



Cover crop programme

Scoring with cover crops.

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UNION**
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Cover crops from a reputable supplier



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

In Northern Germany, 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 cultivation 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 15,000m² each, the storage and processing facilities in Lundsgaard, Schleswig-Holstein

and Sárobgárd, 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 Saatzeit Lundsgaard GmbH has been a shareholder for many years.

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.



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Scoring with cover crops

Targeted use of cover crops improves the yield and quality of the main crop, 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 loosen the soil

Cover crops can grow through impacted soil thanks to intense rooting. They can also stabilise the loosened soil after mechanical soil cultivation. 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. Radish-forming oilseed radish STINGER is a one-off, as it perforates the topsoil with its strong taproots. The cover crop roots therefore stabilise the topsoil and increase the soil's load-bearing capacity.



Improves the field moisture capacity and increases rain water 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.



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 crop residues in preparation for the following main crop.



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.

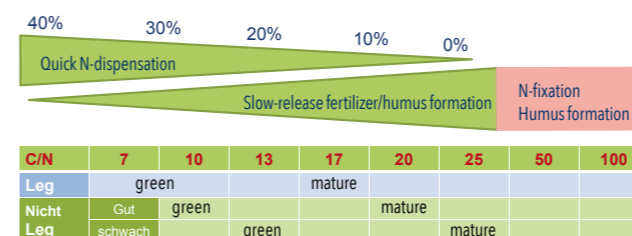


Improves soil fertility and encourage humus formation

Cover crops let you add 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 CO₂ and creates 1.5kg O₂. 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 crop residues is important. Legumes have a narrow C/N ratio, so their biomass is easily digestible for soil life. Lignifying varieties such as early sown white mustard, oil flax and bristle oat have a higher C/N ratio, so they are more resistant to degradation. This effectively contributes to the formation of long-lasting humus. Roots have a different C/N ratio from leaves and stems. So varieties with lots of underground biomass (such as oilseed radish and grasses) contribute a lot to lasting humus.

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



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.



Nitrogen conservation in the soil and nitrogen binding over winter to prevent leaching.

Cover crops can effectively collect nutrients in the autumn, store them in biomass and retain them in the top layer. 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 incorporating green manure in the following spring, the nutrients stored in the cover crops are re-mineralised so they can be made available to a main crop such as corn during the peak growing season. Find out more about nutrients, fertilisation and water protection on pages 30 and 58.



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.



Contains legumes that fixate atmospheric nitrogen

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. See page 26 and onwards for more information on which legumes make the best cover crops.



Winter-hardy for continuous protection of soil and soil life

Winter-hardy cover crops protect the soil and any fixed nutrients until spring. Soil life is provided with constant nutrition. Depending on the use system and cultivation process, soil protection and biomass production can be combined. Hence, viterra® UNTERSAAT, viterra® LUNDSGAARDER GEMENGE and viterra® WINTERQUARTETT ÖKO are ideal for regenerative agriculture, which aims to activate and strengthen the soil life connected with humus enrichment by greening all year round.



Can be used as biomass

Many cover crops produce biomass that can be used in biogas plants. 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 viterra® GRANOLEG and viterra® GRANOPUR can also be cultivated after earlier cereals, facilitating another biomass harvest: see page 28.



Freezes off for easier soil preparation in spring

Cover crops that freeze off are easy to incorporate in spring, leaving optimal conditions to sow the summer crop. Mulch and direct sowing are easier with cover crops that freeze off. Crops 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).



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 viterra® LUNDSGAARDER GEMENGE and viterra® FUTTER, can be harvested before or after winter, and encourage soil fertility through intense root formation, see page 47.



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 encourage 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. 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 wildlife will also benefit from cover crop cultivation. Wild forage blends viterra® HORRIDO and viterra® HOCHWILD have been especially designed for this purpose (page 51). 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 pages 22 to 25 for the diversity of cover crops.





Cover crops for sugar beet rotations

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



Recommended Cover crop blends

- Nematode-reducing**
- viterra® cover crop blends** page 38
viterra® RÜBE, viterra® MULCH
- Nematode-neutral**
- viterra® cover crop blends** from page 38
viterra® RÜBENGARE, viterra® UNIVERSAL, viterra® BODENGARE, viterra® TRIO, viterra® RAPS and more



Cover crops for potato crop rotations

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** AKIRO, SILETTINA page 22
- Bristle oat** PRATEX, OTEX page 21



Recommended Cover crop blends

- viterra® cover crop blends** from page 38
viterra® INTENSIV, viterra® POTATO



Cover crops for rapeseed crop rotations

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



Recommended Cover crop blends

- viterra® cover crop blends** from page 38
viterra® RAPS, viterra® BODENGARE, viterra® UNIVERSAL, viterra® UNIVERSAL WINTER and more
- In large-scale rapeseed crop rotation (25% and below)**
- viterra® cover crop blends** from page 38
viterra® INTENSIV, viterra® MULCH, viterra® TRIO, viterra® MAIS and more



Cover crops for maize crop rotations

Recommended varieties

- White mustard** ALBATROS, CLASSIC, COVER page 23
- Oilseed radish** SILETTINA, AKIRO page 22
- Taproot-forming oilseed radish** STINGER 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



Recommended Cover crop blends

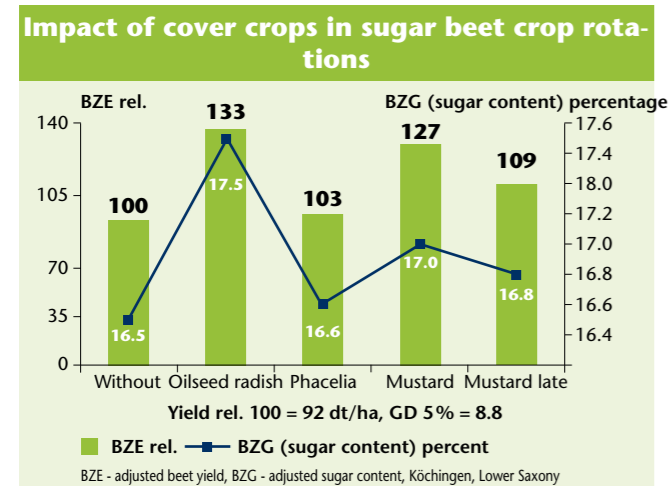
- viterra® cover crop blends** from page 38
viterra® MAIS, viterra® WASSERSCHUTZ, viterra® MAIS STRUKTUR, viterra® SCHNELLGRÜN, viterra® SCHNELLGRÜN LEGUMINOSENFREI, viterra® UNIVERSAL WINTER, viterra® BODENGARE, viterra® MULCH and more



