed proportions of the individual components may vary slightly due to different TKWs. If unavailable, varieties may be replaced by varieties of equal value.
Suitable for fulfilling AUM requirements.

Achieve more with nutrient efficiency

Cover crops as natural nutrient reservoirs

After the main crop is harvested in summer, unused nutrients remain in the soil and the mineralisation of harvest remnants increases. Arable land without plant coverage comes with a huge risk of nutrient loss. This not only applies to nitrogen. Sulphur can be stored in deeper layers as sulphates in a similar way to nitrates. Potassium can bind to clay minerals due to its positive charge. In sandy ground, however, up to 50kg of potassium may be lost per hectare each year. Magnesium is also mobile in soil at low pH values. Phosphorous is only minimally endangered by leachate up to retention level D. Instead, surface run-off plays a role here. Cover crops can bind a significant quantity of these major nutrients in plant mass. This especially applies to dense, deep-rooted varieties such as crucifers (e.g. marrow stem kale or oilseed radish). So they are retained in the top layer of soil over autumn and winter. In spring, especially when the soil is worked, nutrients are remineralised from the remains of the cover crop, making them available for the following crop.

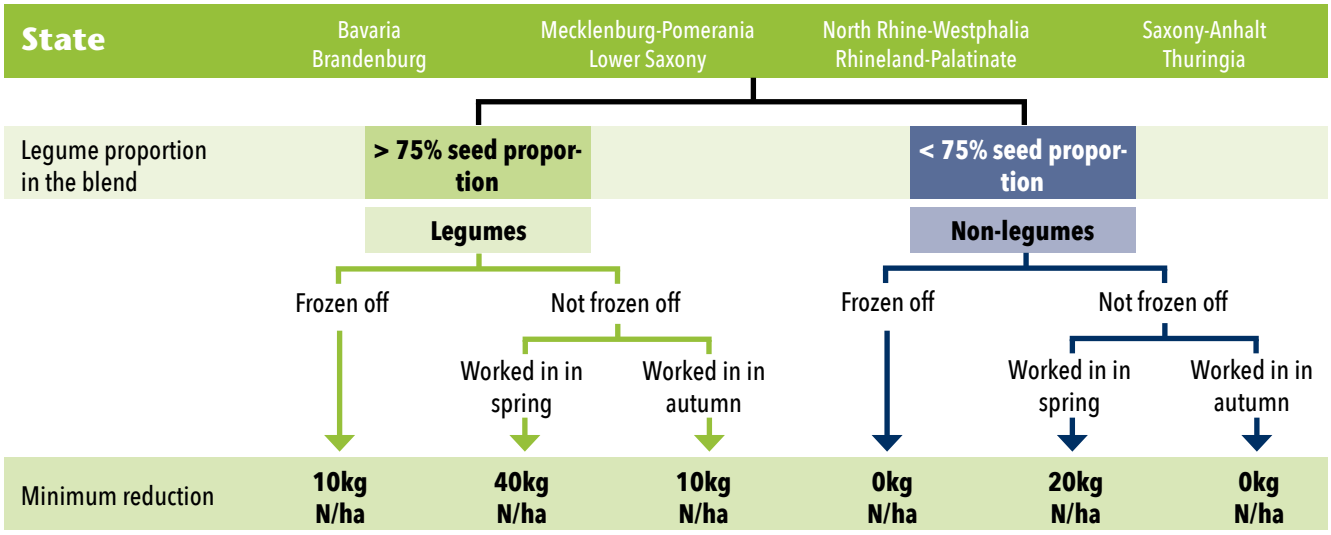
Considering legume content

Attachment 4, table 7 of the Fertilisation Act stipulates the minimum reduction (kg N/ha) for the relevant main crop in the previous year that must be taken into account. If the previous crop was frozen off cover crops that are considered non-legumes, no reduction must be taken into consideration. The decision as to from what percentage of legumes a cover crop blend is considered a legume is left to individual federal states. Generally, a cover crop is considered a legume if the seed mix exceeds 75% legumes. Exceptions apply in Baden-Württemberg (> 60% based on seed proportion), Schleswig-Holstein (> 50% based on weight) and Saxony (100% legumes in the blend).

