

Let's make grain great again

# The Landrace

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Newsletter no. 9  
September 2022

The grain is harvested and we're looking into a new season. Please read what's relevant to know disregarding.

Anders Borgen

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## Become member of Landsorten and receive free seed of our newest wheat variety!

Yes, this is not a translation error. [Gurli](#) is our newly released wheat population developed to give a high yield under organic conditions. For most conditions, the protein content is too low for baking, but the high yield of [Gurli](#) matching the highest yielding varieties on the market is relevant for feeding purposes. As a new member of Landsorten you will be given a welcome present of 200kg seed of [Gurli](#). Our gain of this offer is that we wish to have the seed tested under different growing and climatic conditions, and we hope you will assist.

You will become a member of Landsorten by signing up at the homepage <https://landsorten.dk> and contact Bjarne ([bjarne@landsorten.dk](mailto:bjarne@landsorten.dk)) to receive the seed (shipment not included).

Are you a member of Landsorten or not? A simple question, but for some readers of this newsletter a bit difficult to answer. This newsletter is free of charge and is circulated to 900 subscribers. Some supports Landsorten with a membership, whereas others just enjoy reading. Everybody should have the chance to sniff the scent of being part of the movement. We just hope at some readers enjoy reading so much that you at some point choose to become active part of the movement as a member of Landsorten.

Last year, Landsorten had 110 members, but even the production of our grain is increasing, the number of members has decreased since we introduced the online payment system. Some members are in good faith and thinks they are still members of Landsorten even though they have not paid for 2022. Landsorten financial situation and future development depend on the memberships, and we really need the support from memberships. Please check your account in on [My Page](#). Just type in your email address. If you cannot log in, it is because something is wrong, and you should [contact Landsorten](#) to solve the problem. Please.

## Other varieties for winter sowing 2022

If you need seed for sowing this autumn, please contact Bjarne Hansen ([bjarne@landsorten.dk](mailto:bjarne@landsorten.dk)) who will be in charge of seed coordination. Landsorten offers [registered organic heterogeneous seed of Popkorn](#). Because of some legal terms that I don't really understand, we are not allowed to call it certified seed, but in practise it is the same. Hence, there are no restrictions in terms of amounts or regions for production or marketing.

Apart for the registered seed of [Popkorn](#), you can also find other varieties in [our catalogue](#) that are marketed in limited amount under special conditions (see page 5).

The seed system in Landsorten is a bit different from common commercial seed systems. Landsorten is not a seed company, and we do not produce seed for marketing. Landsorten is a membership organisation, and it is the members that request or produce the seed and trade with each other. Landsorten just helps members to contact each other, so that for example the millers can get good quality grain from farmers, and the farmers can have access to seed of the best varieties from seed producing farmers. Therefore membership is required to get access to the varieties. You can read more about this on the homepage <https://landsorten.dk>.

## **Popkorn – winter wheat with good baking quality**

Popkorn is the first choice if you're looking for bread wheat this season. Winter hardiness and resistance to diseases is good, and baking quality is at the level of winter sown Mariagertoba, the "Danish Manitoba".

## **Purple wheat Viola**

The purple wheat Viola is an innovative alternative among flour and grain products. Where continental varieties in some cases have an inferior baking quality, Viola is developed for organic conditions and gives high gluten content and weed competition.

## **E3 spelt**

E3 spelt is a variety that doesn't produce expansin. Expansin is the substance that triggers grass pollen allergy (hay fever) and in food stuff it can also cause wheat allergy. E3 spelt also has a low content of fructan, that may cause IBS (Irritable bowel syndrome). For consumers without coeliac diseases, who even so suffers from wheat intolerance, E3 spelt may offer an alternative to wheat to minimise symptoms. E3 spelt can be grown both as spring spelt and as winter spelt, but in Northern Europe we recommend it as a winter sown crop. because of earlier harvest and better weed competition. E3 spelt has a fine taste and we receive positive feedback on baking quality.