Biological nematode control

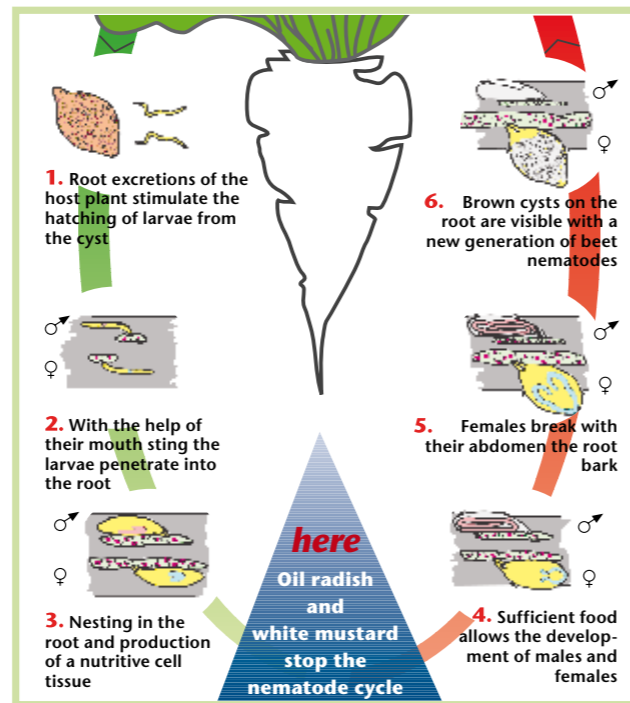
Beet cyst nematodes impact yield

Beet cyst nematodes (*heterodera schachtii*) are still the most important sugar beet pest from an economical perspective. Hence, 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 viability of the beet cultivation.



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 <i>ditylenchus dipsaci</i>
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).		
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

Flowering tendency low - very low 3 4 5 6	2	LUCIDA	VERDI			
	3		PROFI GAUDI	CLINT TOPAS		
	4		VETO	ACCENT	MASTER SCOUT	
	5					
	6					
			4 slow - medium	5	6	7
Initial development						

Nematode-resistant oilseed radish

Flowering tendency low - very low 3 4 5 6 7	3	CONTRA COSMOS ADAGIO	COMPASS			
	4		COMET DACAPO CARUSO	ANGUS DEFENDER CONTROL	AGRONOM	
	5			AMIGO CONCORDE		
	6					
	7					
			4 slow - medium	5	6	7
Initial development						

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

Underlined varieties also tackle *meloïdogyne 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

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 uninterrupted soil coverage

PROFI

PROFESSIONAL NEMATODE CONTROL

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

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



MASTER

RAPID START - STRONG FLOWERING DELAY

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

SCOUT

FLEXIBLE SOWING - EFFICIENT AGAINST NEMATODES

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

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
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 tillth 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 before winter

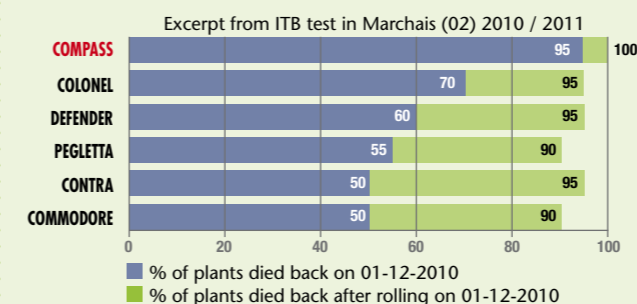
COMPASS after winter

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 BEET CULTIVATION

- 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

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



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
- Mid-late flowering for a long vegetative growth phase
- COMET's deep, finely structured root system covers the entire soil volume
- High yield of green plant matter for adding to organic mass, especially important at light, sandy sites



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.

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

CONTRA

SPECIALIST FOR VEGETABLE CROP ROTATIONS

- Resistance level 2+, tackles beet cyst nematodes and *meloïdogyne chitwoodi*
- Reduction of *meloïdogyne hapla* (northern root knot nematodes)



CONTROL

EFFECTIVE CONTROL OF VARIOUS NEMATODES AND DISEASES

- Resistance to beet cyst nematodes in the upper area of grade 2
- State-confirmed resistance to root gall nematodes
- Multi-resistant genes: developed from DEFENDER
- Excellent initial development with good soil coverage to suppress 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

CARUSO **NEW**

EFFICIENT AGAINST NEMATODES AND FROST-SENSITIVE

- Multi-resistant to beet cyst nematodes and root knot nematodes, reduces viral rust spot, no propagation of stem nematodes
- Excellent initial development for secure establishment
- CARUSO is more susceptible to frost than other oilseed radish varieties





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 aggravating the problem. Subsequent crop planning, cultivation and field hygiene form the basis for successful pest management.

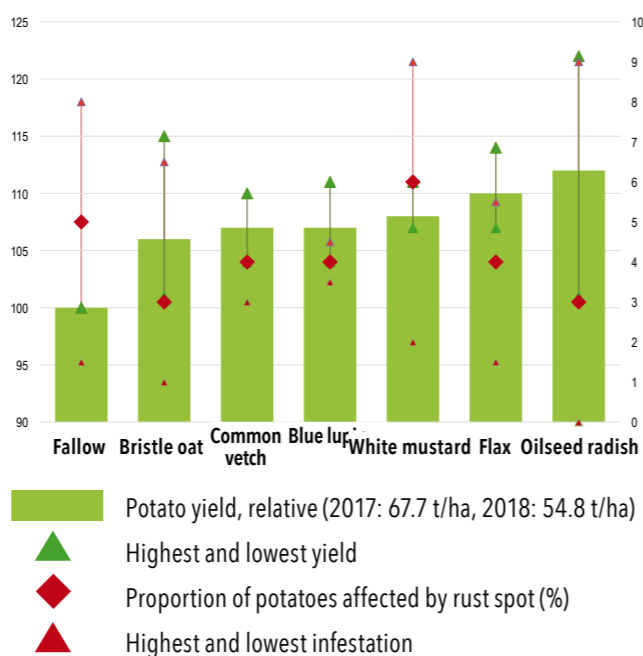
Trichodorus and viral internal rust spot

As free-living nematodes, trichodorus are hard to treat directly as they are also found deep in the soil, waiting to attack new plants. So far, 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. 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 reinfest 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*)

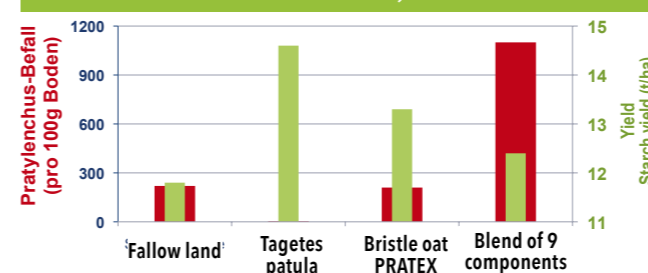
These migratory root nematodes are often found in lightweight soil and can lead to significant losses in potato, vegetable and grain yields, usually forming nests. Plants that are attacked experience stunted growth and are more susceptible to fungal infections such as *verticillium* and *fusarium*.

