

Innovations & Product Guide

Grass and other forage crops



 **BARENBRUG**

Great in Grass

Edition 2015 - 2016

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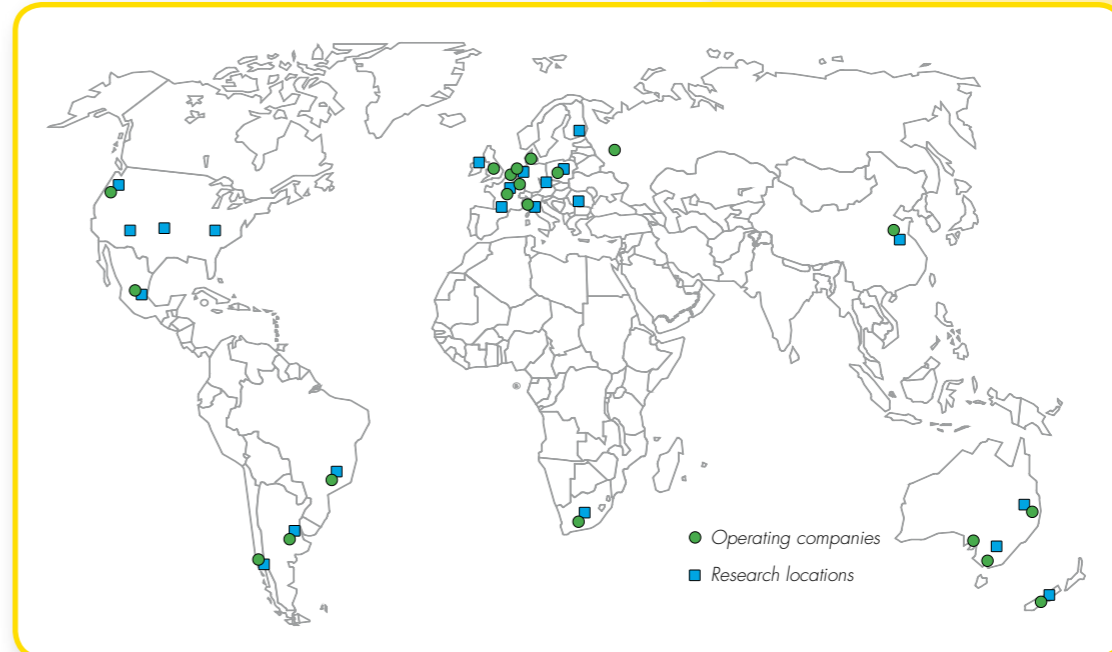
Passion for Grass

We are the global leader in seeds for turf grass, forage grass and legumes. With our international focus, we offer local, sustainable solutions with added value to end-users around the world. We offer continuity to our customers, suppliers and shareholders while creating an inspiring and rewarding environment for our employees. As an innovative family-owned company, we focus on Research & Development and the successful marketing of innovative products. We aim to further strengthen our position in existing markets and use this strong foundation to enter new markets.

Barenbrug

Passion for Grass

We have a passion for grass that we share with our customers and growers; this is something that four generations of the Barenbrug family have shared through to the present day. We have achieved our position in the grass seed market not just by putting our craftsmanship into practice; it is a role that we have built up and cultivated over the years. The basis for our success is captured in five core values: Innovation, Partnership, International, Quality and Marketing.



R&D and innovations

Trial locations Barenbrug Research



Research & development

Grass is a wonderfully versatile and adaptable plant, offering an enormous diversity of over 8,000 species. Barenbrug takes only a small proportion of these to carefully select and cross them in order to develop improved commercial varieties of particular species. Barenbrug runs breeding programmes for grasses and forage legumes at 10 breeding stations worldwide. Local testing of varieties and mixtures is extremely important. For that reason, Barenbrug Research runs over 29 testing locations all over Europe (see map at page 6). This makes our products locally adapted and reliable.

Grass has a tendency to make the best of even the most difficult conditions. However, specific selection and breeding for differing climatic conditions produces grasses that are supremely able to exploit their environment. The results are extremely successful cultivars which can cope with seasonal variations, both within and between seasons. The main traits where our products are selected on are: forage yield, feed quality, persistency, sward density, winter-hardiness, disease resistance and drought-tolerance. Other characteristics as lodging resistance, growth pattern, palatability and traffic tolerance are taken into account as well. After a long and intensive evaluation a new cultivar can be launched after approx. 15 years.

Northern European areas	Nordic climate (cold winters and mild humid summers)
Central and eastern European areas:	Eastern - continental climate (cold winters and hot, dry summers)
Western European areas:	Oceanic climate (mild winters and humid summers)
Southern European areas and the Middle East	Mediterranean climate

Animal evaluation

As the real 'consumer' of our grasses and legumes are animals, many trials are conducted with live animals (cows, sheep, horses). Grass varieties at Barenbrug Research trial locations are tested under grazing, to observe their palatability, survival and adaptability to real farm situations. Also feed quality (ie. digestibility, protein, energy, fibre, minerals etc.) of all grass and legume varieties is evaluated both in simulated situations (laboratory) as by live animals.

The use of animal evaluation in forage breeding and development is essential to select the highest quality products which exactly suits the need of our customers.

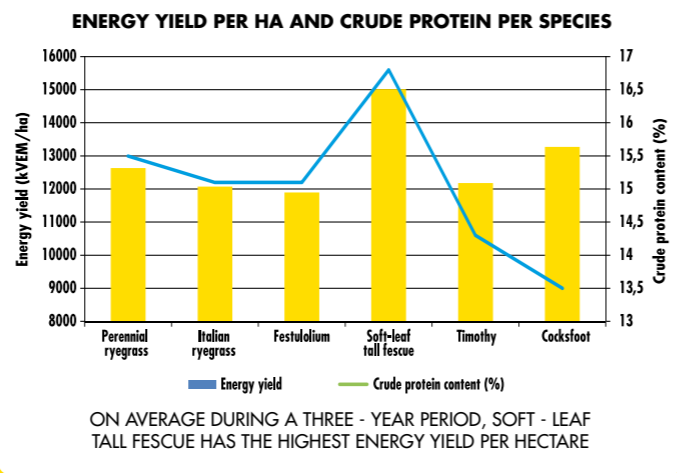
NutriFibre

Finally; effective fibre and feed value in one



The success factor of NutriFibre by Barenbrug is its combination of effective fibre and feed value. NutriFibre is based on soft-leaf tall fescue.

Traditional tall fescue offers a combination of high long-term yield, hard leaves and a low feed value. Barenbrug has now succeeded in considerably improving both the palatability and feed value of this species, thus creating a soft-leaf tall fescue. This makes NutriFibre silage the perfect source of forage for the modern dairy farm.



SOURCE
 ▶ Summary of trials at Barenbrug Research (NL), Knowledge Center for Agriculture (DK), Gent University (BE) and ISF Schaumann GmbH (DE).

Up to 30 % more yield

Tall fescue establishes slowly because it invests a lot of energy in the development of its root system in the first year. But after that first year, tall fescue produces 25 - 30 % more mass than perennial ryegrass, corresponding to around €750,— more profit per hectare per year.

During prolonged drought the advantage is even significant more; the long roots of NutriFibre are able to absorb water from deeper layers in the soil so that the grass will continue to grow. Scientific research shows significant more energy and protein yield with NutriFibre compared to other species.
 (Source: Cougnon, M., 2013. Potential in mixed sward and breeding of tall fescue. Gent University, Belgium.)

Forage with effective fibre for healthy cattle

Healthy cattle are the first matter of importance. The NutriFibre technology ensures that the silage offers cattle more effective fibre.

Trials carried out with rumen fistulated cattle showed that silage containing NutriFibre promotes rumen activity and therefore prevents rumen acidosis. This approach therefore ensures that cattle remain healthier and perform better.

Minimal rumen acidosis with NutriFibre

Rumen acidosis occurs at 60 % of all high-productive dairy farms. The pH in the rumen of animals affected by rumen acidosis is too low, causing the rumen flora to malfunction. This results in disappointing milk production, low protein and fat contents and problems concerning fertility and claw health. Research into the effects of different grass species on the rumen of fistulated cattle show that soft-leaf tall fescue offers a combination of effective fibre with additional rumen activity and digestible cell walls, so that the feed value is also high.

SOURCES

- ▶ Kleen, J.L., Hooijer, G. A., Rehage, J. & Noordhuizen, J. P. T. M. (2004). Subacute ruminal acidosis in Dutch dairy herds. *Veterinary Record* 2009;164:681 - 684 doi:10.1136/vr.164.22.681.
- ▶ Laarhoven, W. van, dairy consultant at Valacon Dairy. Quote in 'De Molenaar' magazine, volume 115, issue 6, 2012.

Resistant to drought

It is only really worthwhile harvesting a high tonnage over a period of several years, if the grass has the required persistency. NutriFibre's deep roots extract water from lower soil levels, while also better utilising soil nutrients and fertilizers. NutriFibre's deep rooting (up to a depth of 105 cm) is a great benefit in this regard. Simply compare it with perennial ryegrass, whose root formation is concentrated in the upper 10 cm of soil (see picture).



Root formations of perennial ryegrass (left) and soft-leaf tall fescue (right).

Mineral efficiency

Soft-leaf tall fescue utilises more of the nitrogen contained in the soil than perennial ryegrass. It can therefore yield up to 450 kg of crude protein more per hectare on the same amount of fertilizer.

Fertiliser	200 kg N/ha	400 kg N/ha	200 kg N/ha	400 kg N/ha
GRASS SPECIES	DRY MATTER YIELD IN TONS/HA		CRUDE PROTEIN YIELD IN KG/HA	
Perennial ryegrass	10.3	12.2	1994	2619
Cocksfoot	13.2	14.2	2394	2663
Tall fescue	13.8	14.3	2444	2925

SOURCE
 ▶ Louis Bolk Institute, 2011

Prota Plus

More protein from your own land

That's what farmers need to prevent high feed costs. Concentrate feed is very expensive, so there is a need to increase on-farm protein production.

For this reason Barenbrug has launched a new concept: Prota Plus. Prota Plus is a seed mixture for short-term protein production. This combination of the best ryegrasses and annual clovers provides a high quality feed for dairy cows.

High feed value

Concentrate prices are sky-high at the moment. Prices of cereals and soybean meal have increased over 150 % in recent years and are not likely to fall. Buying in additional protein is a huge cost factor, especially for farms which feed a lot of corn silage. Feeding more high quality grass silage is one part of the solution, but more can be done.

This situation prompted Barenbrug to come up with other solutions to get more home-grown protein sources. Legumes can play an important role in this, as they are a natural nitrogen supplier. Fast-growing annual clover can be particularly important on farms which grow winter forage crops. These legumes boost nitrogen levels in the crop and more importantly, protein levels in the silage. However, it's not always easy to achieve the optimal combination of grasses and clovers. Barenbrug has tested a lot of different combinations and mixtures of grass and legumes in different areas in developing Prota Plus.

