



YELLOW JACKET[®]

RHIZOBIUM SEED COATING



**LUCERNE,
EASY**

 **BARENBRUG**



YELLOW JACKET®

RHIZOBIUM SEED COATING

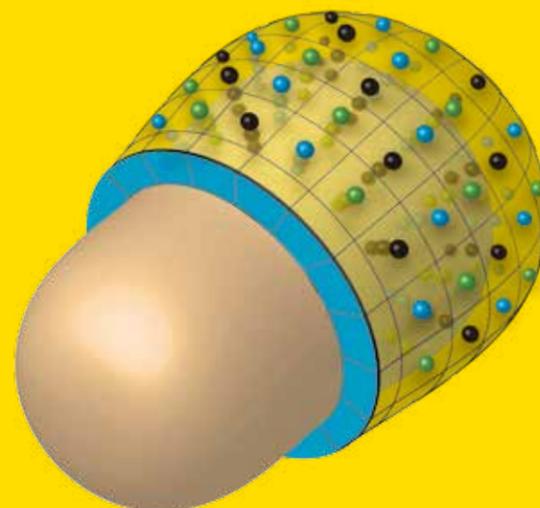


LUCERNE, EASY

YELLOW JACKET RHIZOBIUM SEED COATING

Barenbrug has developed an enhanced seed coating, which makes it possible to embed Rhizobium bacteria directly into the seed. Coated seed saves labour and increases the certainty of optimal crop establishment. The Yellow Jacket Rhizobium seed coating embeds bacteria in a polymer matrix around the seed. Extra nutrients and preservatives have been added to this coating to increase shelf life.

The new Rhizobium strain is perfectly able to survive under difficult conditions. The Rhizobium strain that is used for the Yellow Jacket coating is the result of extensive selection whereby a large number of bacteria strains have been tested under various circumstances.



- Rhizobium
- Nutrients
- Trace elements

From now on, growing lucerne is hassle-free. Seed for this high-protein forage is now available with an innovative coating, ensuring a good start for the crop and a rich harvest for you, as well as high-protein rations for your dairy cattle. The Yellow Jacket Rhizobium seed coating makes growing lucerne much easier.

Barenbrug has developed the technology for the enhanced coating of lucerne seeds. Yellow Jacket Rhizobium coating contains active Rhizobium bacteria, which are essential for the growth of lucerne in the initial phase. Extra nutrients and a buffering layer have been added to the coating. These nutrients feed the seedlings, increase shelf life and protect the Rhizobium bacteria against stress.

Yellow Jacket Rhizobium seed coating improves the establishment of your crops, ensuring long-standing, high and hassle-free forage production. Growing lucerne is much easier from now on.

Rhizobium, indispensable

Aided by nitrogen-fixing Rhizobia, lucerne captures nitrogen from the air in root nodules. The bacteria also ensure improved crop establishment, resulting in higher protein and dry matter yield.

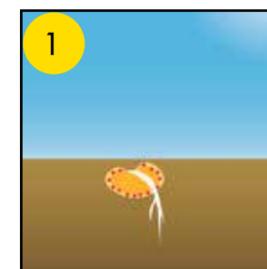
The importance of Rhizobium bacteria

Rhizobium bacteria may occur naturally in soil in small amounts. The addition of bacteria improves the crop's establishment, especially when sowing lucerne in a pasture for the first time. Many farmers manually mix Rhizobium bacteria with Lucerne sowing seed before sowing. A proper establishment of Lucerne is essential as it forms the basis for a perennial, rich harvest. Badly established lucerne crops will result in yield loss for all the following years because it's impossible to sow extra lucerne in between existing crops, as the lucerne plants' roots excrete a substance that is poisonous to its own seed.

