



SAATEN
UNION
HY SEED

HY SEED COMPETENCE

SAATEN-UNION hybrid breeding expertise in all 4 winter cereals.

As market leader in hybrid-wheat and hybrid-rye, SAATEN-UNION is now developing hybrid-barley and hybrid-triticale

SAATEN-UNION's investment in producing high quality seed of hybrid varieties with impressive performance, provides farmers with the opportunity to achieve higher & more stable yields. The remarkable genetic potential of hybrids provides varieties that are better able to cope with the increasingly variable climate as well as having the ability to benefit from the advanced & sophisticated agronomic techniques now being used by many farmers.

SAATEN-UNION has successfully demonstrated its ability to breed, develop, multiply & deliver large quantities of high quality, high perfor-

ming hybrid varieties across Europe. Continual investment in intensive research now means that SAATEN-UNION is the only plant breeder with expertise & advanced programs in the production & development of hybrid-wheat, -rye, -barley & -triticale.

All of the hybrid cereal breeding activities in SAATEN-UNION are now being brought together to be marketed under the name HYSEED, reflecting the integration of progresses across the SAATEN-UNION group to provide farmers with improved varieties & even more efficient service.



Leader in hybrid-rye

Rye as first hybrid cereal started its success in the mid 80's. Thanks to the basic research by the University of Hohenheim, a reliable genetic sterility mechanism is since then available to breeders. The additional yield is particularly high, at 15 to 20 % compared to conventional varieties due to strong heterosis effects. SAATEN-UNION is the German market leader thanks to its top yielding turbo hybrids. In Germany, the biggest European market, SAATEN-UNION provides the 8 best performing varieties.

Europe's only wheat breeder with hybrid technology

Since 1985, hybrid-wheat is developed on the basis of a chemical sterility system. In 1999, SAATEN-UNION received approval for the first European hybrid-wheat variety HYBNOS 1. In 2000 and 2002, the hybrid-wheat programmes of Monsanto and Dupont were taken over and integrated into the breeding program of SAATEN-UNION. Today, hybrid-wheat is a European success story with more than 200,000 ha of growing area. Since 2005, SAATEN-UNION owns the rights to the gametocide CROISOR®100 and all the varieties in the market are based on the SAATEN-UNION hybrid technology.

Hybrid-barley about to be released to the market hybrid-triticale in preliminary testing

Hybrid-barley is being developed by the HYSEED specialists of SAATEN-UNION in two breeding programmes, one in Germany and one in France. The first hybrid-barley varieties from SAATEN-UNION will be ready for approval from 2018 onwards.

In the medium-term, high performing, approved varieties can be expected from the breeding programme for hybrid-triticale.

As increasing numbers of breeders are investing more into cereal hybrid breeding, the breeding progress of hybrids will become faster and the practically relevant advantages will become continuously bigger.



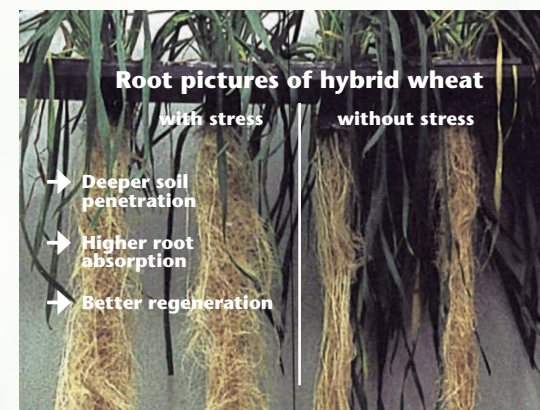
S. Koop

Sönke Koop
Crop Manager Hybrid Cereals

Hybrid cereals. The future of crop growing.