## **Danish spelt**

Spelt was grown as a minor crop in Denmark until mid 1900 where it finally was replaced by bread wheat. Only a single variety has been saved for the future, collected in Denmark by Nicolai Vavilov in 1928. Today, seed of Danish spelt is only available from Landsorten and from the Vavilov Institute in Russia.

## **Macha**

Macha is a species of the wheat genus originating from Georgia. It has traits that resembles bread wheat and spelt, but is considered a separate species. It has tight glumes and need therefore de-hulling like spelt, but the seeds are smaller and looks more like bread wheat. Macha has never been marketed commercially in Western Europe, so here is your chance to introduce your exclusive new product.

Agronomically, Macha is a bit soft in the straw and should therefore not be fertilised as much as bread wheat, but more like long straw landraces.

## **Mariagertoba**

[Mariagertoba](#) is the North European version of Manitoba flour named after the town Mariager where I live and developed it. During the past year or two, it has become the preferred choice among artisan bakers in Denmark. [Mariagertoba](#) is a spring wheat, but it has good winter hardiness and some farmers are growing it as a winter wheat. However, if you plan to sow a winter wheat, we recommend [Popkorn](#) rather than [Mariagertoba](#). Like [Popkorn](#), [Mariagertoba](#) is propagated as registered organic heterogeneous material, and seed is available for sowing now.

## **Dr. Baumanns hairy vetch**

Hairy vetch is a productive green manure plant that can also give a significant yield when grown to maturity in mixture with cereals. Mixing 10% of hairy vetch into your [Gurli](#) wheat or other varieties of feeding grain will increase the protein content significantly and replace expensive imported feed concentrate.

Dr. Baumanns hairy vetch is the most grown hairy vetch in Northern Europe. It is available as certified organic seed.

## **Quality control of seed from Landsorten**

Landsorten has written a [guideline for seed production](#) describing Landsorten's seed system. I'm sorry that it is at present only available in Danish. The principle is that seed from Landsorten should as a minimum match the quality standards known for certified seed and in some cases higher standards. The higher standards are in some cases required as the regulations for certified seed are minimum requirements for conventional conditions. In organic farming, we sometimes need better seed quality, eg. for seed borne diseases and germination speed for improved weed competition.

Landsorten conveys both registered organic heterogeneous material ([Popkorn](#) and [Mariagertoba](#)) but also seed for test productions and trials. The principle should be that seed for test productions should match the same standards as registered seed. Landsorten does not take responsibility of private seed exchange amongst members, but only for seed conveyed by Landsorten.

If you are a member of Landsorten and wishes to have Landsorten help you with marking of your grain for seeding purposes, then there are certain conditions that you need to fulfil. The seed needs to be checked for seed borne diseases, and the seed coordinator should be able to inspect the field for wild oat and other noxious weeds before harvest. You therefore need to contact Landsorten in due time to be sure to be included in [Landsorten's seed catalogue](#).

In [the guidelines](#) , you can find the details about dates and requirement that you need to fulfil.

# News from common bunt research

## Genetic markers

Agrologica has in 2022 had the worlds so far biggest bunt research trial. At least, nobody has published research describing a more comprehensive trail, and until we're contradicted we claim the assertion. The trial included 857 wheat varieties, each infected with 8 different races of the fungus. By analysing which races were able to infect which wheat variety, we have been able to identify 13 different resistance genes. We will now analyse the DNA of each of the varieties with 25,000 genetic markers distributed over the entire genome. With this data and with the data we have collected previously in LIVESEED and other projects, we will identify which genetic markers are linked with each resistance gene. This knowledge will be crucial for future plant breeding to develop resistant varieties, and hopefully finally put an end to chemical seed treatment.



*Figur 1: Bunt rial 2022 with endless rows of infected wheat*

In July this year, we made a workshop for bunt researchers from all over Europe that we cooperate with, and we are happy for the support and feedback we received.