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.

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



Root gall nematodes (*meloïdogyne chitwoodi*, *meloïdogyne hapla*)

The **columbia root knot nematode** (*meloïdogyne 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 Meloïdogyne) 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!

The **northern root knot nematode** (*meloïdogyne 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 gall nematodes need host plants to survive. A purposefully unsuitable cover crop can almost completely eliminate an infestation.



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

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 usually don't 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.

Nematodes and diseases

Nematodes

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

Southern root-knot nematodes



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

Root-knot nematodes



- Resistance to *meloidogyne chitwoodi* officially tested
- Prevents the development of *M. fallax*
- For crop rotation with potatoes, vegetables and flowering bulbs

Stem and bulb nematodes



- No multiplication of *ditylenchus dipsaci* as a cover crop
- in beet, vegetable and flowering bulb rotations

Northern root-knot nematodes



- Efficient control of *meloidogyne hapla*
- For organic crop rotation with a high proportion of clover and carrot cultivation
- Also protects potatoes and sugar beet

Lesion nematodes



- Bad host plant for *pratylenchus* nematodes
- on sandy soil as a cover crop
- For crop rotation with potatoes, oilseed rape, cereals, vegetables and flowering bulbs

Diseases

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

Pythium



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

Rhizoctonia rot



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



Clubroot



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

Cereal crop rotation diseases



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

Oilseed radish against viral internal rust spot



SILETTA NOVA

REDUCES INTERNAL RUST SPOT 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 viral internal rust spot
- 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 pragmatist 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 *solanaceae* 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*.

Uses for bristle oat

1. Nematode reduction

Tackles migratory root nematodes (*pratylenchus penetrans*) without any breeding of *trichodorus* species - especially important in sandy and light soil for potato and vegetable production. Sowing density: 80 - 100 kg/ha

2. Erosion protection

As erosion protection in autumn sowing - very rapid and leafy development with good weed suppression (allelopathy). Bristle oat freezes off reliably, offering optimal conditions for mulching and direct sowing of the following crop. Sowing density: 25 - 50 kg/ha

3. Biomass production

For the production of biomass - also for the soil, as silage or fresh fodder and for biogas. Sowing density: 50 - 125 kg/ha

4. Cover crop blends

All-purpose blend partner that is ideal for combining



PRATEX

CONTROLLING PRATYLENCHUS PENETRANS

- Tackles lesion nematodes (*pratylenchus penetrans*) without any multiplication of *trichodorus* 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 **NEW**

COVER CROP WITH STRONG INITIAL DEVELOPMENT

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

	Profile
CODEX NEW	The late bristle oat
TRADEX NEW	Highest biomass yield



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.

Taproot-forming oilseed radish is used in blends to add structure.



AKIRO

- Promotes soil structure and activates soil life
- Leafy initial development with rapid ground shade, promoting the formation of valuable tilth
- Competes well with weeds

SILETINA

- 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

Taproot-forming oilseed radish



STINGER **NEW**

TAPROOT-FORMING OILSEED 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

TAPROOT-FORMING OILSEED 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

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

THE CLASSIC AMONG THE HIGH-QUALITY VARIETIES

- Rapid and strong initial development even when sown late
- Valuable above-ground greens and dense, deep roots form a stable, humus-rich soil structure
- 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

- 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
- Excellent weed suppression
- 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

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

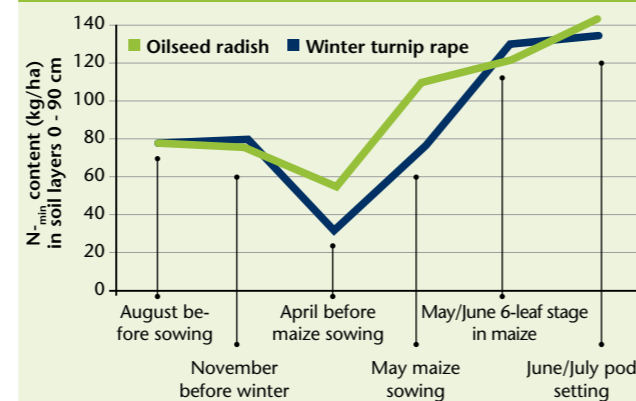
- Favourable leaf/stalk ratio
- Relatively frost-tolerant
- Good stability



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 perfect 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

ZOLTAN

- Undemanding with fine but deep-reaching taproots

Buckwheat

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. Because of the risk of self-seeding and difficult control, we do not recommend buckwheat for use 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

- 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 bitters.

TABEA **NEW**

- Flowers extremely late, stores phosphorus

TABOR **NEW**

- Good rapid ground cover, late flowering



Legumes as cover crops

Persian and Egyptian clover

This undemanding, small-grained clover is often used as a cover crop. In cover crop blends, the other plants benefit from clover's nitrogen production. Clover flowers are also attractive nectar sources for honey production.



Persian clover **FELIX**

- A honey plant with good root growth

Egyptian clover **OTTO**

- High value as a preceding crop and fodder
- Multi-shear

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

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.



CONTEA

- For increasing nitrogen, loosening soil and use as fodder

Serradella

With its low TKW (thousand kernel weight), serradella is especially well suited as a sole cover crop in light soils, for fodder or as an addition to blends to produce nitrogen.

Vetchling

Protein-rich and colourful for cover crop blends



Field beans for green manuring

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

As a large-grain legume, the blue lupin introduces additional nitrogen into crop rotations when used as a cover crop, as its pronounced taproot penetrates deep layers of the soil.



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

Common vetch and winter 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 is mostly found in winter-hardy biomass blends such as viterra® LUNDSGAARDER GEMENGE and viterra® WICKROGGEN.



Summer vetch **NEON** **NEW**

- Excellent for green manuring and fodder

Common vetch **ARGON** **NEW**

- Compact-growing cover crop for blends

Winter vetch **LATIGO**

- Excellent for green manuring and fodder

Field pea **RUBIN**

Fast-growing field pea is an ideal partner in cover crop blends: small-grained, leafy and provides nitrogen

Winter field pea ^{NS} **PIONIR**

PIONIR is especially small-grained (*field pea*) and winter-hardy, making it an ideal supplement for winter-hardy blends. Both people and insects love the striking flowers.