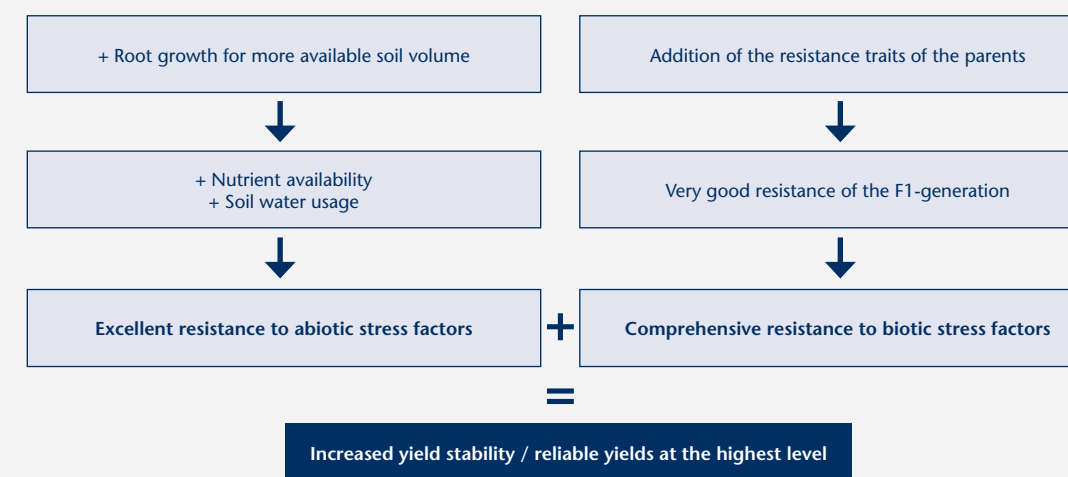
"It is not the strongest of the species that survives, but rather the one which is most adaptable to change" summarises Charles Darwin's Theory of the Evolution. This is especially true for plant cultivation.

The weather becomes more and more unpredictable, increasing regulations on the use of fertiliser and plant protectants are limiting plant production, and the market prices have dropped for four consecutive years. For farmers this means maximising output while minimising input. Efficiency is the main focus.

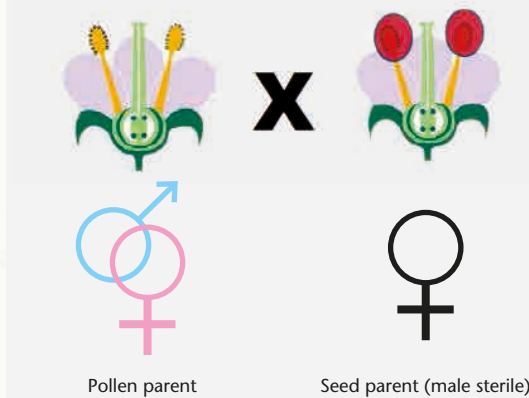


These circumstances clearly define the breeding targets for the HYSEED specialists.

The aim: maximised productivity with comprehensive resistance to biotic and abiotic stress factors



Hybridisation scheme hybrid-wheat



In comparison to conventional varieties, hybrid-wheat has a significantly higher yield potential combined with lower yield fluctuation. This is particularly true for difficult and unfavourable conditions.

The root system is better developed so that a larger soil volume can be reached as compared to the non-hybrid varieties. The stress resistance to cold temperatures, excess water and drought is higher, which contributes to lower yield fluctuations over the years. This is accompanied by a higher seeding time flexibility.

Throughout Europe more and more professionals benefit from the advantages of hybrid cereals. Hybrid cereals will cover an increasing part of the growing area in future!

Hybridisation.

A hybrid variety is created by crossing two highly divergent inbred parents. The crossing creates an F1 generation, where the performance is higher than the average performance of the parent generation. This is the desired "heterosis effect".

Hybrid-wheat seeds are created by crossing two inbred lines:

- One sterile line that doesn't produce pollen and therefore is male sterile. This is used as seed parent and therefore as "female" line.
- A different, "male" line (pollen parent). Their task is to pollinate the "female" parental line (seed parent).

The grain, harvested from the "female" parental line (seed parent), is the hybrid seed of the first generation, the so-called F1 generation, which is sown by the farmers profiting from the heterosis effect.



HY SEED COMPETENCE

HY SEED ADVANTAGE

The performance advantage of hybrids.

Hybrid cereals have a higher yield potential than conventional line or population varieties. Looking at rye, the increased yield potential, is over 25 % depending on variety. The current breeding progress in winter wheat also shows an increased performance. The heterosis is somewhat lower in self-pollinating cereals such as wheat and barley than in cross-pollinating cereals such as rye or maize. The additional yield as compared to the most successful conventional varieties in winter wheat is about 8-10 %. This is proven by the two-year research project

HYWHEAT on 11 sites with 1,600 test hybrids, coordinated by the University of Hohenheim.