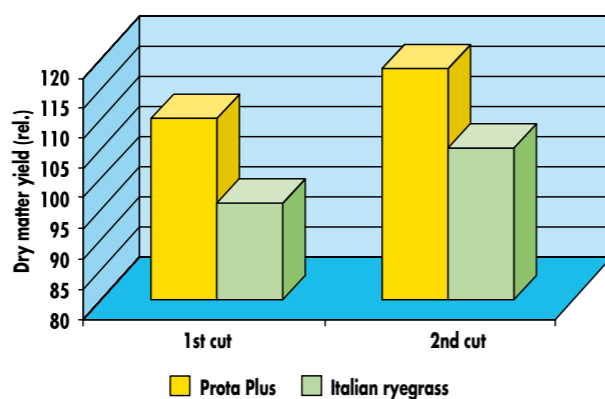
Feed analysis from the silage proved that the feed value, and especially digestible protein, increases substantially. Silage from Prota Plus compared to pure ryegrass:

- + 5 - 15 % energy (MJ ME).
- + 30 - 50 % digestible protein.

The extra protein produced on one hectare is equivalent to 700 - 800 kg soybean meal. With current feed prices this means that €300,-/ha can be saved on concentrate costs by using Prota Plus.

High dry matter yield

Results from several trials by Barenbrug Research have shown that Prota Plus can yield up to 20 % more dry matter per hectare than pure ryegrass. This can be seen from the graph below. The extra supply of nitrogen from the legumes gives a boost to the forage production.








Composition*

Prota Plus is a high-quality mixture containing top varieties of annual ryegrasses combined with annual clovers like Persian, Crimson and Berseem clover. The exact composition is based on the specific area and management system. Prota Plus has been developed by Barenbrug Research after internal trials and field-tested in many different regions.

* The exact composition is based on the local conditions and management system, such as climate, soil condition, sowing periode, cutting frequency and silage or grazing use.

For example: in mixtures for autumn sowing a higher content of Westerwold ryegrass is applied. Or: in dry areas Crimson clover is the best performing type and therefore the main clover species in the mix.

The species of Prota Plus	Benefits	Picture
Westerwold ryegrass (<i>Lolium multiflorum</i> Var. <i>Westerwoldicum</i>)	Very fast establishing, outstanding yield in 1st cut, high in feed value. Tetraploids for silage, diploids also suited for hay.	
Italian ryegrass (<i>Lolium multiflorum</i>)	High-yielding, fast regrowth, perfect for multi-cut swards, high in feed value and palatability.	
Crimson clover (<i>Trifolium incarnatum</i>)	Fast establishing, high yield in 1st cut, drought-tolerant, excellent protein quality, suitable on acid soils.	
Berseem clover (<i>Trifolium alexandrinum</i>)	Late flowering, fast establishing, perfect for multi-cut swards, outstanding on humid soils.	
Persian clover (<i>Trifolium resupinatum</i>)	High-yielding, more prostrate growth habit, excellent protein quality.	

Yellow jacket

Guaranteed top yields for lucerne with Yellow Jacket enhanced seed coating



Yellow Jacket - Rhizobium coating is Barenbrug's enhanced seed coating for lucerne. Using new technology, high levels of effective Rhizobia are embedded in a protective polymer matrix. Together with a nutrient booster containing all essential

minerals and trace elements, this product is designed to improve establishment and increase forage production. All of our lucerne varieties are available with Yellow Jacket seed coating.

Reasons for using Yellow Jacket - Rhizobium coating:

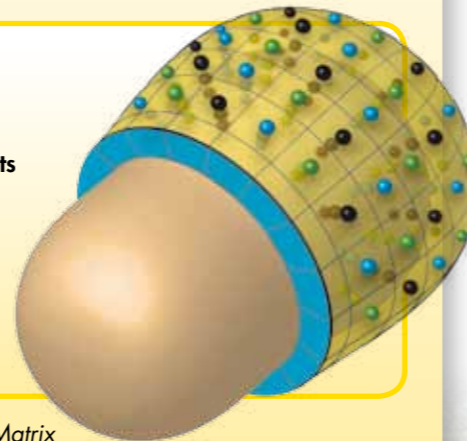
- A ready-made product saves labour, reduces risks.
- Unique Rhizobium strain.
- Improved establishment under difficult conditions.
- Better use of available water and soil moisture.
- Increased disease resistance.
- Improved nitrogen fixation.
- Increased forage and protein yield.

All of our lucerne varieties are available with Yellow Jacket seed coating.

Protective Polymer Matrix - unique Rhizobium strain

A new, unique Rhizobium strain was developed by Barenbrug for this product through the extensive selection of many strains under a wide range of conditions. The new strain has demonstrated perfect survival capabilities under tough conditions. This ultimately ensures that more vigorous Rhizobia are present in the soil. Extensive research and field trials at Barenbrug Research have shown that lucerne seeds with Yellow Jacket - Rhizobium coating benefit forage production, especially under tough conditions.

- Rhizobium
- Nutrients
- Trace elements



Protective Polymer Matrix

Proterra Maize

Green manure grass for undersowing in maize



Improves soil fertility and structure by intensive rooting

During summer Proterra Maize develops slowly under the maize crop. The strong grasses tolerate shade and are drought-resistant. Shortly before the maize is ready to harvest its growth increases, as more light penetrates through the maize crop.

Directly after harvesting the maize, a well-established green manure grass covers the field. Proterra Maize produces roots up to 90 cm deep, which is excellent for soil structure. It produces a lot of organic matter which is ideal for soil fertility. Proterra Maize prevents leaching of nutrients and forms a perfect green manure for the following crop.

Contains specially selected grasses

The grass species and varieties used in Proterra Maize are specially selected for developing under a cover crop without competing with the maize. They grow well but slowly under the shade of the large maize plants. During periods when the maize needs all its energy for starch formation, the growth of Proterra Maize is temporarily restricted to avoid competition.

Sown directly or shortly after maize

It is important to sow Proterra Maize directly or shortly (*within 7 days*) after sowing maize. At this time the soil usually contains enough moisture. By sowing in the same period, the Proterra Maize will be well-established at the time of herbicide treatment. If it is sown too late there's a risk of failure due to drought.

Sowing can be done in different ways:

- With a special grass-sowing unit on the maize sowing machine, sowing directly with maize.
- With a grass sowing machine or harrow/sowing unit in the week before or after maize has been sown.

Tolerant to herbicides

Extensive trials by independent institutes* prove that Proterra Maize is tolerant to many herbicide treatments. Weeds and weed grasses can be tackled, whereas the green manure crop will survive. The herbicide slows down the growth of Proterra Maize, the main advantage of which is that it doesn't compete with maize. Ask your local supplier for the recommended herbicide mixes to use on Proterra Maize.

* Agro Research International BV, The Netherlands, 2011+2012.

Gent University, Belgium, 2014.

Knowledge Centre for Agriculture, Denmark, 2014.

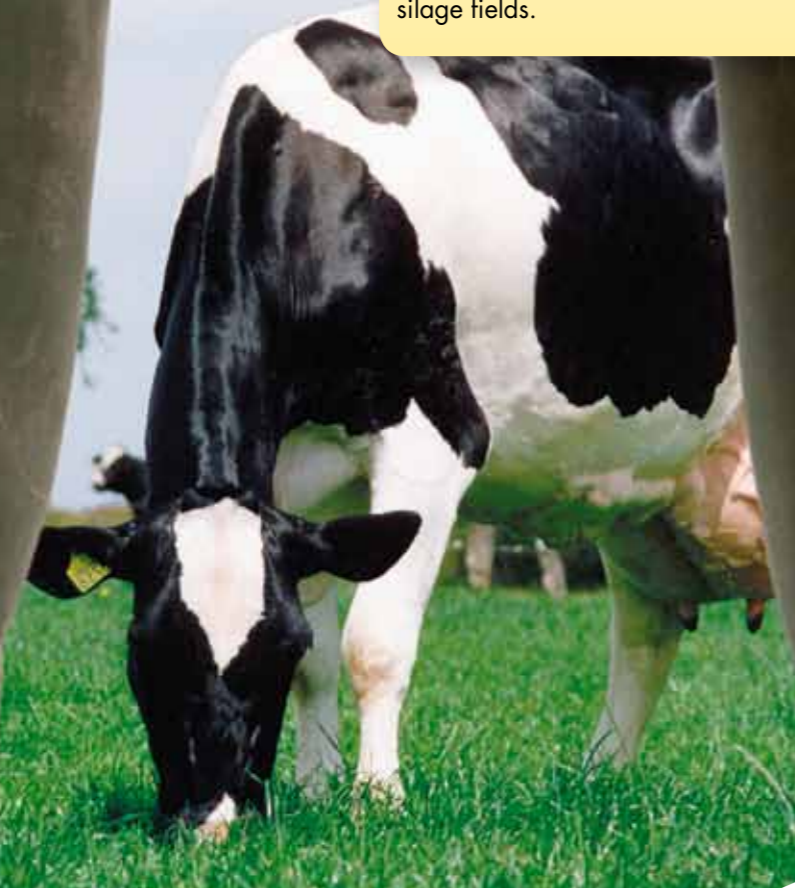
YELLOW JACKET COATED SEEDS

UNCOATED SEEDS

Grassland

From an economic point of view, grassland plays a significant role on every dairy farm. Dairy herds are growing, as is milk production per cow, which is why farmers are constantly looking for ways to improve the efficiency of their grassland. A balanced feed ration is required. That is why high-performance grassland is essential for long-term profitability. Pastures that produce a massive amount of grass annually are the key to success.

Grassland can be combined with clovers in order to stimulate yield with moderate/low fertilization levels. As clovers fix nitrogen from the air, they are the 'natural' fertilizer for many grasslands. Red and white clover improve protein yields of both grazing and silage fields.



Green Spirit

Massive grass production, better palatability



Green Spirit is our line of grass and clover mixtures for high-yielding farms and offers solutions for the modern farmer. There is a Green Spirit mixture to suit each type of grassland and farm management system available, which provides a massive high quality forage yield, better palatability and improves animal health.

Maximizing returns from grass

Green Spirit mixtures contain a well-balanced composition of Barenbrug's top varieties, so the farmer can get the very best out of grass. These mixtures provide durable and high quality pastures which guarantee a high protein content and high levels of energy and effective fibre in both fresh grass and silage. This maximizes the returns from grass.

The value of Green Spirit grassland

Trials by official institutes and experience on working farms have shown that the varieties used in the Green Spirit mixtures produce at least 5 % more total feed value per hectare than common seed mixtures. This results into 600 - 700 kg dry matter per hectare more, which in practice means enough extra energy and protein available to provide an additional 1,000 kg milk per hectare. With current milk prices a farm can earn €350,— per hectare more every year from Barenbrug's Green Spirit products.

Exclusive distribution

Green Spirit is distributed all over Europe by exclusive Barenbrug dealers.