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

EUROPE'S LEADING FORAGE RYE

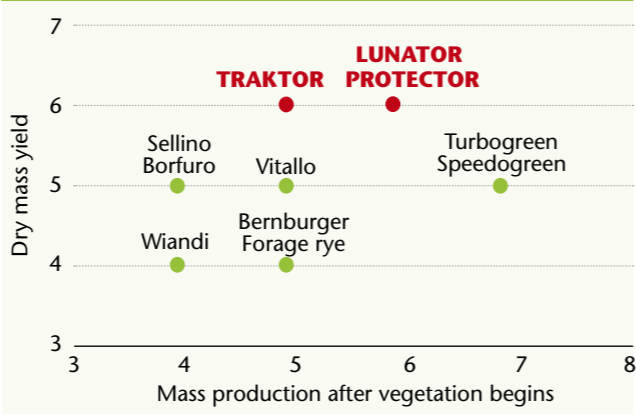
- Longstanding number 1 in German evaluations
- Biomass and fodder provider with excellent return on invested time
- Double usage: for cattle and biogas
- Excellent winter growth, exceptional erosion protection
- Very good tolerance to late sowing: up to late October for greening after maize

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.

PROTECTOR – Top forage rye

Yield performance of winter rye varieties in cover crop cultivation



Source: from data from the Descriptive Variety List 2018

JOHAN

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

Forage rye for biomass



TRAKTOR NEW

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

Forage/WPS rye

GENERATOR

- For early use in WPS

Greening rye

MATADOR

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

Forage rye

LUNATOR

- High-yield and healthy
- Optimal for northern Countries

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

- Steady and stable yield

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

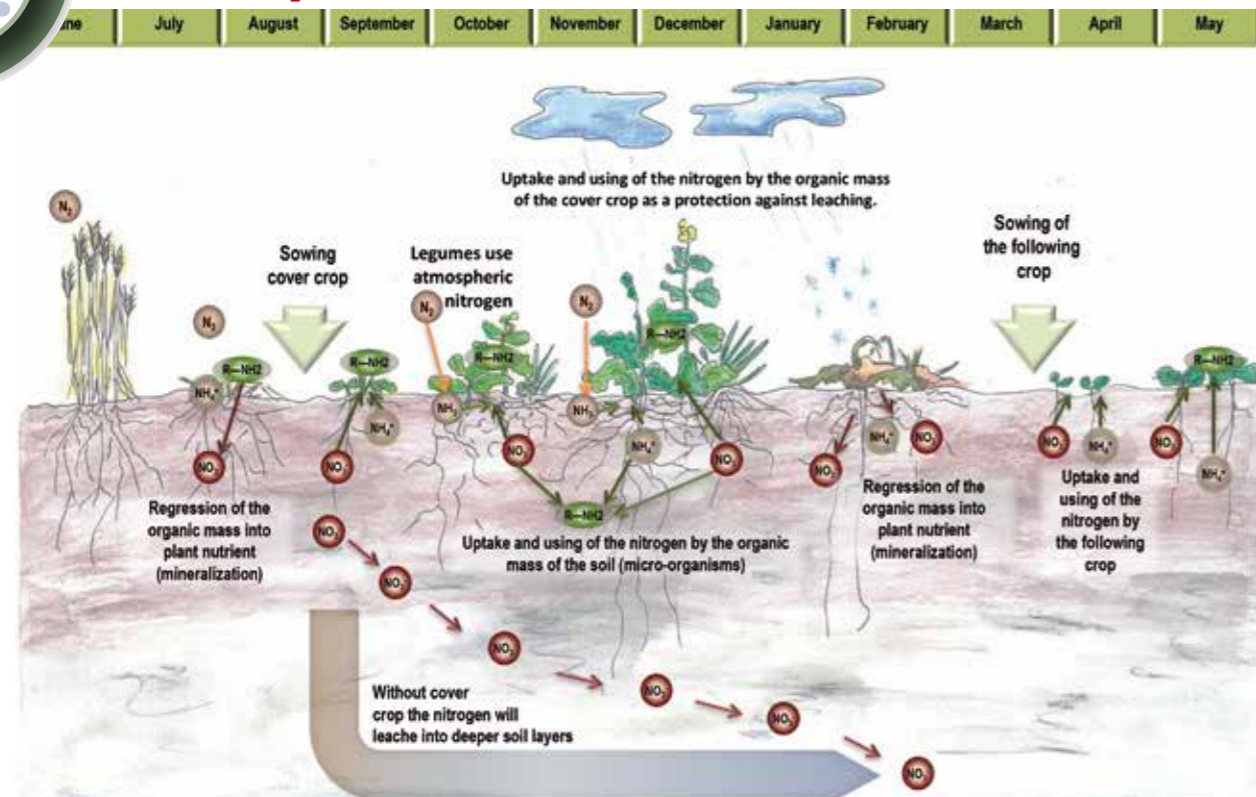
- Medium late - very flexible harvest window
- High-yield and healthy

DIPLOMAT diploid

- Early and fast
- Upright growth for easy cutting



Water protection and nutrient conservation



Avoid leaching early on

Nitrogen is an essential nutritional element for plants and plays an important role in agriculture today. Nitrogen enters the soil via mineral and organic fertilisers or the binding of atmospheric nitrogen by legumes.

Nitrate (NO₃), which is very mobile in the soil, can easily be taken up by plants but it can also be easily leached out in unfavourable conditions. Large amounts of nitrate from fertilisation or the mineralisation of organic substances, weakly absorbent soils, and high levels of precipitation encourage movement into deeper layers of the soil and the groundwater.

Levels of leaching loss over bare ground are considerably higher over the winter months than in summer due to increased precipitation. Once the nitrate has made its way into deeper layers of soil, many plants can no longer reach it.

As well as transport via leachate water, nutrients can also make it into surface water through erosion. The level of precipitation and relief as well as the soil's infiltration capacity and structural stability play a role here.

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 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, they are available again to the subsequent crop in mineralised form. A suppressive soil 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. The viterra® WASSERSCHUTZ blend is especially designed for this purpose. viterra® MAIS STRUKTUR or an under-sown layer of grass with viterra® UNTERSAT would also be suitable for maize sites with a high N supply potential. In trials, water protection advisors were won over by viterra® INTENSIV and its very low N_{min} content in late autumn. The crucifer-free blend viterra® UNIVERSAL WINTER would be ideal for tight rapeseed crop rotations. For effective nutrient storage in October, we recommend viterra® DEPOT ÖKO.