Both the DIVERSILIENCE and the BOOST projects supports our bunt research, but several institutions and companies participating the workshop promised to financial support the research for speed up the process.

## Virulence races

Common bunt is a seedborne disease, and like other diseases, bunt is divided into different variants or races. Just like corona that is divided in the alfa variant, delta variant and omicron variant. This means that even though a wheat variety has a resistance gene, there is still a risk of infection if a new races is virulent and can infect a particular resistance gene. We therefore have tested races of bunt collected different places in Europe to find out which races are most widespread and which genes are most safe for the farmers. This year, we have tested 40 different races and infected 22 different wheat varieties with known resistance genes with each race to see which races are able to infect which resistance gene. Our results indicate that the European bunt can be divided into at least 16 different races with different virulence profiles. Unfortunately, the result is not very optimistic. Actually, only three resistance genes (Bt9, Bt11 og Bt12) could not be infected by the any of the 16 races. The conclusion therefore is that so far it is safest to breed more than one resistance gene into each wheat variety. To achieve this, the genetic markers are crucial, because these can be used to identify the genes present in the different varieties.

# The grain colours

Grains can have different colours and each colour is caused by different phyto chemicals that often also have other traits than just the colour. Agrologica has developed a wide range of varieties with different colours that may not only provide a diversity of culinary applications, but most of them also provide positive health related effects since most of them are powerful antioxidants and contribute to the taste of the grain and flour made from it.

## Red wheat and white wheat

In Northern Europe, most wheat varieties are light brown in the surface colour and are in English and in particular in America called *red wheat*. The colour is caused by the presence of polyphenols in the bran. Polyphenols are the same kind of substance that turns apples and bananas brown when they are cut in pieces. When exposed to oxygen, they polymerise and turn brown and in this way they prevent the oxygen to come in contact with the germ and prevent germination. Polyphenols have a bitter taste and give character to the taste of whole meal flour compared with white sifted flour.

Some wheat varieties have hardly any polyphenols in the bran, and appear almost white. The taste of them is milder, and whole meal flour is significantly whiter than flour of red wheat. The mild taste is attractive in pastry and cookies. Because the polyphenols are part of the system preventing the germination of the seed, white wheat varieties are in general more sensitive to humid conditions during harvest, which may have a negative impact on falling number. White wheat should therefore be harvested as soon as the grain matures to maintain a high falling number and baking quality.

## Purple and blue colours

Anthocyanins are colour substances that cause the red colours of red wine but also the more blue colours of blueberries, elderberries and also most colours in flowers. Some wheat varieties have a high content of anthocyanins in the bran and are called purple wheat. In some varieties, the anthocyanins are present in the aleuron layer just beneath the bran and not in the bran itself. Therefore, the light gets filtered through the bran and the kernels appear more blue. All this may sound a bit nerdy, but it has practical implications. When flour is sifted, the bran is removed from the flour, and in case of purple wheat, the purple colour disappears and is only present in the bran fraction. In blue wheat, most of the colour remains in the flour fraction after sifting, unless the aleuron is also removed as in the case of very fine sifted flour such as Tipo 00.

Rye too can have anthocyanins in the surface. Most varieties are of the blue type with blue aleuron, but there are also varieties without. Being a cross-pollinating species, light coloured seeds are also often found in varieties predominantly of the blue type. Bread of purple wheat and blue wheat will have the same colour as normal rye bread, but normally more intense in colour as the amount of anthocyanin is normally higher in purple wheat than in rye. Apart from the colour, the anthocyanin also contributes to the taste.

The blue and purple trait is caused by different genes, and it is therefore possible to develop varieties that have both the blue and the purple gene. In this way, there will be the double amount of colour, and the kernel appears almost black. The black wheat from Agrologica is still in development, but will be set in production within a few years.