Green Spirit product line with grass and clover mixtures for high-yielding farms

Temporary grassland (1 - 3 years)		Utilization (years)	Grazing	Silage
Green Spirit Production 1	The ideal solution for short-term forage	1		✓
Green Spirit Production 2	Massive forage yielder for intensive farming	2		✓
Green Spirit Production 3	15 - 20 % more high quality grass	3	✓	✓
Prota Plus	More protein from your own land	1	✓	✓

Permanent grassland (4 years and more)				
Green Spirit Grazing	Delicious fresh grass from pasture	4+	✓	
Green Spirit Silage	Silage with the highest feed value	4+		✓
Green Spirit NutriFibre	Effective fibre and feed value in one	4+		✓
Green Spirit Biogas	For the maximal biogas yield per hectare	4+		✓
Green Spirit Overseeding	The grassland renovator	4+	✓	✓
Green Spirit Lucerne-Grass	High energy grass x high protein lucerne	4+		✓

Clover mixtures				
Quartet	White clover blend	4+	✓	✓
Duet	Red and white clover blend	3 - 4		✓

GREEN SPIRIT

Production 1

The ideal solution for short-term forage



- Silage
- Grazing

- Suitable for 6 - 12 months production.
- Can be used for 1-cut systems as well.
- Ideal for double-cropping.
- Extremely high-yielding.
- Based on varieties with superb standability.
- Leafy grass for maximal digestibility and feed value.
- Efficient utilization of slurry, manure and fertilizers.
- Very resistant to diseases such as crown rust.



Composition*:

Westerwold ryegrass - tetraploid	50 %
Italian ryegrass - tetraploid	50 %

Specifications

- Seed rate: 35 - 45 kg/ha • Sowing period: Mild climates - autumn/spring, Continental/Nordic climates - spring/summer
- Sowing depth: 1.0 - 2.0 cm • Packaging: 15 kg bags

www.barenbrug.biz/greenspirit_1

GREEN SPIRIT

Production 2

Massive forage yielder for intensive farming



- Silage
- Grazing

- Grass for maximum use of 2 years in mild climates.
- 1-year forage for continental and Nordic climates.
- Perfect intercrop on farms with intensive crop rotation.
- Yields 35 % more than permanent grassland.
- Gives excellent silage for high-performance dairy cows.
- Contains diploid Italian ryegrass for better regrowth and sward persistency.
- Improves soil organic matter and soil structure.

Composition*:

Italian ryegrass - tetraploid	50 %
Italian ryegrass - diploid	50 %



Specifications

- Seed rate: 40 - 50 kg/ha • Sowing period: Mild climates - autumn/spring, Continental/Nordic climates - spring
- Sowing depth: 1.0 - 2.0 cm • Packaging: 15 kg bags

www.barenbrug.biz/greenspirit_2

GREEN SPIRIT

Production 3

15 - 20 % more high quality grass



- Silage
- Grazing

- Grass mix for 2 - 3 year production period.
- Excellent for fast crop rotation on many farms.
- Shows good tolerance to (rotational) grazing.
- Contains 'perennial type' hybrid ryegrass varieties.
- Yields 15 - 20 % more than permanent grass leys.
- Superb digestibility high sugar and protein content.
- Faster regrowth, low aftermath heading.
- Very efficient use of nutrients from fertilizers.



Composition*:

Hybrid ryegrass - diploid	30 %
Hybrid ryegrass - tetraploid	30 %
Perennial ryegrass - diploid	20 %
Perennial ryegrass - tetraploid	20 %

Can be combined with clover blend Duet.

Specifications

- Seed rate: 45 - 55 kg/ha • Sowing period: Mild climates - spring-autumn, Continental/Nordic climates - spring/summer
- Sowing depth: 1.0 - 2.0 cm • Packaging: 15 kg bags

www.barenbrug.biz/greenspirit_3

Prota Plus

More protein from your own land



- Silage
- Grazing

- Grass/clover-mixture for 6 - 12 months production.
- Contains very fast developing clover species.
- For silage, fresh feeding or rotational grazing.
- Contains 30 - 50 % more digestible protein, equivalent to 700 kg soybean meal per hectare.
- Excellent feed value and energy content (+ 5 - 15 % MJ).
- Can yield up to 20 % more, especially at lower fertilizer rates.
- Deep rooting clovers improve soil structure and fertility.

Composition*:

Italian/Westerwold ryegrass	50 - 70 %
Crimson/Berseem/Persian clover	50 - 30 %



Specifications

- Seed rate: 35 kg/ha • Sowing period: Mediterranean climates - autumn, Oceanic climates - summer • Sowing depth: 0.5 - 1.0 cm • Packaging: 15 or 25 kg bags

www.barenbrug.biz/protaplus

GREEN SPIRIT Grazing

Delicious fresh grass from pasture



- Silage
 Grazing

- Gives the highest milk production from fresh grass.
- Late heading varieties for the best grass quality.
- Highest disease resistance for maximal intake.
- Fast regrowth, production peak within 3 weeks.
- Long and stable growth curve and grass supply.
- Forms a dense and persistent sward.



Composition*:	N	O	C	M
Perennial ryegrass	✓	✓	✓	✓
Timothy	✓	(✓)		
Tall fescue			✓	(✓)
Meadow fescue	✓	(✓)	✓	
Cocksfoot			(✓)	(✓)

Can be combined with clover blend Quartet.

Specifications

- Sowing rate: 35 - 40 kg/ha • Sowing depth: 1.0 - 1.5 cm
- Packaging: 15 kg bags

www.barenbrug.biz/greenspirit_grazing

GREEN SPIRIT Silage

Silage with the highest feed value



- Silage
 Grazing

- For grassland which is used for silage.
- Suitable for hay or haylage production as well.
- Mix of the best varieties for maximal feed value.
- Gives high digestibility and protein content of silage.
- Saves the farmer on concentrate costs.
- Yields maximal in 30 - 40 day growth periods.
- Durable and long-term persistent.

Composition*:	N	O	C	M
Perennial ryegrass	✓	✓	✓	✓
Timothy	✓	(✓)	(✓)	
Tall fescue	✓		✓	✓
Meadow fescue	✓	(✓)	(✓)	
Cocksfoot			(✓)	(✓)
Bromus			(✓)	

Can be combined with clover blend Quartet or Duet.



Specifications

- Sowing rate: 40 - 45 kg/ha • Sowing depth: 1.0 - 1.5 cm
- Packaging: 15 kg bags

www.barenbrug.biz/greenspirit_silage

GREEN SPIRIT NutriFibre

Effective fibre and feed value in one



- Silage
 Grazing

- Special mixture based on the NutriFibre technology.
- Massive forage, energy and protein for more milk.
- Rich in effective fibre for healthy cattle.
- Up to 30 % more yield than regular grasslands.
- Efficient utilisation of soil nutrients.
- Deep rooting gives excellent drought resistance.



Composition*:	N	O	C	M
Tall fescue	✓	✓	✓	✓
Perennial ryegrass	(✓)	(✓)	✓	✓
Timothy	(✓)	(✓)	(✓)	

Can be combined with clover blend Duet.

Specifications

- Sowing rate: 50 kg/ha • Sowing depth: 1.0 - 1.5 cm
- Packaging: 15 kg bags

www.barenbrug.biz/greenspirit_nutrifibre

GREEN SPIRIT Biogas

For the maximum biogas yield per hectare



- Silage
 Grazing

- Contains grasses with the highest biogas potential.
- Composition based on intensive methane batch-trials.
- Great flexibility in harvest window.
- Can be cut 2 - 6 times per year.
- Non-lodging grass types, easy to process.
- Adapted to high levels of fermenter substrate.
- Ideal for 2 till 5 production years.

Composition*:
Green Spirit Biogas 100 %



Specifications

- Sowing rate: 45 - 50 kg/ha • Sowing depth: 1.0 - 1.5 cm
- Packaging: 15 kg bags

www.barenbrug.biz/greenspirit_biogas

Legenda

N	Nordic climate	✓ = Standard
O	Eastern - continental climate	(✓) = Additional option
C	Oceanic climate	
M	Mediterranean climate	

* Variety selection based on local conditions.

Permanent grassland

Clover blends

GREEN SPIRIT

Overseeding

The grassland renovator



- Silage
- Grazing

- Special product for overseeding existing grasslands.
- Selected for fast establishment at low temperatures.
- Can be used in early spring or late autumn.
- For both grazing as silage purposes.
- Excellent germination and establishment.
- Improves yield and feed value of grasslands.



Composition*:	N	O	C	M
Perennial ryegrass	✓	✓	✓	✓
Hybrid ryegrass	(✓)	(✓)	(✓)	(✓)
Timothy	(✓)		(✓)	
Tall fescue	(✓)		(✓)	(✓)
Meadow Fescue	(✓)		(✓)	

Can be combined with clover blend Quartet.

Specifications

- Sowing rate: 20 - 25 kg/ha (overseeding) • Sowing depth: 1.0 - 1.5 cm • Packaging: 15 kg bags

www.barenbrug.biz/greenspirit_overseeding

GREEN SPIRIT

Lucerne-Grass

High energy grass x high protein lucerne



- Silage
- Grazing

- Better alternative than pure lucerne.
- Good sward balance between grasses and lucerne.
- Grasses that grow in the same rhythm as lucerne.
- More reliable option for new fields in dry areas.
- Sugar from grass increases silage quality.
- Fast developing after sowing.
- Lowers weed pressure.
- Increase yield and persistency.

Composition*:	N	O	C	M
Lucerne	✓	✓	✓	✓
Tall fescue	(✓)	(✓)	(✓)	(✓)
Cocksfoot			(✓)	(✓)
Perennial ryegrass	(✓)	(✓)	(✓)	

Can be combined with clover blend Quartet or Duet.



Specifications

- Sowing rate: 30 - 35 kg/ha • Sowing depth: 0.5 - 1.0 cm • Packaging: 15 kg bags

www.barenbrug.biz/greenspirit_lucerne-grass

Quartet

White clover blend



- Permanent grassland
- Temporary grassland

- Great adaptation to diverse grassland management.
- Four clover varieties to combine strengths.
- Stimulates high yields at low fertilization level.
- Improves palatability and digestibility.
- Can fix up to 150 kg Nitrogen from the air.
- Increases soil life and fertility.



Composition*:	
White clover - large-leaved	25 %
White clover - medium/large-leaved	50 %
White clover - small-leaved	25 %

Specifications

- Add 3 - 5 kg/ha Quartet to the grass mixture
- Sowing depth: 0.5 - 1.0 cm • Seed into warm soil

www.barenbrug.biz/quartet

Duet

Red and white clover blend



- Permanent grassland
- Temporary grassland

- Extremely high yielding at low fertilization levels.
- To be mixed with Green Spirit Silage.
- Red clover produces maximally in first 2 - 3 years.
- White clover takes over and gives persistency.
- Better resistance to traffic than pure red clover.
- Fast developing.
- Can fix up to 250 kg Nitrogen from the air.
- For protein-rich silage.