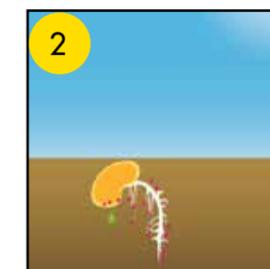
Benefits of Yellow Jacket Rhizobium seed coating

Though many soils in Europe contain Rhizobium bacteria naturally, the occurrence and activity is not the same everywhere. Rhizobium bacteria on the seed are always active and close to the young roots. Rhizobium bacteria will infect the roots and make root knots (nodules). Nitrogen from the air which diffuses through the upper soil level is taken up by the root knots. Nitrogen is converted to amides or uric acids by the Rhizobium bacteria and transported to the plant. This is the major source of nutrients for plant growth.

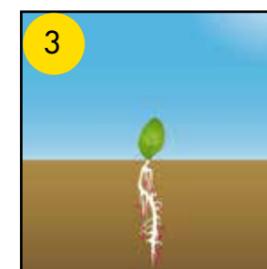
Yellow Jacket Rhizobium coating increases the amount of active Rhizobium bacteria in the soil, as closely as possible to the seedling, for optimum effectiveness. Moreover, the activity of these bacteria is guaranteed for at least six months in storage. This makes it possible to store excess seed for the next sowing period.



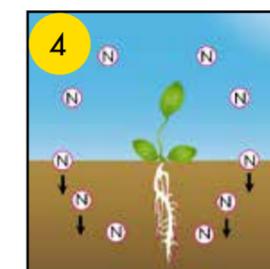
The lucerne seed germinates.



The bacteria establish themselves on the roots of the lucerne plants.



Rhizobia migrate from the coating to the soil.



The bacteria capture nitrogen from the air in root nodules. The nitrogen is transformed into amino acids and absorbed by the plant.

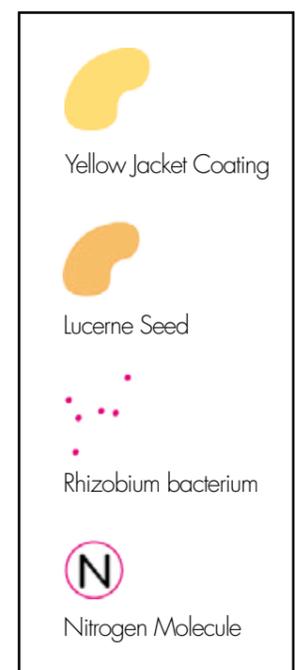


Figure 1: How do the Rhizobiumbacteria work?



Perfect forage

Lucerne has a high content of protein and effective fibre. A choice for lucerne is a choice for optimal roughage production and maximum milk production. On top of that you will economise on purchasing supplementary concentrates.

High quality seed by Barenbrug

All Barenbrug lucerne varieties give a high (protein) yield. They have a large proportion of leaves and flexible stem parts. The latter ensure that little high-protein leaf is lost during cutting. High-end Barenbrug varieties can easily yield more than low quality varieties to an equivalent of value of €1.50 per hectare per year. Barenbrug lucerne seed is free from noxious weeds and the lucerne plants have a high resistance against nematodes. Barenbrug can provide a suitable seed type for every climate zone.

Tolerance to drought

Lucerne is highly suitable for cultivation in dry areas. Lucerne roots will penetrate the ground more than 100 centimetres deep when the soil allows this. Its plants are better able to absorb moisture from the deeper layers of soil compared to grasses.

This is why lucerne also is an excellent choice in dry areas of, for example, Central and Eastern Europe. In the coming decades, the likelihood of dry, hot summers will be on the rise, making lucerne the forage crop of the future.

EU-CAP

Greening is an important element of the EU's Common Agricultural Policy (CAP). Because lucerne fits in well with this policy, some countries are offering subsidy opportunities for farmers growing lucerne - making it an even more attractive forage choice for dairy farmers.

Table 1: Average composition and digestibility of lucerne silage and maize silage (g/kg DM)

	LUZERNE SILAGE	MAIZE SILAGE
Sugar (g/kg DM)	5	10
Starch (g/kg DM)	0	320
NDF (g/kg DM)	475	380
NDF - digestibility (%)	58	53
Crude protein (g/kg DM)	190	70
Energy for milk (MJ NEL)	5.2	6.7

Source: CVB

The composition of lucerne silage

Table 1 shows the differences in main nutrients from lucerne and maize silage. The values may vary according to circumstances.