Naked barley can like wheat have either blue or purple kernels, and can also be coloured by polyphenols. In Tibet, landraces of purple naked barley are found, but in Northern Europe, the variety

Babuskha developed by [Cultivari](#) is one of the most widely grown purple barley variety. Blue naked barley is not grown commercially, but is under development in Agrologica.

## Yellow wheat

Colours can also be present inside the seed and not visible on the surface. In particular lutein can be present in the endosperm of the seed and in this case the flour itself will be coloured yellow, rather than the white colour of normal sifted wheat flour. Lutein is also the substance that give the yellow colour in spaghetti even if it is produced without adding eggs, as most durum varieties are of the yellow type with a high content of lutein. Also many maize and einkorn varieties contains lutein and produce yellow flour.

Some bread wheat varieties also contains lutein and gives yellow flour, and it can be attractive for both bread and pastry. Also, lutein is quite healthy as it like beta-carotene is a pre-stage of Vitamin-A and an important nutrient preventing visual disorders. Landsorten is propagating the spring wheat variety [Sunshine](#), and small amounts will be available for the spring season 2023.

In some countries Golden Rice is promoted to prevent eye diseases caused by Vitamin-A deficiency, but Golden Rice is transgenic which of course is a *no go* within the organic breeding program of Agrologica.

## Black oat and black barley

The seeds of malting barley and normal oat are hulled, and the hulls can be coloured by a melamine-like substance making it totally black. As we don't eat the hulls of barley and oat, it has no influence on the food quality. To prevent any confusion here, there are a lot of oat species. Normal oat grown in agriculture is the species *Avena sativa*. There is another species, *Avena strigosa* that is sometimes called black oat, because the hulls of this species is more often black than light. So the term black oat can both refer to normal oat with black hulls or the species *Avena strigosa* that often but not always has black hulls. In the following, I only refer to normal oat *Avena sativa* when talking about black oat.

Even oat is de-hulled before producing oat meal, some producers and consumers prefer black oat for the production. That oat meal from varieties with black hulls are more tasteful or nutritious than from yellow or white oat may not be caused by the colour itself, but could also be caused by the fact that the black varieties contains more fat and proteins, which are important components also for taste, but I must admit that I am now speculating, as it is not a topic I have studied in detail. However, I do know that many horse breeders and stud farms prefer feeding horses with black varieties, and I do believe there is a reason for it.

In Syria and Iraq, barley with black hulls is predominantly used for feed whereas varieties with white/yellow colours are used for human consumption. I haven't found out why, but I call for the readers to contact me if you do.

To my knowledge, only a single producer in Denmark, *Favnen Fuld af Grise* is producing black barley from a landrace most likely originating from South-Eastern Europe or Middle East. Agrologica has developed varieties of black barley adapted for Northern Europe, and they can be multiplied if demand is there.

# Agrologica is looking for new investors

It is me, Anders Borgen, who owns Agrologica, but at some point preferable within the coming decades, I would like have a couple of holidays before it is too late. I have therefore begun to consider how Agrologica can develop and be more independent from me, so that the plant breeding can continue also on a longer term. Agrologica is therefore looking for qualified staff that gradually can take over the breeding and editing of this newsletter, and it should also be done within better physical facilities than the present. However, to begin such a transmission, capital is required, so if you by any chance is sitting on a treasure chest and don't know exactly what to do with it, this is chance for a long term investment in future green transmission of plant breeding. This could include both commercial and charity investments.

Links to previous issues of this newsletter:

- [The Landrace no. 8, May 2022](#)
- [The Landrace no. 7, December 2021](#)
- [The Landrace no. 6, September 2021](#)
- [The Landrace no. 5, May 2021](#)

Links to Danish versions:

- [Sigtekornet nr. 9, maj 2022](#)
- [Sigtekornet nr. 8, maj 2022](#)
- [Sigtekornet nr. 7, december 2021](#)
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- [Sigtekornet nr. 2, december 2019](#)