Composition*:	
Red clover	70 %
White clover - large-leaved	30 %



Specifications

- Add 8 - 10 kg/ha Duet to the grass mixture
- Sowing depth: 0.5 - 1.0 cm • Seed into warm soil

www.barenbrug.biz/duet

Legenda

N	Nordic climate	✓ = Standard
O	Eastern - continental climate	(✓) = Additional option
C	Oceanic climate	
M	Mediterranean climate	

* Variety selection based on local conditions.

Lucerne



The main goal of Barenbrug's lucerne breeding programme is to obtain the maximum farm benefits from lucerne. Our programme is running in northern France (*Flemish types*), southern France (*Mediterranean types*), Romania (*continental types*) and Australia (*non-dormant types*). This gives Barenbrug varieties unique adaptability to different circumstances. Our breeders focus on forage quality and yield. Key elements are digestibility, protein content, disease and nematode resistance, dry matter yield and persistency.

What distinguishes Barenbrug varieties from local 'ecotypes' is their leafiness and stem flexibility. This higher leaf/stem ratio gives a higher protein and energy content. In addition, the plant flexibility protects against leaf loss during harvesting. This leads to more high quality silage/hay and maximum animal production per hectare.

All our varieties are officially listed in the countries where we distribute our seeds. Many Barenbrug varieties are top-ranked in highly rated trials such as the French 'Liste A', the Swiss 'Liste der Empfohlende Sorten' and the list from the Polish 'Coboru'. This confirms the high quality we stand for. Quality also implies seed quality. This means that Barenbrug lucerne seeds have excellent germination rates and are free from harmful weeds such as *Cuscuta (dodder)*. Seed quality of this level is unfortunately not always very common in international trade. Barenbrug guarantees to deliver quality seeds according to the highest standards.

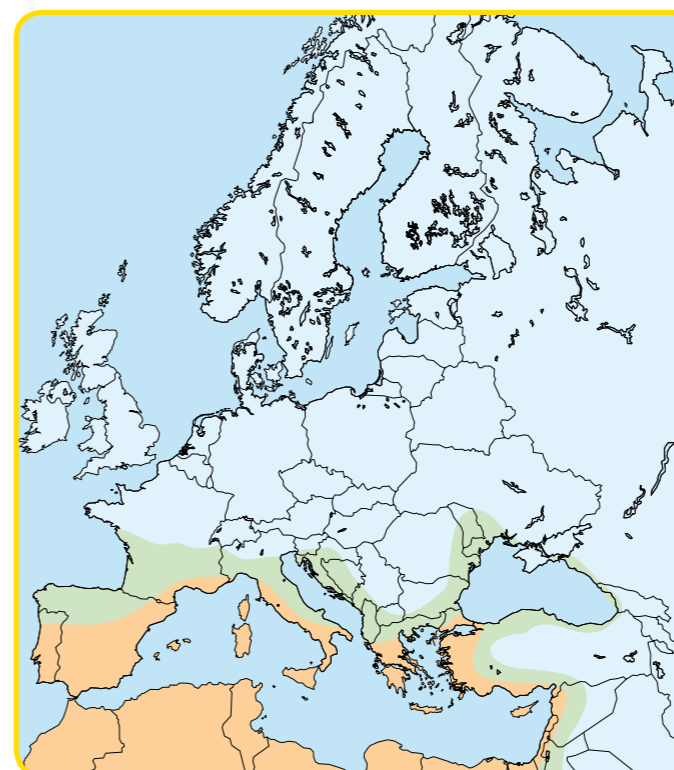
Excellent feed value

As the main forage on many farms, lucerne plays an essential role in animal nutrition. Highly palatable lucerne with excellent feed value will always result in higher forage intake, boosting milk production and growth. Increased forage intake will allow farms to save on (*expensive*) concentrate use. This will reduce production costs and give higher farm benefits. Selection based on feed value is a theme which runs throughout the Barenbrug breeding programme. Continuous screening for parameters like digestibility, crude protein, NDF and dNDF has resulted in varieties with exceptional feed value. This uniqueness of Barenbrug products has been confirmed by many official trials and independent studies all over the world.

Yellow Jacket

Guaranteed top yields for lucerne with Yellow Jacket enhanced seed coating

Yellow Jacket - Rhizobium coating is Barenbrug's enhanced seed coating for lucerne. Using new technology, high levels of effective Rhizobia are embedded in a protective polymer matrix. Together with a nutrient booster containing all essential minerals and trace elements, this product is designed to improve establishment and increase forage production.



Dormancy classification

Flemish type	dormancy class 2.0 - 5.5
Semi-non-dormant type	dormancy class 5.5 - 7.5
Non-dormant type	dormancy class 7.5 - 10.0

Flemish varieties are mainly used in maritime climates and in (*harsh*) continental climates with cold winters, e.g. northern Europe, western Europe, eastern Europe, Russian Federation, central Turkey, Kazakhstan, etc.

Semi-non-dormant varieties are used in the transition zones between arid or warm (*Mediterranean*) climates and maritime or mild continental climates, from northern Spain to the Black Sea.

Non-dormant varieties are used in warm or arid areas where no winter exists and temperatures remain above zero degrees Celsius, e.g. Mediterranean area, northern Africa, Middle East, etc.

NEW

Artémis

Highest yielding



- Flemish type**
- Semi-non-dormant type
- Non-dormant type

- Dormancy class 4.5.
- Rated as No.1 variety on the French 'Liste A'.
- Tolerant to early cutting, resulting in very high feed value.
- Excellent yielder, in intensive cutting systems.
- Outstanding disease and pest resistance.
- Extremely persistent, especially in dry and cold areas.
- Officially listed in France and Switzerland.

Alexis

Healthy type for short crop rotations



- Flemish type**
- Semi-non-dormant type
- Non-dormant type

- Dormancy class 5.0.
- Good resistance to lodging and diseases.
- Officially listed in France and Croatia.

Verdor

Top performer in southern Europe



- Flemish type
- Semi-non-dormant type
- Non-dormant type**

- Dormancy class 8.0.
- Excellent adaptation to the Mediterranean area.
- Guarantees yield from early spring to late autumn.
- Erect-growing type, non-lodging.
- Tolerant to light salinity.
- Has outperformed common varieties in official trials: better persistency, disease resistance and yield.
- Officially listed in France, Turkey and Spain.

Dorine

Fast regrowing Mediterranean type



- Flemish type
- Semi-non-dormant type**
- Non-dormant type

- Dormancy class 6.4.
- Widely adapted to the Mediterranean areas.
- Suitable for frequent cutting systems (6 - 7/year).
- Fast regrowth after cutting.
- Specially selected for resistance to lodging.
- Good overall disease resistance and persistency.
- Officially listed in France.

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Alpha

Quality lucerne for the dairy farmer



- Flemish type**
- Semi-non-dormant type
- Non-dormant type

- Dormancy class 4.9.
- All-round type.
- Leafy variety with fine stems.
- Excellent persistency and yield.
- Very high protein level, resistant to lodging even after heavy cuts.
- Outstanding winter-hardiness.
- Officially listed in Austria, Czech Republic, France, Poland, Germany and Belarus.

NEW

Bardine

Extremely winter-hardy and drought-tolerant



- Flemish type**
- Semi-non-dormant type
- Non-dormant type

- Dormancy class 5.0.
- Very high-yielding, especially in summer and autumn.
- Its deep rooting makes forage production easy in dry areas.
- Extremely winter-hardy.
- Rated as one of the top varieties for persistency.
- High in protein and digestible fibres.
- Officially listed in France and Romania.

Variety characteristics

Variety	Type	Dormancy class	Yield	Persistency	Feed quality	Nematode resistance
Artemis	Flemish	4.5	5	5	5	5
Alpha	Flemish	4.9	4	4	4	4
Alexis	Flemish	5.0	4	4	4	5
Bardine	Flemish	5.0	4	5	5	4
Dorine	Semi-non-dormant	6.4	4	3	4	4
Verdor	Non-dormant	8.0	5	4	4	3

Specifications:

- Seed rate: 25 - 30 kg
- Packaging: 25 kg bags
- Available with Yellow Jacket seed coating



YELLOW JACKET
ENHANCED SEED COATING

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Sorghum



Sorghum is an annual tropical forage, suited to regions in southern Europe. Different types can be distinguished within this species, from multi-cut sudan grass to single-cut forage hybrids. In recent years, Barenbrug has established a wide portfolio in conjunction with different breeders. The best varieties have been selected through intensive trials in southern France and local testing in Spain, Portugal and Greece.

Sorghum is a better alternative to maize in areas with severe drought and moderate soil quality. Sorghum utilizes approx. 30 % less water and 50 % less nutrients compared to maize. Therefore it is cheaper to grow and more reliable in many areas. As sorghum should be planted 2 - 3 weeks later than maize, it allows for an additional grass harvest in spring.

Sorghum

Feed quality

All ruminant animals find sorghum silage very palatable. Silage from leafy sorghum plants leads to increased forage intake. It can be excellently fed (or grazed) as fresh green fodder if it's offered in the right growth stage.

The inclusion of the Brown Midrib (BMR) gene into modern sorghum varieties had lowered the lignin content by 40 - 60 %. This has led to a tremendous increase in digestibility, due to a higher sugar and hemi-cellulose content. Many forage and feeding trials have shown that BMR-sorghums have comparable or even superior digestibility to maize. As sorghum is higher in protein, these BMR-types show an improved feed value compared to maize.

Average forage quality BMR-sorghum versus maize (range within silage analyses)



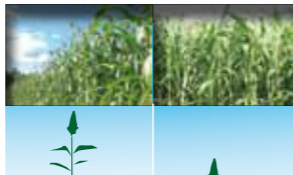

	BMR sorghum	Maize
Dry matter content (%)	28 - 30	32 - 34
Sugar (g/kg DM)	110 - 200	10 - 20
Starch (g/kg DM)	60 - 280	320 - 350
Crude protein (g/kg DM)	110 - 120	60 - 80
NDF digestibility (%)	52 - 55	52 - 55

Different sorghum types

Sorghum is a genus of grasses with different species, one of which is raised for grain and many of which are used as fodder plants, either cultivated or as part of pasture. Barenbrug offers 4 types of Sorghum.

Sudangrass (Forage)	Sudanese x Sudanese
Hybrid sorghum (Forage)	Sudanese x Bicolor
Sweet sorghum (Forage)	Bicolor x Bicolor
Grain sorghum (Grain)	Bicolor x Bicolor

THE DIFFERENT SORGHUM TYPES

FAMILY	POACEAE (TRUE GRASSES)			
SUBFAMILY	SORGHUM			
SPECIES	SORGHUM BICOLOR			
Type	Sudangrass (Forage)	Hybrid sorghum (Forage)	Sweet sorghum (Forage)	Grain sorghum (Grain)
Background	Sudanese x Sudanese	Sudanese x Bicolor	Bicolor x Bicolor	Bicolor x Bicolor
Features				
Products	Barsudan	Lussi, Sweet Creek, BMR-333	Tonga	
Purpose	Multi-cut (grazing/silage/hay)		One-cut (silage)	Grain harvest

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Barsudan

Sudan x sudan



- Single-cut
- Multi-cut
- BMR
- High sugar

- Sudan grass hybrid.
- Multi-purpose type.
- Fine stems, excellent for hay or wrapped bales.
- Forms tillers, makes a dense field.
- Perfect regrowth after cutting.
- Very high drought-resistance.
- Suitable for grazing.
- High sugar content.