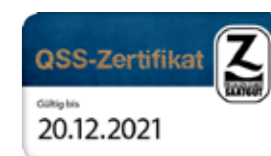


Extra high-quality seeds



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.



Info on brochures and field signs

Contact your Saaten-Union sales advisor for information materials and field signs or simply if you have any questions.

You can also find more information and brochures to download at www.phpetersen.com/downloads or www.saaten-union.de.



Field signs for PR work



Information brochures for game blends



Information brochures for viterra blends



Cover crop blends 2020

Scoring with cover crops.

www.saaten-union.de
www.viterra-mischung.de



Quality pays off.

Strong varieties + strong blends = strong soil

Strong varieties with special agronomical properties to the highest level of seed and cultivation quality form the foundations of **viterra® cover crop blends**.

The strategic combination of individual varieties with their particular properties - with a focus on the subsequent crop and purpose - ensures cover crops deliver the maximum possible benefit.

The programme has been carefully reimagined for 2020. Improved formulas as well as new and optimised blends are the result of a tailored process.

We'd be happy to help you with any questions you may have.

Our blends are grouped by various uses:

Soil fertility blends

viterra® soil fertility blends contribute to humus formation and improve soil fertility. They encourage root penetration and offer protection from erosion. Nitrogen and other nutrients are fixed over winter and remain available in the top layers near the roots. They increase the quality and yield of main crops.

Biomass blends

viterra® biomass blends are ideal for biomass production for bio-gas facilities or for cattle fodder. Summer cereal blends are cultivated as secondary crops after early harvest grains. Winter-hardy blends can provide biomass as a cover crop or main crop. Fodder gaps can be effectively closed with viterra® grass blends.

Special blends

viterra® special blends are used for special applications, such as greening buffer strips and wildlife grazing plots, undersowing with maize or biofumigation. These groups include bee and honey crop blends.

Organic blends

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.





Overview of viterra® blends

Blend	Special feature	Suitable for crop rotation with							Contents as abbreviation	Seed quantity kg/ha	Sowing window							Page
		Maize	Cereals	Repeased	Sugar beet	Potatoes	Legumes	Intensive cultures			March	April	May	June	July	August	September	
INTENSIVE	Healthy blend	+	+	+	+	++	+	++	HS, OR	40-50								38
POTATO	Boosts potatoes	+	+	+	+	++			OR, HS, LN, WIS, LUB	50								38
MULCH	Frost-sensitive blend without clover	++	+	+	++	+	+	+	HS, OR	40-50								39
RÜBE	Professional against nematodes	+	+		++		+		OR, SF	20-25								39
RÜBENGARE NEU	The versatile beet blend	++	++		++				SF, WIS, LN, PHA, AKL, HS	25								40
TRIO	Frost-sensitive blend with clover	+	+	+	++				PHA, AKL, OR	18								40
MAIZE	Fast-growing blend without legumes	++	+				++		PHA, OR, HS, SOL, LN	20-25								41
MAIS STRUKTUR NEU	Loosens stressed soil	++	+						PHA, WR, IKL, HS, OR, WIS, SOL	30								41
SCHNELLGRÜN	Suitable for late sowing, with clover	++	+						SF, AKL, LND, SFB	15								42
SCHNELLGRÜN LEGUMINOSENFREI	Suitable for late sowing, without clover	++	+				++		SF, LN, LND, SFB	15								42
UNIVERSAL	Crucifer-free and fast-growing	++	+	++	+				PHA, HS, AKL, PKL, WIS	25								43
UNIVERSAL LEGUMINOSENFREI	Crucifer-free and fast-growing	++	+	++	+		++		PHA, HS, LN	25								43
UNIVERSAL WINTER	Crucifer-free and evergreen	++	+	++	+		+		WV, PHA, HS	25-45								44
BODENGARE	A powerhouse for main crops	++	+	++	+				PKL, PHA, AKL, WIS, EF, LUB, SOL, LN, BA	50								44
RAPS	Frost-sensitive blend without crucifers	+	++	++	+				PHA, LN, AKL, PKL	15								45
WASSERSCHUTZ	For effective groundwater protection	++	++				+	+	RAW, RUW, KOF	10-12								45
GRANOPUR	Summer cereal mix for WPS use before winter	++	++	+	+	+	+	+	TIS, RS, HS, HA	135-150								46
GRANOLEG	Summer legume mix for WPS use before winter	++	++	+	+				TIS, RS, HA, EF, HS	135-150								46
WICKROGGEN	Winter-hardy WPS blend	++	+	+	+				RW, WIW	100-120								47
LUNDSCGAARDER GEMENGE	Evergreen, greening-compatible with possible use as fodder	++	++	++	+				WV, IKL, WIW, EF	50								47
FUTTER	Grass-clover blend for harvest after winter	++	++	+	+	+	+	+	WV, IKL	35								48
SOMMERFUTTER	Feed mix, can be used in growing year	++	++	++	+				WV, WEI, PKL	25								48
SOMMERFUTTER A2	Grass blend for harvest in growing year	++	++	++	+		+		WV, WEI	40								49
UNTERSAAT	For sustainable maize cultivation	++							WV, WD	10-15								49
BIENE	Annual bee/honey fallow without crucifers	++	+	++	+				PHA, PKL, AKL, LUZ, Dill, WIS, EF, RBL, LUB, SOL, SD	25								50
MULTIKULTI	Annual bee/honey fallow	++	+		+				PHA, PKL, AKL, SF, SD, OR, WIS, LUB, SOL, BOR, EF, BW	25								50
HORRIDO	Biennial gameland pasture blend	+	+						BW, HS, SD, WIW, AKL, PKL, SOL, LN, OR, WKL, PHA, RAW, WR, KOF	25-30								51
HOCHWILD NEU	Biennial gameland pasture blend without crucifers	++	++	++					RKL, LUZ, AKL, IKL, EF, LUB	30-40								51
BIOFUMIGATION	For biofumigation, tackles soil-borne pests					+	++	++	SFB, OR	15								52
BLÜHZAUBER	The flowering meadow	Not recommended for arable farming							Over 40 flowering varieties	5-7 g/m ²								52

Sow by 01.10 for greening

More information about viterra® blends:

AKL Egyptian clover, BA broad bean, BOR borage, BW buckwheat, EF field pea / winter field pea, ESP sainfoin, HA oat, HS black/bristle oat, IKL crimson clover, KOF marrow steam kale, LN flax, LUB blue lupin, LUZ alfalfa, LND camelina, MAL hollyhock, OR oilseed radish, PHA phacelia, PKL Persian clover, RAW winter forage rape, RBL marigold, RKL red clover, ROT red fescue, RS spring rye, RW population winter rye, RUW winter turnip rape, SD serradella, SFB brown mustard, SF white mustard, SOL sunflower, TIS spring triticale, WAL wild rye, WD perennial ryegrass, WEI annual ryegrass, WIS common vetch, WIW winter vetch, WKL white clover, WV Italian ryegrass

+ suitable for appropriate crop rotations ++ especially suitable and recommended for appropriate crop rotations G greening-compatible (Status as of January 2020)



Organic blends

viterra® organic blends are a valuable basis for good crop rotation in organic farming.

