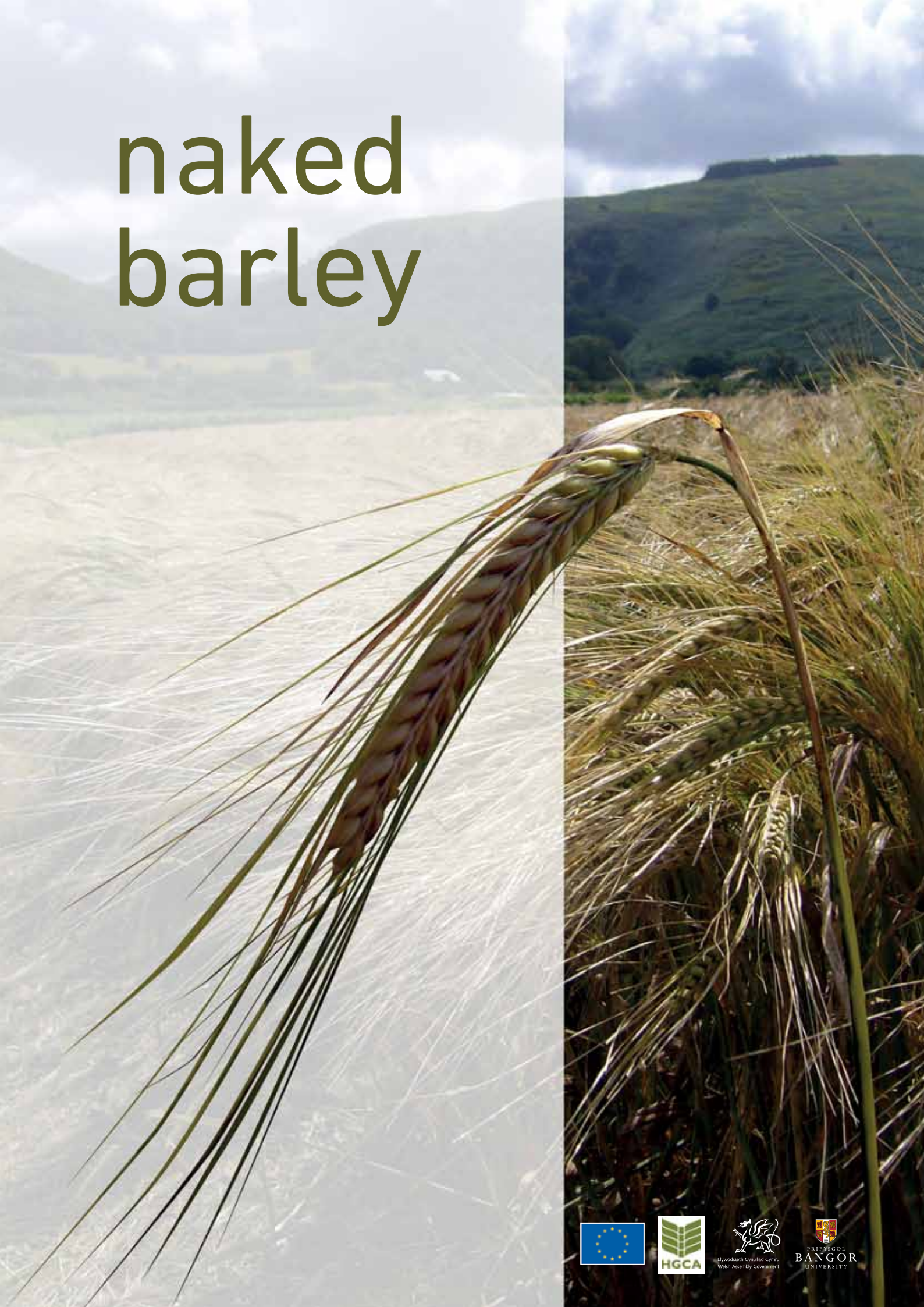


naked barley





What is naked barley?

Naked barley is barley (*Hordeum vulgare*) with grains that thresh freely out of the hulls (like wheat).

Why is it useful?

The hull of covered barley is indigestible for humans and must be removed by pearling. Naked barley doesn't need this processing and is ideal for food use.

Why is it naked?

In covered barley the hulls are 'glued' to the grain as it develops. In naked barley the gene that controls the production of the 'glue' is mutated, so the hulls fall off easily.

Where did it come from?

Genetic studies show that the mutation probably occurred around 8,000 years ago in a region that is now in modern Iran. Naked barley spread quickly throughout Europe, Asia and North Africa to become an important cereal crop in the Neolithic and Bronze Age.

Why is naked barley a forgotten crop?