Specifications

- Sowing period: May - June (soil temperature > 14°C)
- Seed rate: 10 - 12 kg/ha • Row distance: 10 - 25 cm, sowing depth 2 cm • Can be utilized from plant height of 40 - 50 cm onwards • To be harvested 2 to 5 times per year

www.barenbrug.biz/barsudan

Lussi

Sudan x bicolor



- Single-cut
- Multi-cut
- BMR
- High sugar

- Very fast development and growth.
- High yield at 1st cut.
- Large, vigorous plants with wide leaves.
- Can be used for grazing and silage.
- Later heading than sudan grass.
- High forage quality.



Specifications

- Sowing period: May - June (soil temperature > 14°C)
- Seed rate: 25 kg/ha • Row distance: 20 - 30 cm, sowing depth 2 - 3 cm • Can be utilized from plant height of 60 - 70 cm onwards • To be harvested 2 to 5 times per year

www.barenbrug.biz/lussi

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Sweet Creek

Sudan x bicolor



- Single-cut
- Multi-cut
- BMR
- High sugar

- Extremely high yielding sudan grass hybrid.
- Early and fast development, with high yield at 1st cut.
- Fine stemmed, forms many tillers.
- Can be used for multi-purpose: grazing, silage and hay.
- High sugar content.

BMR-333

Sudan x bicolor



- Single-cut
- Multi-cut
- BMR
- High sugar

- Excellent standability.
- Very good heat and drought tolerance.
- High yielding, utilizes 40 % less water than maize.
- BMR-type: high digestibility, comparable with maize.
- Fast establishing, protects against weed infestation.
- To be used as silage, harvested in autumn.

Tonga

Bicolor x bicolor



- Single-cut
- Multi-cut
- BMR
- High sugar

- Forage hybrid.
- Very consistent and homogenous variety.
- Moderate plant height, perfect resistance to lodging.
- Outstanding digestibility (BMR 6) and sugar content.
- Male-sterile type, no grain formation when grown alone.
- Much better alternative to maize on dry and marginal soils.

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Specifications

- Sowing period: May - June (soil temperature > 14°C)
- Seed rate: 25 kg/ha • Row distance: 20 - 30 cm, sowing depth 2 - 3 cm • Can be utilized from plant height of 60 - 70 cm onwards • To be harvested 2 to 5 times per year

www.barenbrug.biz/sweet_creek

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Specifications

- Sowing period: May - June (soil temperature > 14°C)
- Seed rate: one unit (220,000 seeds) per hectare
- Row distance: 40 - 50 cm, sowing depth 2 - 3 cm
- Growth period: 120 - 150 days

www.barenbrug.biz/bmr-333



Specifications

- Sowing period: May - June (soil temperature > 14°C)
- Seed rate: one unit (220,000 seeds) per hectare
- Row distance: 40 - 50 cm, sowing depth 2 - 3 cm
- Growth period: 120 - 130 days

www.barenbrug.biz/tonga

Green manure grasses

Grases are highly valued as green manure crop, primarily because they form extensive root systems. This enables them to supply large quantities of organic matter to the soil, while their roots simultaneously improve soil structure. And even if green manure grasses are harvested for forage, large quantities of well-distributed organic matter will remain in the soil.

As grasses emerge quickly, they form a dense ground cover and it is not necessary to control weeds with herbicides. This makes it possible to use grasses under diverse conditions and for various crops. In addition, several green manure grasses can be used to provide extra forage.

Green manure grasses

Under cover crop or after harvest

Green manure grasses can be sown either under a cover crop or directly after harvest of the maize crop.

Crops that are to be grown under a cover crop can be sown at different times:

- Shortly before the cover crops is sown, at the time when the seedbed is prepared.
- Shortly after the cover crop has been sown.
- Or even much later, for example on frozen ground.

Grass species

Perennial ryegrass and tall fescue are suitable for sowing under a cover crop; Italian ryegrass and Westerwold ryegrass are preferably sown after harvest because the varieties of these species germinate quickly. Some varieties even germinate well at very low temperatures in late autumn, for example after a late maize harvest.

Controlling nematodes

Grasses play a separate role when it comes to controlling nematodes. Green manure grasses may cause some nematode populations to decrease, whereas in contrast other nematodes may multiply substantially under grass. So it is very important to know what types of nematodes occur in a particular plot before using a green manure grasses. There are also differences between individual grass species with respect to the multiplication of nematodes, e.g. Italian ryegrass and perennial ryegrass.

Portfolio

Preceding crop/ cover crop	Green manure product	Sown into...	Sowing period	Full-developed green manure crop	Suitable as forage
Maize	Proterra Maize	Cover crop	Spring	Directly after maize harvest	No
Winter-cereals	Proterra Cereals	Cover crop	Late autumn/winter	Directly after cereal harvest	No
Cereals, potatoes, vegetables, maize	Intermezzo	After harvest / (cover crop)	Spring - autumn	Late autumn - early spring	Yes
Maize	SoilCover	After harvest	Autumn	Early spring	Yes

Proterra Maize

For undersowing in maize



- Sown after harvest
- Sown into maize crop

- Provides a well-established green manure crop after maize harvest.
- Contains specially selected grasses.
- Sown directly or shortly after maize.
- Develops well, but slowly, under shade.
- Tolerant to several herbicides.
- Improves soil fertility and soil structure by intensive rooting.



Composition:
Proterra Maize 100 %

Specifications

- Sowing rate: 15 - 20 kg/ha • Sowing period: directly with maize or within 7 days after sowing maize (spring) • Suitable all over Europe on all common soil types

Detailed information at www.barenbrug.biz/proterra_maize

Proterra Cereals

For undersowing in winter cereals



- Sown after harvest
- Sown into cereal crop

- Can be sown directly with/into an established cereal crop.
- Doesn't compete with cereals.
- No seed head formation.
- Leaves a catch crop directly after cereal harvest.
- Saves time and labour during harvest time.
- Produces lots of soil organic matter.
- Improves soil structure and soil fertility.
- Prevents mineral leaching after cereal harvest.

Composition:
Proterra Cereals 100 %



Specifications

- Sowing rate: 15 - 20 kg/ha • Sowing period: - directly with winter cereals (September - December) - in established cereal crop during winter (December - February) • Suitable all over Europe on all common soil types

Detailed information at www.barenbrug.biz/proterra_maize

Intermezzo

Maximal organic matter



- Sown after harvest
- Sown into cover crop

- Ideal for sowing after cereals, vegetables or maize.
- Can be sown into cover crop: cereals (spring) or maize (at 40 cm plant height).
- Fast-establishing, late-heading.
- Produces more roots and soil organic matter than rye.
- Suitable as forage crop.



Composition:
Italian ryegrass varieties 100 %

Specifications

- Sowing rate: - after harvest: 25 - 40 kg/ha - into cover crop: 15 - 25 kg/ha • Sowing period: - after harvest: June - October (min. 6 weeks before expected night frost) - into cover crop: March - June • Requires N - fertilization (30 - 50 kg N/ha) for maximal production • Suitable all over Europe on all common soil types

Detailed information at www.barenbrug.biz/intermezzo

SoilCover

The fast autumn catch crop



- Sown after harvest
- Sown into cover crop

- Selected for low soil temperatures.
- Ideal for use after late (maize) harvest.
- Fast-establishing, fast-developing.
- Efficient mineral and nutrient fixing in the soil.
- Deep-rooting, improves soil structure.
- Suitable as forage crop.

Composition:
Westerwold ryegrass 50 %
Italian ryegrass 50 %
Selected varieties which germinate at low temperatures



Specifications

- Sowing rate: 20 - 25 kg/ha • Sowing period: September - November (min. 6 weeks before expected night frost) • Suitable all over Europe on all common soil types

Detailed information at www.barenbrug.biz/soilcover

Horse paddock & pasture



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Every horse owner wants what's best for his horse. That includes a pasture in which a horse can safely sprint around and which contains grass that is healthy for the horse. Unfortunately, many horses actually graze in pastures containing cattle grass or in pastures with a lot of bare patches, with all the adverse consequences that that involves.

Horses love it

Innovative

Most grass seed mixtures are traditionally intended for use by cattle. However, cows' requirements with respect to grass are quite different from those of horses. Grass intended for cows contains a lot of energy and sugars. That's unhealthy for horses, which require roughage with a high effective fibre content. Horse Master is an innovative grass seed mixture yielding roughage that is ideal for horses' rations. The varieties contained in Horse Master are moreover extremely strong, making for a sward that is resistant to sprouts around the pasture.



Varieties in Horse Master

All the grass varieties contained in Horse Master are recommended in several variety lists. This gives Horse Master users a quality guarantee. The varieties have all been individually evaluated to assess their specific characteristics with respect to use by horses. They provide the energy and effective fibre that horses need. Horse Master grass also has a low growth point, i.e. the point from which the grass plant regrows after it has been grazed or cut, and it is deep-rooted to ensure a strong horse pasture.

Sustainable

Massive underground networks of long roots make Horse Master a sustainable grass seed mixture. The long roots enable the grass plants to take up moisture and minerals from deep down in the soil. A Horse Master pasture will not have to be irrigated much in dry periods. Horse Master pastures will last for at least ten years, subject to good agricultural use.



Low fructan content

A low fructan concentration in grass reduces the risk of laminitis. Fructan is a carbohydrate (a type of sugar) that is produced by grass plants under the influence of sunlight. Grass plants produce particularly large amounts of fructan when nights are cold and sunlight is intense.