One main focus of **viterra® organic blends** is optimising the flow of nutrients within crop rotations. Symbiotic nitrogen binding as well as nutrient conservation come into effect.

In organic farming, efficient weed suppression is especially important. The vigorously-growing components in reliable **viterra® organic blends** meet these needs.

As well as the targeted use of individual blends to control nematodes or produce fodder, all **viterra® organic blends** encourage soil life and contribute to increasing soil fertility.

All **viterra® organic blends** meet the requirements of EU Act 834/2007. The blends are checked by our testing body DE-Öko-003. You can download the certificate at www.phpetersen.com or www.saaten-union.de.

	Special feature	Suitable for crop rotation with							Amount of seed kg/ha	Sowing window					Page	
		Maize	Cereals	Rape-seed	Sugar beet	Potatoes	Legumes	Vegetables		June	July	Aug	Sep	Oct		
INTENSIV ÖKO	Health blend	+	+	+	+	++	+	++	40-50							53
BODENGARE ÖKO	Nitrogen supplier	++	+	++	+				60-70							54
DEPOT ÖKO	Nutrient reservoir	++	++				++		25							54
LUNDSCGAARDER GEMENGE ÖKO	Evergreen grasses and legumes for fodder	++	++	++	+				50							55
WINTER-QUARTETT ÖKO	For flexible winter greening and fodder	++	++						50 or 80							55
WICKROGGEN ÖKO	Winter-hardy blend for fodder or green manure	++	+	+	+				100-120							56
WICKROGGEN FUTTER ÖKO	Winter-hardy blend for fodder or green manure	++	+	+	+				100-120							56





viterra® INTENSIV

ALSO AVAILABLE as an organic blend (see page 53)

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
INTENSIV	X	X	X	X	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						



viterra® POTATO

The boost for potatoes

- Substantial blend to improve soil and enrich humus in potato crop rotations
- 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
- Blue lupin and common vetch provide nitrogen, while oilseed radish and bristle oat quickly convert nitrogen into organic matter.
- Excellent erosion protection, not winter-hardy

Optimised 2020 blend

RECOMMENDATION	SUITABLE FOR CROP ROTATION WITH						
	Maize	Cereals	Rapeseed	Sugar beet	Potatoes	Legumes	Intensive cultures
POTATO	X	X	X	X	XX		
Seed proportions	46% oilseed radish CONTROL, 18% bristle oat PRATEX, 16% flax JULIET, 16% common vetch, 4% blue lupin ILDIGO						
Sowing	Early-mid July to mid August						
Sowing density	50 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® 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	XX	X	X	XX	X	X	X
Seed proportions	56 % bristle oat PRATEX, 44% nematode-resistant oilseed radish COMPASS						
Sowing	Mid July to early September						
Sowing density	40 - 50 kg/ha						



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	X	X		XX		X	
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						



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® RÜBENGARE **NEW**

The versatile beet blend

- No multiplication of beet cyst nematodes
- Intensive root penetration of the upper soil through complementary root shapes of deep, flat and cordate rooting plants
- Can be sown with a shaker, phacelia seeds are pelleted so can be scattered to germinate in the dark.
- 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

RECOMMENDATION	SUITABLE FOR CROP ROTATION WITH						
	Maize	Cereals	Rapeseed	Sugar beet	Potatoes	Legumes	Intensive cultures
RÜBENGARE	XX	XX		XX			
Seed proportions	29% phacelia ANGELIA pelleted, 20% flax ZOLTAN, 16% Egyptian clover, 18% white mustard VERDI, 11% bristle oat PRATEX, 6% common vetch						
Sowing	July to late August						
Sowing density	25 kg/ha						



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

Optimised 2020 blend

RECOMMENDATION	SUITABLE FOR CROP ROTATION WITH						
	Maize	Cereals	Rapeseed	Sugar beet	Potatoes	Legumes	Intensive cultures
TRIO	X	X	X	XX			
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						

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

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

Optimised 2020 blend

RECOMMENDATION	SUITABLE FOR CROP ROTATION WITH						
	Maize	Cereals	Rapeseed	Sugar beet	Potatoes	Legumes	Intensive cultures
MAIS	XX	X				XX	
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 - 25 kg/ha						



viterra® MAIS STRUKTUR **NEW**

Loosens compacted 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 soil-improving STINGER radish, leaves looser soil with increased infiltration
- Common vetch and crimson 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

RECOMMENDATION	SUITABLE FOR CROP ROTATION WITH						
	Maize	Cereals	Rapeseed	Sugar beet	Potatoes	Legumes	Intensive cultures
MAIS STRUKTUR	XX	X					
Seed proportions	25% phacelia ANGELIA, 22% winter turnip rape, 21% crimson clover, 16% bristle oat PRATEX, 8% nematode-resistant oilseed radish ADAGIO, 4% oilseed radish STINGER, 3% common vetch, < 1% sunflower						
Sowing	Late July to late August						
Sowing density	30 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® 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						



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% camelina, 19% brown mustard ENERGY						
Sowing	Early August to mid-late September						
Sowing density	15 kg/ha						



viterra® UNIVERSAL

Crucifer-free and fast-growing

- 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
- Balanced combination of nitrogen binders and feeders, enables the formation of organic mass
- **viterra® UNIVERSAL** is also available as **viterra® UNIVERSAL LEGUMINOSENFREI** for crop rotations with rapeseed and legumes
- Phacelia, vetch and clover flowers attract countless insects

RECOMMENDATION	SUITABLE FOR CROP ROTATION WITH						
	Maize	Cereals	Rapeseed	Sugar beet	Potatoes	Legumes	Intensive cultures
UNIVERSAL	XX	X	XX	X			
Seed proportions	50% phacelia ANGELIA, 26% bristle oat PRATEX, 11% Egyptian clover, 10% Persian clover FELIX, 3% common vetch						
Sowing	Early July to early September						
Sowing density	25 kg/ha						



viterra® UNIVERSAL LEGUMINOSENFREI

Crucifer-free and fast-growing

- 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	XX	X	XX	X		XX	
Seed proportions	45% phacelia ANGELIA, 29% bristle oat PRATEX, 26% flax ZOLTAN						
Sowing	Early July to early September						
Sowing density	25 kg/ha						