Lucerne is a great protein source and provides a high effective fibre content (NDF) to the feed ration. Lucerne silage and maize silage are complementary in composition and form an ideal base to feed high productive dairy cows.

Convenience and stability

Yellow Jacket Rhizobium coated lucerne seed offers convenience and stability, easing your worries about roughage production.

Working convenience

Yellow Jacket Rhizobium coated seed is a ready-to-use product, saving you a lot of work. Moreover, the distribution of the Rhizobium bacteria around the seed is much more even than when mixed manually.

Long shelf life

Yellow Jacket Rhizobium bacteria survive well in the coating, ensuring longer storage so the seed can be saved for the next sowing period.

Improved establishment

Coated seed is heavier than uncoated seed, which improves contact with the soil after sowing. Moreover, the seed coating will attract and retain moisture, enabling the crop to establish better compared to crops from uncoated seed.

Tip-top nutrition and acidity

Yellow Jacket Rhizobium seed coating contains essential nutrients and trace elements that feed the seedlings and enhance the effect of the Rhizobium bacteria. Lime (CaCO₃) from the coating maintains the pH value around the roots.

High yield

Various tests by Barenbrug Research demonstrate that the yield of lucerne coated with Yellow Jacket Rhizobium seed coating is higher during many years than the yield of uncoated seed, resulting in a higher roughage yield and, consequently, more milk per hectare.

Establishment and dry matter yield

A trial at Barenbrug Research in the Netherlands demonstrated the benefits of Yellow Jacket coated seed in terms of establishment, ground cover and especially forage yield at the start.

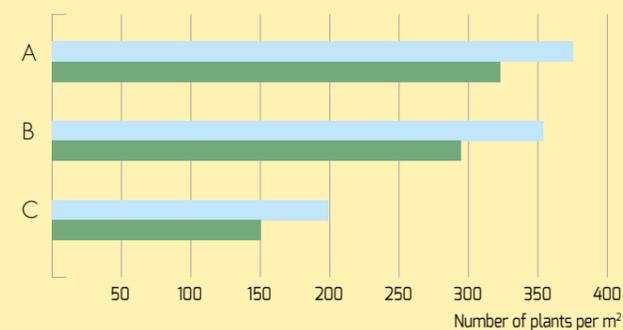


Figure 2A: Establishment of lucerne plants

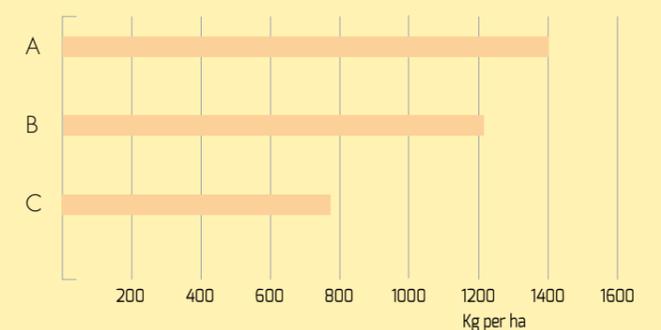


Figure 2B: Dry matter yield first cut

Points of attention during growing

Apart from choosing Yellow Jacket Rhizobium coated lucerne seed, the right soil type, optimal fertilising and correct harvesting methods will contribute to a high roughage yield.

Soil type

Lucerne thrives in well-drained soil with the correct acidity. Sandy soil must have a pH value higher than 5.5, and clay soil at least 6.0. Lucerne must not have been grown for one (in wet areas) to three (in dry areas) years. Good soil structure is advisable.

Fertilising and crop protection

Lucerne is a perennial crop. If the soil contains enough nitrogen at the time of sowing, there is no need to add extra nitrogen. Over time the crop itself will ensure nitrogen fixation from the air. Phosphate, sodium and potassium must be added based on soil analysis. Barenbrug lucerne seed is free from noxious weeds and scores well for nematode resistance. Disease and pest control are often easy to do with available resources. Because lucerne is susceptible to damage from traffic, it is important to leave the crops be as

much as possible. When a lucerne plant dies, it will leave an open spot where weeds can get a chance.