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Detailed information at www.barenbrug.biz/horsesloveit

Low fructan to avoid laminitis

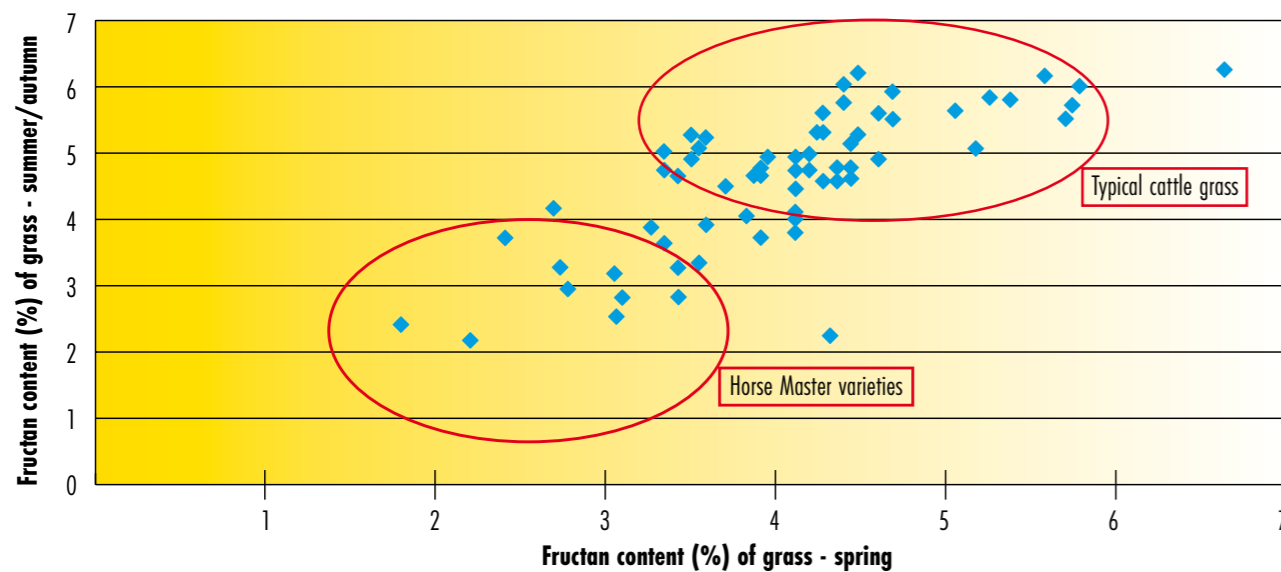
Fructan is currently regarded as one of the main causes of laminitis. It is only partly digested in the small intestine, resulting in high sugar levels in the hind gut that disturb the bacterial balance in the intestines. This leads to the formation of toxic substances that may cause laminitis.

Specific varieties for low fructan

Barenbrug has done a lot of research into the fructan (sugar) contents of different grasses. Some grass species are known for their low fructan contents, but even within a species, some varieties contain more fructan than others. The varieties in Horse Master contain an impressive 50 % less fructan than varieties of grass intended for cattle and sheep.

Barenbrug analyses the fructan contents of more than 70 grass varieties a year. The following graph shows you the great differences in the fructan contents of different varieties.

FRUCTAN CONTENT OF 70 DIFFERENT GRASS VARIETIES



The varieties in Horse Master contain on average less than half of the fructan that is to be found in cattle grass varieties.

Horse Master

Optimum health of your horses



- Grazing
- Silage
- Hay, haylage

- The healthiest pasture for your horse.
- Prevents laminitis and tying up.
- Horse grass instead of cow grass.
- Prevents sand colic.
- Effective fibre in your horse grass.
- Good horse pastures that can be effectively maintained.
- The healthiest grass seed for your horse pasture.



Composition: Horse Master 100 %

Specifications

• Sowing rate: - grazing purposes: 80 kg/ha - silaging purposes: 50 kg/ha • Sowing period: spring/late summer (depending on area; check instructions on the bag)

www.barenbrug.biz/horsemaster

Horse Master Hay

Grass for hay or haylage



- Grazing
- Silage
- Hay, haylage

- The best grasses for hay and haylage production.
- More reliable and safer than natural hay.
- Healthiest grass for horses: low fructan, high fibre.
- Tremendously high hay yields.
- Erect-growing grass species, can be easily dried.
- Yields well under both dry and wet conditions.
- Not suitable for grazing.

Composition: Horse Master Hay 100 %



Specifications

• Sowing rate: 50 - 60 kg/ha • Sowing period: spring/late summer (depending on area; check instructions on the bag)

www.barenbrug.biz/horsemaster_hay

Grass varieties

For more than 100 years Barenbrug has excelled in plant breeding throughout the world in widely varied climatic zones. Our wide range of varieties and our expertise enable us to provide you with adapted forage grasses suited to any location and grassland management system. In this chapter you will find an overview of the forage portfolio marketed by Barenbrug Holland. The most important species are described, as well as the varieties involved.

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GRASS VARIETIES

Perennial ryegrass <i>Lolium perenne</i>	Most important and widely used forage grass.
Hybrid ryegrass <i>Lolium x hybridum</i>	Intermediate between perennial and Italian ryegrass.
Italian ryegrass <i>Lolium multiflorum</i>	Provides excellent quality forage for up to two years.
Westerwold ryegrass <i>Lolium multiflorum Westerwoldicum</i>	A fast growing annual species.
Tall fescue <i>Festuca arundinacea</i>	A deep-rooting, very adaptable species which grows well in dry or wet conditions.
Meadow fescue <i>Festuca pratensis</i>	Winter-hardy and nutritious.
Timothy <i>Phleum pratense</i>	Palatable and superior winter hardiness.
Cocksfoot <i>Dactylis glomerata</i>	Extremely drought tolerant.
Creeping red fescue <i>Festuca rubra rubra</i>	Niche species used for extensive pastures.
Bromus <i>Bromus subsp</i>	A species often used in continental regions.
Teff <i>Eragrostis tef</i>	A warm-season annual grass which can be harvested multiple times during the growing season.

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Detailed information at www.barenbrug.biz/forage_grass_varieties



Perennial ryegrass (*Lolium perenne*)

Perennial ryegrass is clearly one of the most important and widely used forage grasses, exhibiting rapid establishment, good tillering ability, an excellent response to nitrogen and high acceptability to animals. Perennial ryegrass is more digestible than other species at equivalent growth stages, thus increasing digestible dry matter production.

Varieties characteristics

		Yield at 1st cut	Sward density	Crown rust resistance	Persistency	Nordic	Oceanic	Continental	Mediterranean
Early heading									
Bronsyn	2n	5	4	5	3		✓		✓
Rosetta	2n	5	5	3	3		✓		✓
Bargala	4n	5	3	3	4	✓	✓	✓	
Bartasja	4n	5	4	3	5	✓		✓	
Fintona	4n	5	3	4	3		✓		✓
Intermediate-heading									
Bargizmo	2n	4	4	5	4		✓	✓	
Mara	2n	5	4	3	5	✓		✓	
Barcampo	4n	5	4	5	5		✓	✓	✓
Dunluce	4n	5	3	4	5		✓		
Barfamos	4n	4	4	5	5		✓	✓	
Seagoe	4n	5	3	4	3		✓		✓
Late-heading									
Barforma	2n	3	5	5	4		✓	✓	
Tyrella	2n	4	4	3	3		✓		
Drumbo	2n	3	4	4	4		✓		
Clanrye	2n	3	5	4	4		✓		
Barimero	2n	4	5	5	4		✓	✓	
Barflip	2n	3	5	5	5		✓	✓	✓
Barmaxima	4n	4	4	4	4		✓	✓	
Barpasto	4n	4	4	5	5		✓	✓	
Barsintra	4n	4	3	4	4		✓	✓	
Dromara	4n	5	3	5	3		✓		✓
Navan	4n	4	3	4	4		✓		
Barkamaz	4n	4	4	3	5	✓		✓	
Meltador	4n	4	4	5	5		✓	✓	
Melverde	4n	3	4	5	5		✓		

Highlighted new varieties:

BARTASJA

Modern early tetraploid, suitable for continental climates. Extreme winter-hardy and drought-tolerant. This new generation from our breeding station in Romania is a revolution for farms in eastern and central Europe.

FINTONA

New tetraploid variety with great performance in UK and Ireland. Fintona is a very active spring grower, suitable for early grazing or high yielding silage mixtures.

BARCAMPO

Outclassed all other candivars in official trials in Germany and Denmark on yield, ground cover, disease resistance and winter-hardiness. Also recommended for use on heavy (*peaty*) soils. Barcampo is the 'living proof' that Barenbrug's modern tetraploids set a new standard for the next decade.

BARGIZMO

All-round variety which was recently listed in Germany. Selected in many areas with extreme conditions, with harsh winters and high disease pressure. This persistent variety should be part of every long-term grass ley.

BARFAMOS

This variety has proven its superb performance in western Europe and the Alps. Extremely high-yielding with outstanding crown rust resistance and persistency.

SEAGOE

One of the highest yielding varieties for areas with mild winters, especially under conservation management. Listed in Ireland and UK with good overall figures for all aspects.

CLANRYE

High quality late diploid. Shows a constant yield during the year. Listed in Ireland and UK with great performance on total yield and ground cover. Good companion in mixtures with an early spring grower.

BARIMERO

The leading late diploid variety in the Netherlands, Germany and Denmark. Multi-purpose type with an outstanding yield and crown rust resistance. Adapted to many areas and farm systems.

BARKAMAZ

Late tetraploid for continental climates. Has very little stem formation and therefore increased digestibility and protein content. Ideal for high-yielding dairy farms.



Hybrid ryegrass (*Lolium x Hybridum*)

Varieties of hybrid ryegrass are obtained by crossing perennial and Italian ryegrass. As a result three types of hybrid ryegrass can be distinguished. The Italian types have an erect growth habit and produce good spring growth, whereas the perennial types form a denser sward and have later spring growth. Intermediate types also exist.

Highlighted new varieties:

BARSENNA

Suitable for areas with a long growing season and mild winters. Top variety on the French recommended list, with high scores for yield and persistency.

TROJAN

The most popular variety from New Zealand. Trojan is a true perennial type, excellent for grazing but giving higher yield and more 'shoulder growth' in spring and autumn.

BARVITRA

Extremely high-yielding type for 2 - 3 production years in southern and western Europe. Very leafy type which gives high forage quality in intensive cutting systems.

Varieties characteristics

		Type	Persistency	Crown rust resistance	Nordic	Oceanic	Continental	Mediterranean
Barsilo	2n	Intermediate	5	4		✓		✓
Sabella	2n	Perennial	5	3	✓	✓	✓	
Barsenna	2n	Italian	4	5		✓		✓
Trojan	2n	Perennial	3	4				✓
Barvitra	4n	Italian	3	5		✓		
Belleek	4n	Perennial	5	2	✓	✓	✓	



Italian ryegrass (*Lolium multiflorum*)

Italian ryegrass provides excellent quality forage for up to two years, depending on climate and available moisture. Due to its quick regrowth, very early development in spring and prolonged growing period in autumn, this species usually has greater overall productivity than perennial ryegrass.

Highlighted new varieties:

BARTRENTO

Recently listed in Germany (*the best in its class*) and recommended for temporary grasslands. Shows outstanding disease resistance and reasonable winter survival in western and central Europe.

BARULTIMA

Highest yielding tetraploid variety in trials in Italy and France. Late-heading for better silage quality. Perfect companion for Westerwold ryegrass to increase yield at 2nd/3rd cut in short-term leys.

Varieties characteristics

		Speed of germination	Tolerance to heavy traffic	Disease resistance	Best choice for 2 production	Best choice for green manuring	Nordic	Oceanic	Continental	Mediterranean
Barprisma	2n	3	5	5	✓			✓	✓	✓
Barelli	2n	3	5	4	✓			✓	✓	✓
Barextra	4n	5	4	4		✓		✓	✓	✓
Barpluto	4n	4	3	3		✓	✓	✓	✓	✓
Barmultra II	4n	5	5	5	✓	✓	✓	✓	✓	✓
Bartrento	4n	4	5	5	✓	✓		✓	✓	✓
Barultima	4n	4	5	5	✓			✓	✓	✓



Westerwold ryegrass (*Lolium multiflorum Westerwoldicum*)

Westerwold ryegrass is a rapidly establishing annual species (*or biannual if sown in autumn*) which gives high productivity in the season of sowing (*if seeded early and adequate moisture is available*). This species is useful for spring sowing or sowing immediately after maize or cereal harvest in autumn or when high yields are required within 3 - 6 months of sowing.