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						



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 2020 blend

RECOMMENDATION	SUITABLE FOR CROP ROTATION WITH						
	Maize	Cereals	Rapeseed	Sugar beet	Potatoes	Legumes	Intensive cultures
RAPS	X	XX	XX	X			
Seed proportions	53% phacelia ANGELIA, 23% oil flax ZOLTAN, 15.5% Persian clover FELIX, 8.5% Egyptian clover						
Sowing	Early July to late August						
Sowing density	15 kg/ha						



viterra® BODENGARE

A powerhouse for the crop rotation

- Promotes soil structure, revegetation and crumb formation to improve soil fertility
- After early preceding crop (e.g. WPS) as a summer cover crop for soil regeneration, free from grasses
- Existing tillage encourages aeration and water flow, preventing capping
- Enriches plant life and habitats for many insects and beneficial organisms
- High proportion of legumes collects additional nitrogen
- Crucifer-free, especially suitable for oilseed rape crop rotation
- Now with small-grained AVALON broad bean for structure



ALSO AVAILABLE as an organic blend (see page 54)

Optimised 2020 blend

RECOMMENDATION	SUITABLE FOR CROP ROTATION WITH						
	Maize	Cereals	Rapeseed	Sugar beet	Potatoes	Legumes	Intensive cultures
BODENGARE	XX	X	XX	X			
Seed proportions	38% Persian clover, 18% phacelia ANGELIA, 25% Egyptian clover, 8% oil flax JULIET, 6% common vetch, 2% summer field pea, 1% broad bean AVALON, 1% blue lupin ILDIGO, <1% sunflower						
Sowing	Mid June to mid August						
Sowing density	50 kg/ha						



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

Optimised 2020 blend

RECOMMENDATION	SUITABLE FOR CROP ROTATION WITH						
	Maize	Cereals	Rapeseed	Sugar beet	Potatoes	Legumes	Intensive cultures
WASSERSCHUTZ	XX	XX				X	X
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						





viterra® 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
- **viterra® 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	40 % spring triticale, 20 % spring rye OVID, 20 % bristle oat PRATEX, 20 % oat						
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						



viterra® GRANOLEG

WPS use before winter with legumes

- For biomass production after whole plant silage or an early cereal harvest with cutting before winter
- **viterra® 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, 20% spring rye OVID, 20% oat, 20% summer field pea, 10% bristle oat PRATEX						
Sowing	Mid July to late September						
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						

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® WICKROGGEN

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



ALSO AVAILABLE AS AN ORGANIC BLEND (see page 56)

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						



viterra® LUNDSGAARDER GEMENGE

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)



ALSO AVAILABLE AS AN ORGANIC BLEND (see page 55)

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						

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® 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						



viterra® 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 **viterra® 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						
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						

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® 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 **viterra® 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 Aug)						
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						



viterra® UNTERSAAT

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

RECOMMENDATION	SUITABLE FOR CROP ROTATION WITH						
	Maize	Cereals	Rapeseed	Sugar beet	Potatoes	Legumes	Intensive cultures
UNTERSAAT	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						

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

Annual bee/honey fallow without crucifers

- Top recommendation as fallow with honey plants for creating ecological compensation area
- 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 2020 blend

RECOMMENDATION	SUITABLE FOR CROP ROTATION WITH						
	Maize	Cereals	Rapeseed	Sugar beet	Potatoes	Legumes	Intensive cultures
BIENE	XX	X	XX	X			
Seed proportions	35% Persian clover FELIX, 28% Egyptian clover, 14% phacelia ANGELIA, 11% dill, 4% serradella, 3% alfalfa, 2% common vetch, 1% marigold, 1% summer field pea, <1% blue lupin, <1% sunflower						
Sowing	Early March to late May (please see AUM sowing requirements)						
Sowing density	25 kg/ha						



viterra® MULTIKULTI

Annual bee/honey fallow

- Top recommendation for honey fallow 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

Optimised 2020 blend

RECOMMENDATION	SUITABLE FOR CROP ROTATION WITH						
	Maize	Cereals	Rapeseed	Sugar beet	Potatoes	Legumes	Intensive cultures
MULTIKULTI	XX	X	X	X			
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						

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

- Suitable for all small native game
 - Flowers attract lots of insects
 - Tasty grains for wild birds
 - Winter-hardy components offer grazing and cover for rabbits, deer and other small game 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 2020 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, 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						



viterra® HOCHWILD **NEW**

Biennial game pasture blend without crucifers

- 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
- Suitable as a cover crop for ecological priority zones as part of greening
- Free from crucifers and grasses

RECOMMENDATION	SUITABLE FOR CROP ROTATION WITH						
	Maize	Cereals	Rapeseed	Sugar beet	Potatoes	Legumes	Intensive cultures
HOCHWILD	XX	XX	XX				
Seed proportions	28% red clover, 26% alfalfa, 21% Egyptian clover, 19% crimson clover, 3% winter field pea, 3% lupin						
Sowing	March to June						
Sowing density	30-40 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® BIOFUMIGATION

Against soil-borne pests

- For controlling soil-borne diseases such as fusarium and rhizoctonia by using biologically active plant substances (principle of biofumigation)
- Fast-growing blend for crop rotations that only leave a short time for cover crops
- Formation of leafy biomass
- At the time of full flowering (7-8 weeks after sowing), chop the plants as finely as possible and work into the soil
- Phytosanitary effect

RECOMMENDATION	SUITABLE FOR CROP ROTATION WITH						
	Maize	Cereals	Rapeseed	Sugar beet	Potatoes	Legumes	Intensive cultures
BIOFUMIGATION					X	XX	XX
Weight percentages	50% brown mustard ENERGY, 50% multi-resistant oilseed radish DEFENDER						
Sowing	Early May to mid September						
Sowing density	15 kg/ha						
Relevant legume proportion according to DüV: 0%							



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/m ²						



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



Naturally cover crops

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.