Cutting

Lucerne is mostly cut for making silage. Depending on the local climate, two up to five or more cuts are possible. In case of springtime sowing one less cutting must be taken into account. The best time for cutting is when five to ten per cent of the plants are flowering. The best cutting height is seven to ten centimetres. Lucerne is a broad-leaved crop, which means the choice of cutting machine is important. When handling is too intensive, too much leafy material is lost, at the expense of forage yield and quality.

Forage yield

In the first year the potential dry matter yield of Lucerne is six to nine tonnes per hectare. For the second and following years the dry matter yield is twelve to seventeen tonnes per hectare. These figures may vary per lucerne variety and regions.

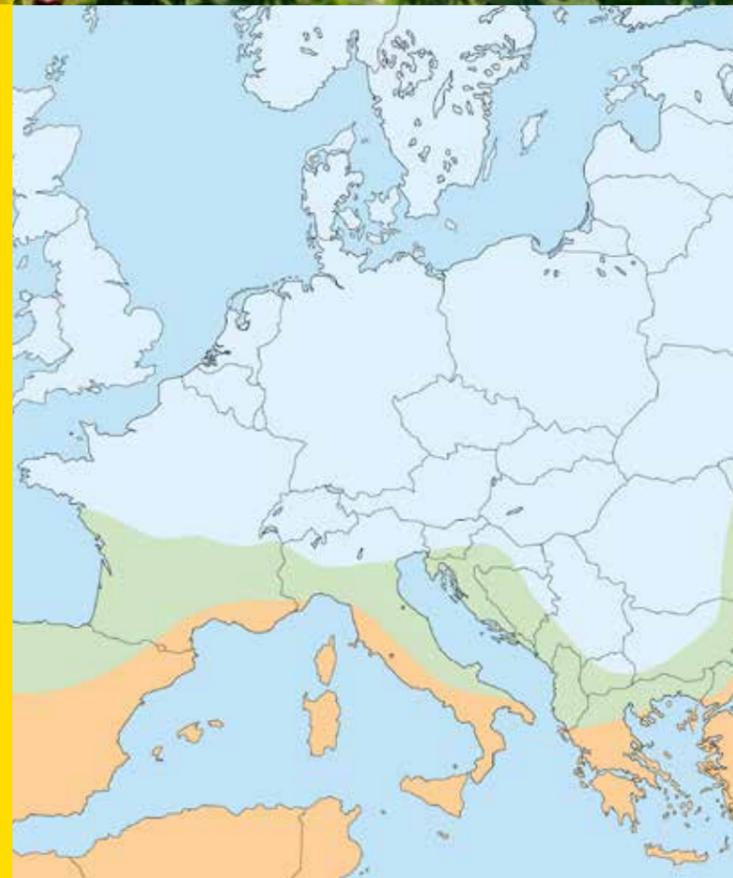


Figure 3: The lucerne dormancy classification in Europe

Barenbrug lucerne varieties

Barenbrug has a widely extended Lucerne breeding program. Our program is running in Northern- France (Flemish types), Southern France (Mediterranean types), Romania (continental types) and Australia (non-dormant types). The main goal of Barenbrug Lucerne breeding is to obtain the maximum farm benefits from Lucerne.

Table 2: Overview of Barenbrug lucerne varieties and dormancy class

VARIETY	DORMANCY CLASS
FLEMISH TYPE	
Artemis	4.5
Alpha	4.9
Alexis	5.0
Bardine	5.0
Sanditi	5.2
SEMI NON-DORMANT TYPE	
Dorine	6.4
NON-DORMANT TYPE	
Verdor	8.0



YELLOW JACKET®

RHIZOBIUM SEED COATING

LUCERNE, EASY



YELLOW JACKET®
RHIZOBIUM SEED COATING

 **BARENBRUG**