To sum it up:

Intelligently integrated into crop rotations, cover crops form an important measure to protect nutrients and ensure they are made available. The opportunity to spread fertiliser in autumn is a bonus for livestock farms, while many arable farmers can benefit from using legumes. So cover crops not only impact one nutrient, but promote overall nutrient balance in the soil.

How much N do I have to allow for from the cover crop in the subsequent crop?



Cultivation recommendation

Sowing

The recommended sowing window is provided for each variety and blend. Location and weather also play a role. To save water, the cover crop can be sown flat directly after harvest. Alternatively, the first wave of volunteer grain or rapeseed can be deferred then drilled after the soil has been worked. This is the safest option as long as moisture is sufficient.

A well consolidated seed bed with a fine soil structure and even straw distribution encourages rapid development. The ideal sowing depth for most blends is 1 to 2 cm. A cover crop can only achieve its aim when sown at the according density. Dense planting prevents weeds, and 'green bridges'. Plants compete for light, nutrients and water. This means that the soil is quickly covered and deeply penetrated by roots. This also improves freezing off. A multitude of thin plants is easier to work in in spring than a few strong plants.

Working in after winter

Depending on the cover crop, the remaining mulch layer may be very different in spring. Brittle, dry material is ideal for mulching and direct sowing. If cover crops have not frozen off, chemical or intense mechanical measures may be used. Ground frost can be used to roll stock (e.g. Cambridge roller). This is also possible on ecological compensation land, where PSM and soil working are not permitted before 16th February. Rolled stock is weaker in winter, dies off more easily and is easier to process in spring.

Fertilisation

Generally, cover crops manage well with a poor nutrient supply. Things become critical when there is a disruption to the nitrogen supply after straw has been worked in. A mineral or organic fertiliser can really help promote initial development (see the Fertilisation Act and greening regulations if applicable)

Scattering or seed drill?

A seed drill is advisable for:

viterra® TRIO, viterra® MAIS, viterra® UNIVERSAL, viterra® UNIVERSAL LEGUMINOSENFREI, viterra® UNIVERSAL N-PLUS, viterra® UNIVERSAL WINTER, viterra® BODENGARE, viterra® RAPS, viterra® INTENSIV, viterra® POTATO, viterra® MULCH, viterra® RÜBENGARE, viterra® MAIS STRUKTUR