Where do hybrids show an advanced performance?

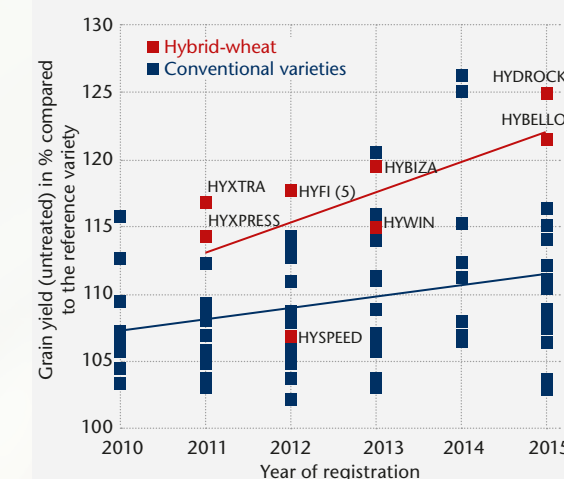
Hybrid varieties prove their higher yield potential especially under unfavourable conditions in terms of site, water supply, weather conditions, preceding crop or cultivation method.

Water efficiency = grain yield per litre of water

High yield is correlated to high water efficiency. Conventional varieties can also have high water efficiency if there is a good water supply. However, under drought conditions (especially in spring) hybrids show sustainably less yield loss.

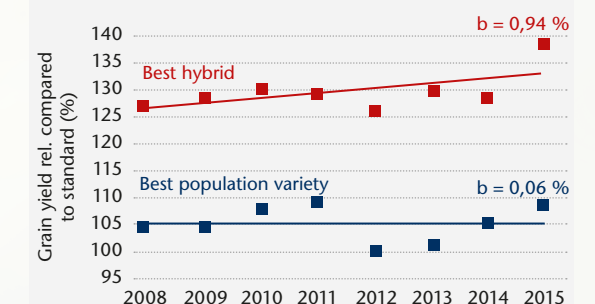
Hybrid-wheat – high performing in arid regions

Grain yield in trials on arid sites in the South of France.



Additional breeding advantage of hybrids

Grain yield comparison Hybrid-rye/Population rye
Basic: Grain yield of population variety
"Conduct" = 100

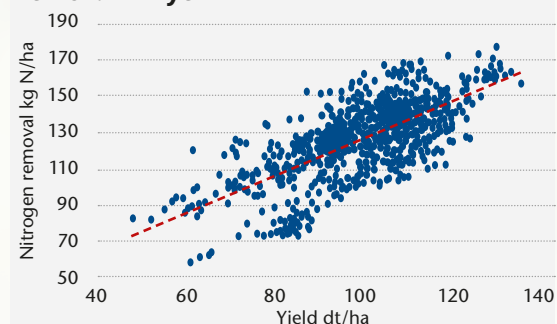




N-efficiency: in hybrids 20 kg N/ha higher

The higher the yield, the more nitrogen is removed from the field. The additional yield of up to 25 % resulting from the hybrid breeding of rye when compared with population varieties, leads to a massively increased removal of nitrogen

Relationship between yield and nitrogen removal in rye

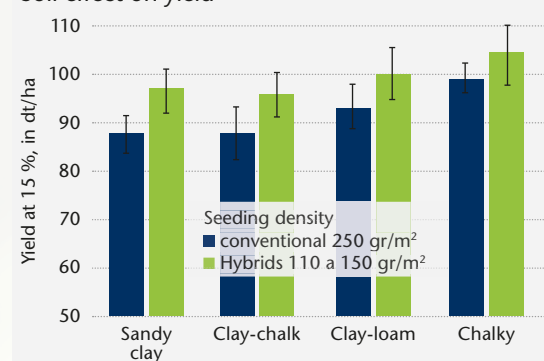


Source: from Bundessortenamt data

from the field with identical fertilisation. This in turn defines the increased nitrogen efficiency of the hybrids. The differences between the hybrid and population varieties are over 20 kg N/ha; the resulting lower nitrogen overhead reduces nitrogen wash-out.