Varieties characteristics

		Speed of germination	Disease resistance	Tolerance to heavy traffic	Best choice for one-cut system	Best choice for multi-cut system	Nordic	Oceanic	Continental	Mediterranean
Baritmo	2n	3	5	5	✓	✓		✓	✓	✓
Barveloz	2n	3	5	5		✓		✓	✓	✓
Barturbo	4n	4	4	3	✓			✓	✓	✓
Bartempo	4n	5	4	3	✓			✓	✓	✓
Barspectra II	4n	5	5	4	✓	✓	✓	✓	✓	✓
Barsutra	4n	5	5	3		✓	✓	✓	✓	✓
Bartigra	4n	4	5	4		✓	✓	✓	✓	✓



Tall fescue (*Festuca arundinacea*)

Tall fescue is a deep-rooting, very adaptable species which grows well in dry or wet conditions. It is also winter-hardy and persistent. Tall fescue grows early in the spring and has the potential for high dry-matter production with nitrogen fertilization. Tall fescue produces about 30 % more dry matter compared with perennial ryegrass.

Highlighted new varieties:

BARDOUX

New 'NutriFibre' type which is listed in Germany and France. Shows improved yield and persistency in many areas, from western Europe to Russia. Soft-leaved with excellent palatability.

Varieties characteristics

	Leaf-type	Very late-heading	Disease resistance	Suitability for grazing	Establishment	Nordic	Oceanic	Continental	Mediterranean
Barolex	Soft	✓	4	4	4	✓	✓	✓	✓
Barelite	Soft	✓	4	4	4	✓	✓	✓	✓
Bariane	Soft	✓	4	5	3	✓	✓	✓	✓
Bardoux	Soft	✓	5	4	4	✓	✓	✓	✓
Karolina	Interm.		3	2	5	✓		✓	✓
Baroptima	Soft	✓	4	4	4			✓	✓



Meadow fescue (*Festuca pratensis*)

This species grows best under cool, moist conditions and tolerates wet and occasionally flooded soils. Once established, it also performs well under drier conditions for making hay or silage. On good soils, meadow fescue surpasses perennial ryegrass in summer production. It has better winter-hardiness than perennial ryegrass.

Highlighted new varieties:

BARAIKA

Developed in continental areas. Has proven great persistency and winter-hardiness. High-yielding, especially in silage systems. The perfect choice for continental climates with sufficient rainfall during summer.

Varieties characteristics

	Suitability for grazing	Disease resistance	Persistency	Nordic	Oceanic	Continental	Mediterranean
Pradel	5	4	5	✓	✓	✓	
Cosmonaut	4	4	3		✓	✓	
Barvital	5	5	4		✓	✓	
Baraika	3	4	5	✓		✓	

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Timothy (*Phleum pratense*)

Palatability and superior winter-hardiness are timothy's most important features. It does very well on wet, peaty and heavy textured soils. This species is rather slow to establish and summer-production is often limited.

Varieties characteristics

	Very late-heading	Suitability for grazing	Competition ability in mixed swards	Persistency	Nordic	Oceanic	Continental	Mediterranean
Barpenta	✓	4	5	5		✓	✓	
Barmidi	✓	5	5	4			✓	
Barfleo		4	5	5		✓	✓	
Tuukka		3	3	4	✓		✓	
Tenho		3	3	5	✓		✓	



Cocksfoot (*Dactylis glomerata*)

Cocksfoot is valuable on light textured soils in dry areas due to its outstanding drought tolerance. Most varieties have good winter hardiness, although this may be somewhat limited in the year of sowing. The species is rather slow to establish but persistency is good under hay, silage, and proper grazing management. Cocksfoot is particularly renowned for its good summer production.

Highlighted new varieties:

BARLEGRO

Very late-heading variety which was developed in continental climates. Officially listed in Germany, Switzerland and Romania. Its high and reliable yield ensures forage year after year.

ADREMO

Has shown an excellent tolerance to heat and drought. Developed in southern Europe and a leading variety on the French recommended list. Best suited for silage and hay production.

Varieties characteristics

	Very late-heading	Palatability	Highest winter-hardiness	Nordic	Oceanic	Continental	Mediterranean
Intensiv	✓	5	5	✓	✓	✓	
Baridana		3	5	✓	✓	✓	
Baraula	✓	4	4	✓	✓	✓	✓
Barlegro	✓	5	5	✓	✓	✓	
Adremo		5	3				✓

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Creeping red fescue (*Festuca rubra rubra*)

Well-suited to dry and hot areas because of its good drought and heat tolerance. *Festuca rubra rubra* is very persistent and has good winter-hardiness. The species performs relatively well under low fertility conditions but is less palatable and less digestible than other forage grasses.

BARUSTIC

All-round variety and important component of Horse Master. Forms a dense sward and has shown excellent winter-hardiness, drought-tolerance and persistency.

Grass varieties



Bromus (*Bromus subsp.*)

Bromus is a natural species in many parts of the world and can be divided in several sub-species. Alaska brome (*Bromus sitchensis*) is a winterhardy type which produces large amounts of forage. Pasture brome (*Bromus valdivianus*) is a drought tolerant species for quality summer feed production.

HAKARI

Alaska brome variety suitable for dry areas with severe winters. It is an erect-growing leafy type with outstanding spring regrowth and summer production. Suitable for hay production and grazing, ideally combined with legumes.

BARENO

Fine leaved pasture brome particularly suitable for grazing. Bareno is used for permanent grasslands in extremely dry areas. Forms a dense sward and is very persistent.



Teff (*Eragrostis tef*)

Teff is a warm-season annual grass which can be harvested multiple times during the growing season as hay or silage, or grazed. It can be sown in spring and under high temperatures it develops quickly and grows well in dry summers. As a fast-growing crop, teff produces high yields during a relatively short growing season. Teff is fine-stemmed and therefore palatable to animals. Excellent for horse hay. Its forage quality is comparable with timothy.

TIFFANY

This well-known variety is best used for quality hay production. Tiffany is easy to grow and a reliable option in many hot and dry areas.

Clover varieties

Several clover species are extensively cultivated as forage crops. The most widely cultivated clovers are white and red clover. Besides that, there is an increased interest in fast growing annual clovers.

Clover, either sown in monoculture or in combination with grass, has long been appreciated, for several reasons:

- Palatable to and nutritious for livestock.
- Fixes nitrogen, reducing the need for synthetic fertilizers.
- Grows in a wide range of soils and climates.
- Appropriate for either grazing, silage or hay.
- Improves soil fertility and structure.

CLOVER VARIETIES

White clover

Trifolium repens

The best legume for perennial pastures where moisture and medium to high fertility prevail. Winter-hardy and frost-tolerant. Easy to establish, produces a network of stolons and a dense ground clover.

Red clover

Trifolium pratense

Tap-rooted, drought-tolerant legume that provides high quality feed. Not as winter-active as white clover, may live for 1 - 3 years in pasture swards.

Annual clovers

Annual legume, ideally suited to areas with winter forage production and or dry summer conditions. The plant has better winter growth than white clover and can persist through self-pollination and reseeding. Commonly used in oversow situations as it is easy to establish.



White clover (*Trifolium repens*)

White clover is a perennial legume which spreads by branching stolons through the sward. It has the ability to produce its own nitrogen through a symbiotic process with rhizobium bacteria in the root nodules. White clover is mainly used in grazing leys for its high nutritive value (*protein and minerals*).

Varieties characteristics

	Leaf size	Suitability for grazing	Suitability for silage	Persistence	Nordic	Oceanic	Continental	Mediterranean
Barbian	S	4	1	5	✓	✓	✓	
Crusader	M	5	2	4		✓		✓
Tasman	M	5	4	4	✓	✓	✓	
Katy	L	3	3	5		✓		
Alice	L	4	4	4	✓	✓	✓	
Calimero	L	4	4	4	✓	✓	✓	
Barblanca	L	2	4	3		✓		✓
Fiona*	LL	2	5	4		✓	✓	✓
Beaumont*	LL	2	5	5		✓	✓	✓

* Ladino-type

Highlighted new varieties:

CALIMERO

Large-leaved variety which has shown good performance in western and central Europe. Was recently listed in Germany. Can be used for both cutting and grazing systems. Especially good for ground cover and persistence.

KATY

Variety suitable for oceanic climates. One of the most persistent in its category. Katy is a very good companion in grass mixtures and shows consistent growth throughout the year.

BEAUMONT

This Ladino-clover was selected in the Swiss mountains and recently listed on the Swiss recommended list. It is the highest yielding Ladino-type in its class and especially highly rated for its persistence. Excellent for permanent grassland without any risk of HCN-accumulation.



Red clover (*Trifolium pratense*)

This herbage legume is often used in grass mixtures for a predominantly cutting regime. As a legume, it is very much appreciated for its nitrogen fixing ability and therefore for its nutritional value as a forage. The main drawback is its limited persistency, which ranges from 1 - 3 years depending on type, variety and environmental conditions.

Highlighted new varieties:

DISCOVERY

Variety from France with good adaptation in western Europe. Very fast-developing and high-yielding. Perfect choice for temporary grassland.

Varieties characteristics

	Ploidy	Disease resistance	Persistence	Nordic	Oceanic	Continental	Mediterranean
Lemmon	2n	5	4		✓	✓	
Discovery	2n	4	3		✓		✓
Spurt	2n	3	4	✓		✓	
Tempus	4n	3	5		✓	✓	



Annual clovers

Annual clover offers a range of grazing, hay and silage options with multiple benefits including nitrogen fixation, weed control rotations and disease breaks. The addition of annual clovers to grass or hay mixes can increase feed quality, protein content of feed and provide nitrogen for grass or cereal growth.