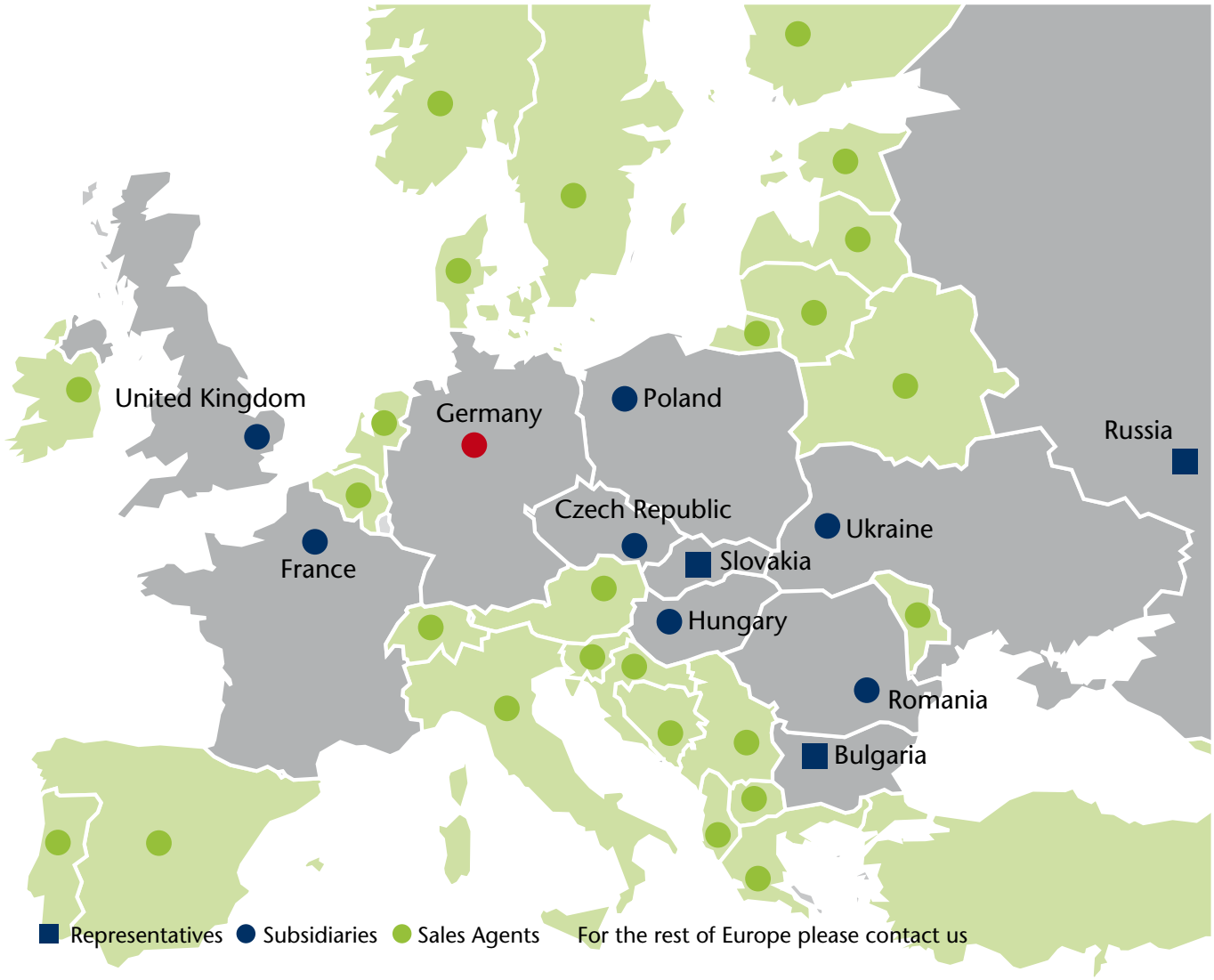
Scattering is possible for:

viterra® RÜBE, viterra® SCHNELLGRÜN, viterra® SCHNELLGRÜN LEGUMINOSENFREI, viterra® WASSERSCHUTZ, SortenGreening® DEFENDER plus flax, SortenGreening® SILETTA NOVA plus flax, SortenGreening® AMIGO plus flax, SortenGreening® COMPASS plus flax, SortenGreening® VERDI plus Egyptian clover

Low seed density	
✗	Thick individual plants
✗	Frost tolerance
✗	Gaps in stock
✗	Weed multiplication
✗	Green bridges
✗	Nutrient loss

Suitable seed density	
✓	Frost sensitivity
✓	Erosion protection
✓	Pest reduction
✓	Soil loosening
✓	Nutrient reservoir
✓	Humus formation

YOUR GROWING SUCCESS



Since its creation in 1965, SAATEN-UNION has been supplying farmers in Europe with high performance varieties that match the markets needs. SAATEN-UNION has already set milestones, and will continue to play a major role in plant breeding in years to come.

Dealer:

P. H. Petersen Saatzucht Lundsgaard GmbH
Streichmühler Str. 8a
D-24977 Grundhof
phone +49 46 36-89 0
fax +49 46 36-89 22
service@phpetersen.com
www.phpetersen.com

SAATEN-UNION GmbH
Eisenstr. 12
D-30916 Isernhagen HB
phone +49 511-72 666-0
fax +49 511-72 666-100
service@saaten-union.de
www.saaten-union.com

SAATEN UNION
Züchtung ist Zukunft

Information stand September 2021