Yield comparison between Hybrids / Conventional

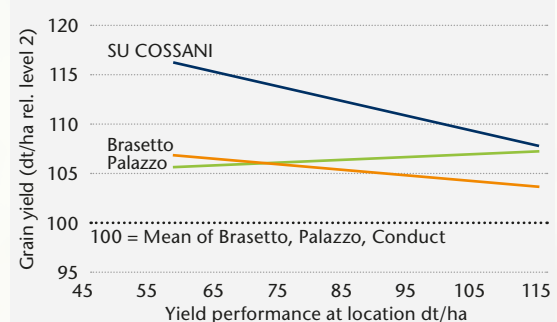
Soil effect on yield



Source: SAATEN-UNION Recherche

Yield stability SU COSSANI

Official trials 2011–2013, n = 44



SU COSSANI shows significant yield superiority over the established varieties, especially at locations with unfavourable growing conditions, which are typical for rye growing regions.

Source: from Bundessortenamt data

HY SEED ADVANTAGE

HY SEED PRODUCTION AND QUALITY

Seed production and quality assurance in hybrid cereals.

- 1 Europewide, the entire breeding and production system is planned, organised, performed and centrally controlled by a seed production departments of SAATEN-UNION.
- 2 All seed lots of parental and basic seeds are checked for genetic purity before seeding and can be traced using a family tree.
- 3 The entire seed production is subject to an internal quality management system of SAATEN-UNION, which provides up to date quality parameters for purity, thousand grain weight, germination capacity and vigour during all the steps of seed production.
- 4 All farms are selected for field production according to internal seed quality standards. The farmers are long-term partners and, with their experience, guarantee the delivery of high-quality raw material.
- 5 All propagation and processing sites are networked centrally through a special IT system.
- 6 Regular field inspections of parental and basic seed multiplication are organised and carried out by employees of the breeders.
- 7 All processing stations are equipped with high quality de-dusters, cleaning and sorting machines as standard, and are certified by independent assessors.
- 8 The treatment with high-quality fungicidal (and where permitted) insecticidal seed dressings and micro-nutrients is performed using computer-aided technology.
- 9 The certified seeds are packed in units with a fixed number of seeds, for hybrid-rye even with germinable seeds.
- 10 Due to the strategic distribution of the processing stations, seed orders can be provided close to the market, on schedule, and according to the customer wishes.