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

The purity and germination of these high-quality seeds exceed the legal norm and form the basis for successful arable farming - in

organic much more than conventional farming. As well as our viterra® organic blends, our organic seed portfolio also includes single crop seeds for the following cultures: Forage rye (e.g. PROTECTOR), spring rye (e.g. OVID), bristle oat (e.g. PRATEX), oilseed radish (e.g. SILETINA), white mustard (e.g. ACCENT), phacelia (e.g. ANGELIA), common vetch (variety on request), buckwheat (variety on request)



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	X	X	X	X	XX	X	XX
Weight percentages	70% bristle oat PRATEX 30% multi-resistant oilseed radish DEFENDER						
Sowing	Mid July to early September						
Sowing density	40-50 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® 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
- Now with small-grained AVALON broad bean for structure

Optimised 2020 blend

RECOMMENDATION	SUITABLE FOR CROP ROTATION WITH						
	Maize	Cereals	Rapeseed	Sugar beet	Potatoes	Legumes	Vegetables
BODENGARE ÖKO	XX	X	XX	X			
Weight percentages	20% common vetch, 28% field pea, 28% broad bean AVALON, 15% blue lupin ILDIGO, 6% Egyptian clover, 3% phacelia ANGELIA ÖKO						
Sowing	Mid June to mid August						
Sowing density	60-70 kg/ha						



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
- 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	46% bristle oat PRATEX, 30% oilseed rish SILETINA, 10% white mustard, 10% phacelia ANGELIA, 4% sunflower						
Sowing	Late July to late August						
Sowing density	25 kg/ha						



viterra® 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						



viterra® WINTERQUARTETT ÖKO

For flexible winter greening and fodder

- Frost-hardy blend interacting components for fodder, soil improvement and soil protection: viterra® WINTERQUARTETT ÖKO can also be used as fresh fodder, late pasture and silage
- For winter greening with a long growth phase for vegetated soil to stimulate soil microbiology and increase soil fertility
- The flat, loose working in of green manure in spring maintains soil structure and creates ideal sowing conditions for maize
- Continuous growth supports valuable soil, putting sunlight to optimal use
- Energy-rich root exudates nourish soil life and promote humus formation.

RECOMMENDATION	SUITABLE FOR CROP ROTATION WITH						
	Maize	Cereals	Rapeseed	Sugar beet	Potatoes	Legumes	Vegetables
WINTERQUARTETT ÖKO	XX	XX					
Weight percentages	67% winter rye INSPECTOR, 13.5% Italian ryegrass, 11.5% crimson clover, 8% winter forage rape EMERALD						
Sowing	June to October: suitable for early and late sowing						
Sowing density	50 kg/ha for winter greening 80 kg/ha for fodder use						



viterrä® 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
- **viterrä® WICKROGGEN ÖKO** helps keep plots 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						



viterrä® 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
- As **viterrä® WICKROGGEN FUTTER ÖKO**, the blend also 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						



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 evenly distributed straw 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 incorporate in spring than a few strong plants.

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 (Please see regional regulations)

Cultivation 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.



Low seed density

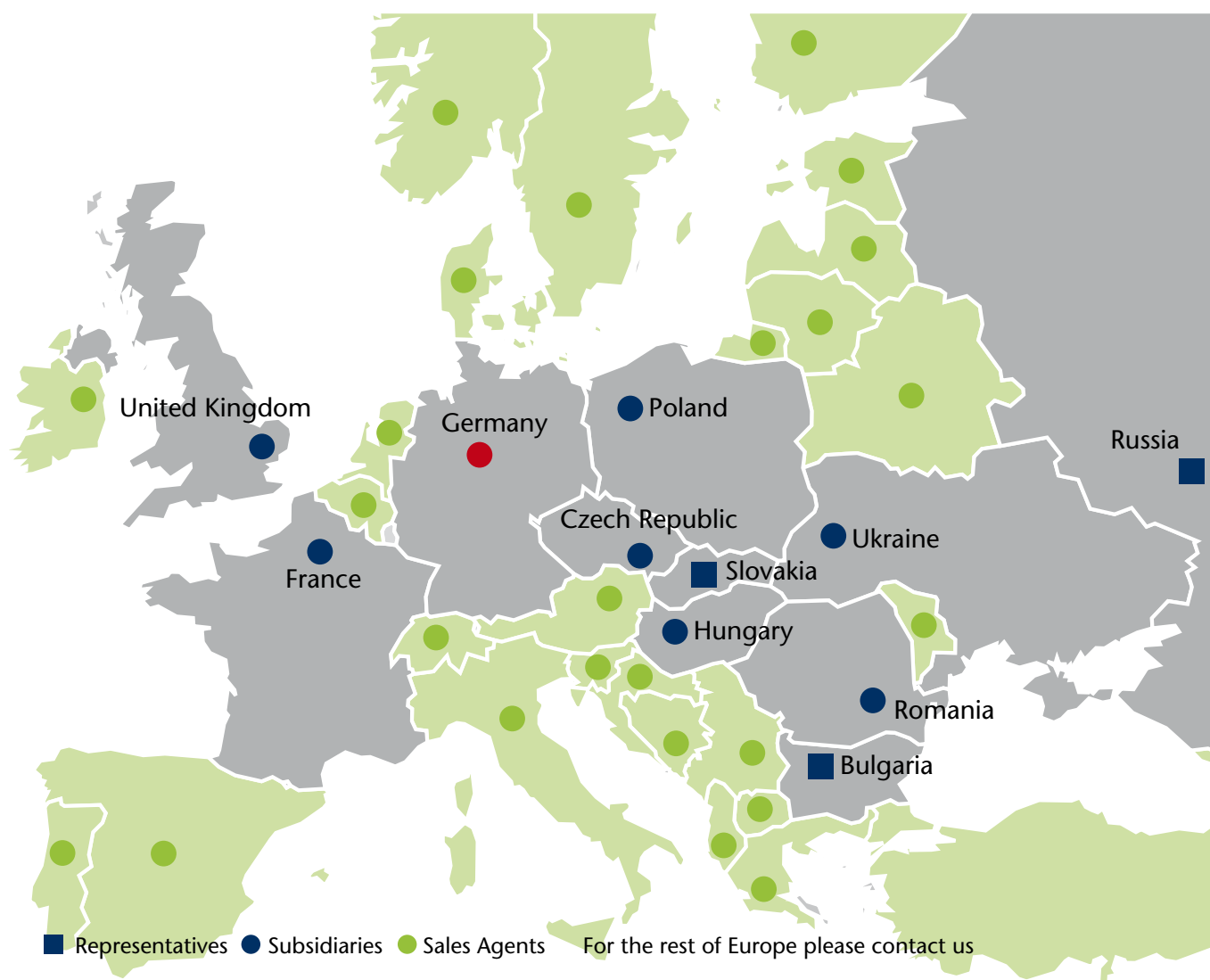
- ✗ Thick individual plants
- ✗ Frost tolerance
- ✗ Gaps in thin soil coverage
- ✗ Weed proliferation
- ✗ Green bridges
- ✗ Nutrient loss

Suitable seed density

- ✓ Frost sensitivity
- ✓ Erosion protection
- ✓ Pest reduction
- ✓ Soil loosening
- ✓ Nutrient reservoir
- ✓ Humus formation

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.

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.

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