Variety	Clover species	Latin name	Soil pH	Drought tolerance	Establishment	Earliness growth/flowering	Growth habit	Regrowing ability (1 - 5)	Yield (1 - 5)
Elite II	Berseem	Trifolium alexandrinum	Neutral to alkaline	Moderate	Very fast	Late	Erect	4	4
Nitro Plus	Persian	Trifolium resupinatum	Neutral to alkaline	High	Fast	Intermediate	Erect	3	5
Lightning	Persian	Trifolium resupinatum	Neutral to alkaline	Moderate	Fast	Late	Erect	3	5
Laser	Persian	Trifolium resupinatum	Neutral to alkaline	Moderate	Fast	Late	Erect	3	5
Blaza	Crimson	Trifolium incarnatum	Slightly acidic to neutral	Very high	Very fast	Intermediate	Erect	2	4
Cefalu	Arrowleaf	Trifolium vesiculosum	Acidic to neutral	Very high	Slow	Late	Semi-erect	4	5
Zulu II	Arrowleaf	Trifolium vesiculosum	Acidic to neutral	High	Slow	Intermediate	Semi-erect	4	5
Bolta	Balansa	Trifolium michelianum	Slightly acidic to neutral	Very high	Moderate	Late	Prostrate	5	3
Frontier	Balansa	Trifolium michelianum	Slightly acidic to neutral	Very high	Moderate	Early	Prostrate	5	3

Other forage and green manure crops



Other forage crops

Besides grass, lucerne and clover products Barenbrug offers a wide range of other forage crops and varieties. Different farm-specific situations can demand different solutions. For examples, legumes like vetches and peas can provide a protein-rich annual fodder. Stubble turnips and forage rape give a short-term solution to prolong the growth season, especially on grazing farms. Other crops like fodder beet, birdsfoot trefoil, plantain and chicory all have their other specific beneficial feature. The Barenbrug range of these forage crops has been carefully selected to provide a broad choice to suit differing climates and growing conditions.

	Annual crop	Perennial crop	Legume	Companion for grass mixtures	Suitable for grazing
Vetch	✓	(✓)	✓	(✓)	
Pea	✓		✓	(✓)	
Forage rape	✓				✓
Stubble turnip	✓				✓
Chicory		✓		✓	✓
Plantain		✓		✓	✓
Fodder beet	✓				
Birdsfoot trefoil		✓	✓	✓	✓

(✓) depending on the variety

Other green manure crops

A fruitful investment

Green manure crops ensure a good soil condition. For a start, they supply large quantities of organic matter, which is important for a good structure and fertility of the soil. Organic matter is decomposed all the year round. So new organic matter has to be added to the soil to increase its concentration or keep it at the required level.

Higher yields

Green manure crops have a positive effect on soil structure, making it possible to till the soil at an earlier stage. The soil will also be able to retain moisture better, while leaching of residual nitrogen will be prevented. This results in higher yields of the main crop. Potatoes in particular respond favourably to green manure crops, with potentially 5 % higher yields. Yields of sugarbeet and wheat may also increase. A green manure crop will moreover imply a lower optimum nitrogen dose, and therefore lower cultivation costs.

Control of nematodes

Resistant green manure crops reduce nematode populations in the soil. Sugarbeet nematodes in particular can be effectively controlled with a green manure crop. When grown as the main crop, sugarbeets produce higher yields when nematode-resistant white mustard or fodder radish is used as a green manure crop.

Fixing of minerals

Green manure crops fix important nutrients such as nitrogen and potassium in plant stems, leaves and roots, precluding the risk of them being leached in autumn and winter. Especially grasses that bolt late fix minerals over long periods. A well-developed green manure crop will yield 80 - 100 kg of nitrogen per hectare.

Detailed information at www.barenbrug.biz/other_crops



Common vetch (*Vicia sativa*)

Vetch can be used for green manuring and for annual protein-rich forage production. It provides good soil structure and weed control due to its rapid germination and development. Vetch can be grown on all soil types but requires a moderate pH-value on sandy soils. It is susceptible to drought just after sowing which may harm its establishment.

NITRA

Extremely fast-emerging spring-type vetch, well adapted to growth during short days, thus providing considerably better and extended autumn production than other varieties. Contains high protein level.



Forage Pea (*Pisum sativum*)

This special type of pea is used for the production of palatable roughage often in combination with oats or barley which provide high quality forage rich in protein. Forage pea contains high levels of protein.

BAR PROTIN

This concept combines a silage pea with a perennial Green Spirit mixture. The selected pea variety is semi-leafless which allows undersown grass to develop slowly. After harvesting the Bar Protin in summer, a dense and productive grass sward remains. Bar Protin provides a cheap and excellent forage.

RIF

Coloured flowering variety producing high fresh yields. Very leafy variety with aggressive growth habit. Combines well with other crops (*cereals*) but is not recommended as cover crop for grasses. Rif has remarkably small seeds.



Forage rape (*Brassica napus ssp. biennis*)

Forage rape is suitable for either grazing by livestock or cutting and feeding. In general, the taller varieties develop more stems but, by way of compensation, the leaves remain cleaner. Forage rape is also used as a green manure crop because of its high and speedy production of dry matter both above and below ground level. It shows good tolerance to night frost and has a rapid initial growth rate.

BARCOLI

Medium tall, very leafy variety with high yield of digestible matter. Provides a short-term solution, very suitable for grazing.



Stubble turnip (*Brassica rapa*)

Stubble turnip is an excellent catch crop which can produce palatable, high quality forage. It can be sown in spring or summer and ensures forage availability in less than 3 months. It provides autumn and winter feed for buffer-feeding cows or for finishing lambs. Stubble turnips provide a means of lowering winter feed costs.

BARKANT

A proven and reliable Barenbrug-bred variety that is high-yielding and very nutritious. Its high proportion of leaves compared to other turnips guarantees a sufficient forage supply for many farming systems.



Chicory (*Cichorium intybus*)

Chicory is a persistent leafy herb lasting 2 - 3 years with a large tap root. It performs best in fertile, few draining soils in regions with more than 550 mm rainfall. Suitable for horse mixtures or for use on organic farms due to its ability to reduce worm burdens and red gut in animals.

COMMANDER

Commander is a very persistent chicory, providing great year round growth, improved root rot resistance and excellent grazing characteristics.



Plantain (*Plantago*)

Plantain is a mineral rich perennial grazing herb that is high in protein (up to 23 %). It is fast-establishing and will be productive and persistent over a wide range of soils and climatic conditions because it has both a tap root and a fibrous root system. It adapts well to drier regions, less fertile soils, low pH, and heavy clay soils.

ENDURANCE

Broad-leaved type. Very late heading (25 days later than *Tonic*) which makes it easy to manage. Endurance has a large tap root and persists well in drought conditions and low-fertile soils.

Other forage crops



Fodder beet (*Beta vulgaris*)

Fodder beets are particularly productive and are the highest yielding crop grown under temperate climates. Yields of 50 - 75 tons of fresh roots per ha are common. The main use of fodder beets is ruminant feeding, though they can also be fed to pigs. They are also a potential crop for biofuel production.

KYROS

A modern variety with monogerm seeds, which eliminates the need for thinning. Kyros produces very evenly sized beets and is resistant to plant heading during season. Its excellent yield makes it a good choice for farmers who want maximal energy yield per hectare.



Birdsfoot trefoil (*Lotus corniculatus*)

Birdsfoot trefoil is a perennial forage legume that adapts well to production on poorly drained, low-pH soils which are not suitable for alfalfa production. The species is resistant to Phytophthora root rot and numerous alfalfa insects. The plant does not cause bloat in animals. Trefoil has usually been used in grazing systems.

LEO

Variety which is well adapted to low quality soils. Gives a long growth season with a consistent yield. Suitable for grazing pastures for cows or sheep.

LOTAR

Was developed in continental climates. Has excellent winter-hardiness and drought tolerance. Therefore very persistent. Perfect choice for perennial pastures in more extensive farming systems.

Other green manure crops



Fodder radish (*Raphanus sativus oleiferous*)

Fodder radish is a non-turnip-forming type of radish. Late-heading varieties are preferred to avoid flowering. This low-growing ground cover crop with fast establishment is considered to be a good green manuring crop, even under late sowing. A further key benefit is its resistance to nematodes, in particular the beet eelworms *Heterodera schachtii* and *Heterodera trifolii*.

MAXIMUS

This variety provides outstanding fast ground cover and is late-heading. This makes it highly resistant to beet cyst nematodes (min. 90 % reduction) and eelworms. Maximus produces very few turnips. An excellent green manure crop in rotation plans with sugar beets, potatoes or maize.



White mustard (*Sinapis alba*)

White mustard is an excellent green manuring crop and can be sown very late in the autumn. It grows very quickly providing good ground cover. Mustard is unpalatable to stock and is very susceptible to frost. Modern varieties have very high nematode resistance (BCA-resistance).

SMASH

Forms a short, strong plant; easy to cultivate with a firm root system. Very fast developing and provides perfect ground cover. Smash has very high resistance to beet cyst nematodes (70 - 90 % reduction) and is a non-host plant to many eelworms and nematode species.



Phacelia (*Phacelia tanacetifolia*)

Fast growing, hairy green manuring species also suitable for set aside. Phacelia germinates very quickly, even in dry soils. It produces weak plants and is rather susceptible to frost. The purple flowers of Phacelia are very attractive to bees.

PROFA

Variety with quick establishment after sowing and excellent ground cover. It has high above-ground biomass production. Profa can be used as monoculture or in green manuring seed mixtures.

Consulting and sales

 Our main regional sales distributors provide specialist knowledge regarding the various applications for our extensive range of quality products.

Barenbrug Holland

P.O. Box 1338
6501 BH Nijmegen
The Netherlands
Tel: +31 (0)24 3488100
Fax: +31 (0)24 3488189
export@barenbrug.nl
www.barenbrug.biz

Sales

Christiaan Arends
Head of Sales & Marketing
Tel: +31 (0)24 3488122
carends@barenbrug.nl

Product Management

Rien Louwes
Product manager
Tel: +31 (0)24 3488129
rlouwes@barenbrug.nl

Sales support

Hannie de Boer
Tel: +31 (0)24 3488185
export@barenbrug.nl

Griet Decavele
Tel: +31 (0)24 3488117
export@barenbrug.nl

For these countries please contact the local sales team

Barenbrug Poland

15 Sowia Street
62 - 080 Tarnowo, Podgorne
Poland
Tel: +48 (0)61 816 4132
Fax: +48 (0)61 814 6305
info@barenbrug.pl
www.barenbrug.pl

Barenbrug Russia

Svobody Street 29
125362 Moscow
Russia
Tel: +7 (0)495 661 35 24
info@barenbrug.ru
www.barenbrug.ru

Barenbrug Belgium

Hogenakkerhoekstraat 19
B-9150 Kruibeke
Belgium
Tel: +32 (0)3 219 19 47
Fax: 00 32 3 219 39 27
sales@barenbrug.be
www.barenbrug.be

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Jan van Winden
Head of Procurement &
International Trade
Tel: +31 (0)24 3488134
jvanwinden@barenbrug.nl

Martin Dekker
Export manager
Tel: +31 (0)24 3488135
mdewker@barenbrug.nl

Johan Mourik
Export manager
Tel: +31 (0)24 3488124
jmourik@barenbrug.nl

Robert Vanzeebroeck
Export manager
Tel: +33 (0)608 306766
rvaneebroeck@barenbrug.nl

Lex van der Weerd
Export manager
Tel: +31 (0)24 3488138
lvdweerd@barenbrug.nl



Great in Grass

Barenbrug Holland BV • P.O. Box 1338 • 6501 BH Nijmegen • The Netherlands • Tel.: +31 (0)24 348 8185 • Email: export@barenbrug.nl • www.barenbrug.biz

 ROYAL BARENBRUG GROUP