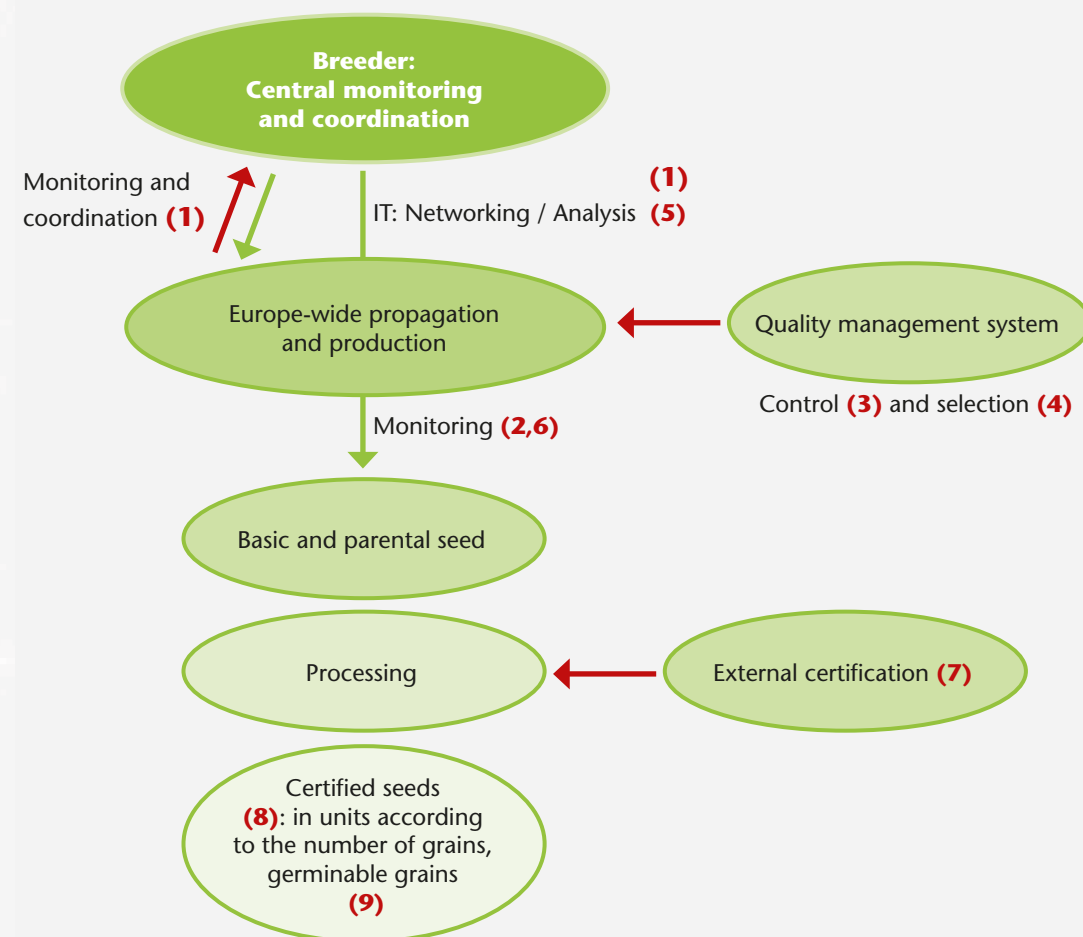


Advantages for the farmer:

For the low seed rates, used with hybrids, the prerequisites are high-quality hybrid seeds from the supplier and produced to the highest quality standards.

Calculating the amount of seeds is made easy by packaging in units in an Europe-wide standard

Seed production and technologies in hybrid cereals



HY SEED PRODUCTION AND QUALITY

Hy SEED PRODUCTION TECHNOLOGY



Do hybrids need different farming technology?

The decision to use hybrids is at the same time a decision to use a modern farming system. In hybrid cereals, everything is centred around the individual plant and this leads to an adapted farming process.

Reduced seed rates

The higher performance of the individual plant allows reduced seed rates. This lower seed rates

also, in combination with the higher yield and a better yield security, compensates for the higher costs of the seeds. In barley and wheat hybrids, the economical optimum is 30 to 50 % below conventional varieties and 20 % for rye. The lower seed rate requires careful drilling in well prepared seed beds.





Adapted sowing times

The differentiation also has to be made with regard to sowing times. For hybrid-barley late sowing dates are recommended, and also in rye the increased late seeding tolerance of the hybrids can be used. Hybrid-wheat should be sown in time to ensure optimal development of the individual plant on the less favourable locations.

Treatment more economical

The lower seed rate allows for particularly economic use of special fungicidal or insecticidal seed dressings. In hybrid-wheat, for instance, the extra costs for the seed dressing against take-all-disease are reduced by 50 %. Early and thinly sown cereal crops are more in danger of attracting aphids and therefore the use of an insecticide must be considered in autumn depending on the infestation level, and is often economically feasible especially in hybrid-wheat.

Accurately timed and sufficient N application

Heterosis combined with lower seed rates and earlier seeding leads to healthier individual plants with stronger stems tillered single plants. The use of hybrid seeds allows a different nitrogen application regime.

Further growing methods must be oriented on the development of the crop, depending on the weather and variety characteristics. The cropping intensity is basically not different, but must be adapted to the higher yield expectancy of the hybrids. It must also be taken into consideration that cross-pollinating hybrid-rye reacts more specifically to a treatment measure. As the individual plants are more closely related, for instance, growth regulator applications have a more pronounced effect than in a population variety.

SEED PRODUCTION TECHNOLOGY



Breeding capacities and competences

Hybrid rye

SAATEN-UNION breeds, selects, tests and produces hybrid-rye at 16 international sites among others in Kleptow, Wulfstode and many other sites in Germany, as well as in Poland, Russia, France, Italy and Hungary.

In Germany, seed processing takes place at 10 sites with breeding partners and selected farms/production companies.

Hybrid wheat

SAATEN-UNION breeds, selects, tests and produces hybrid-wheat at 26 international sites in thousands of crossings each year. The basis of this are annually a total of several hundred father and mother lines. A number of hybrids are currently in official testing process to provide new products for the coming years.

Hybrid barley

Four candidates are currently in official registration trials in Germany, Austria and Czech Republic.



SAATEN-UNION GmbH

Eisenstrasse 12, 30916 Isernhagen HB, Germany

Telephone 0049-511-72 666-0

www.saaten-union.de

**SAATEN
UNION**
Züchtung ist Zukunft