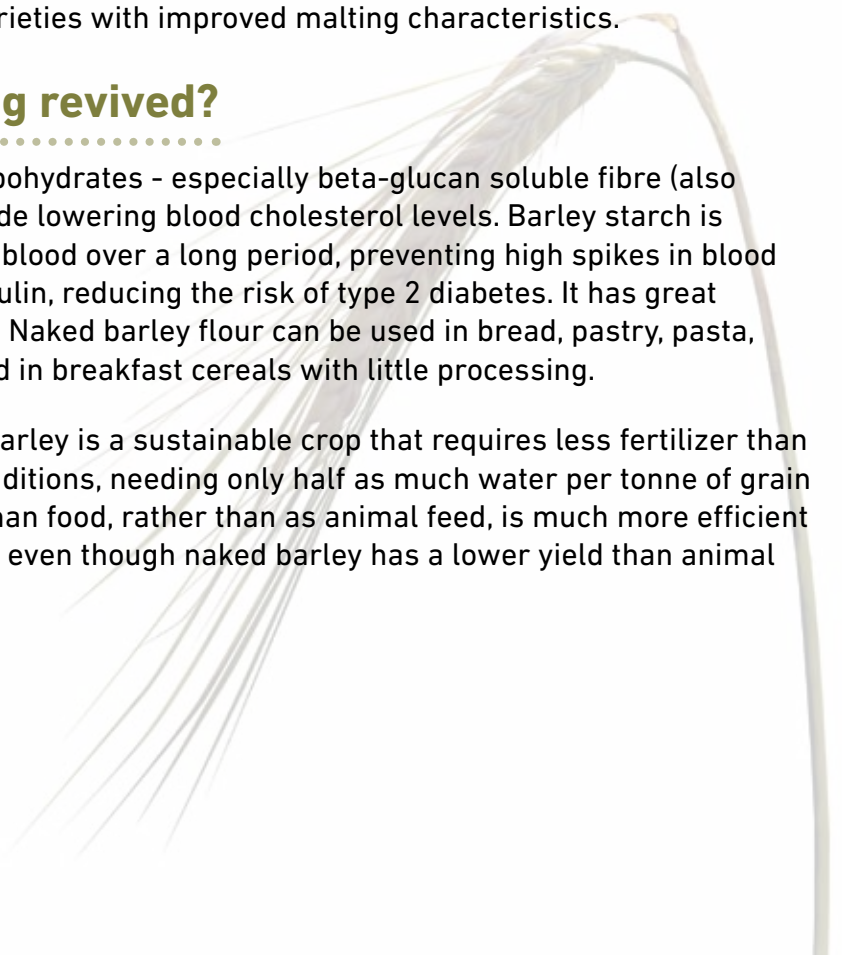
Naked barley began to decline in popularity in Europe during the Iron Age, following the introduction of bread wheat (*Triticum aestivum*). Bread made with wheat flour was preferred, so barley became used mainly as an animal feed for which hulls are not a problem. Naked barley was neglected in the UK because of its poorer yield and lower germination rates.

Covered barley is used for malting to produce beer. Barley breeding programmes in the UK have concentrated on producing covered varieties with improved malting characteristics.

Why is naked barley being revived?

Barley is a rich source of complex carbohydrates - especially beta-glucan soluble fibre (also found in oats). Its health benefits include lowering blood cholesterol levels. Barley starch is broken down to release sugar into the blood over a long period, preventing high spikes in blood sugar and corresponding spikes in insulin, reducing the risk of type 2 diabetes. It has great potential as a whole grain health-food. Naked barley flour can be used in bread, pastry, pasta, cakes and biscuits, and the grains used in breakfast cereals with little processing.

Environmentally, spring-sown naked barley is a sustainable crop that requires less fertilizer than wheat. Barley will grow in adverse conditions, needing only half as much water per tonne of grain as wheat. Using barley directly as human food, rather than as animal feed, is much more efficient in terms of food produced per hectare, even though naked barley has a lower yield than animal feed varieties.



What was done at Bangor University?

A project based at Bangor University's Henfaes Research Centre was funded by the Welsh Assembly Government and the Home Grown Cereals Authority. The project's aim was to investigate whether a supply chain for naked barley could be established with existing naked barley varieties.

Agronomy trials were conducted at Henfaes Research Centre in 2008 and 2009 with 44 naked barley varieties and 4 covered UK varieties. The level of beta-glucan in barley grain was compared between varieties and growing conditions.

Bangor University worked with Pobty Cae Groes, a local company, who developed test products including barley bread, soda bread and bakery products.

A number of farmers grew crops of a German variety Lawina in 2008 and 2009 with agronomic guidance from Bangor University. Unfortunately, this variety did not perform as well on farms as it did in research trials, so only one farmer was able to supply naked barley grain to commercial food companies.

Crosses were made between naked barley varieties and UK covered varieties. These crosses are being used in a breeding programme and to investigate the genetic properties of naked x covered barleys.

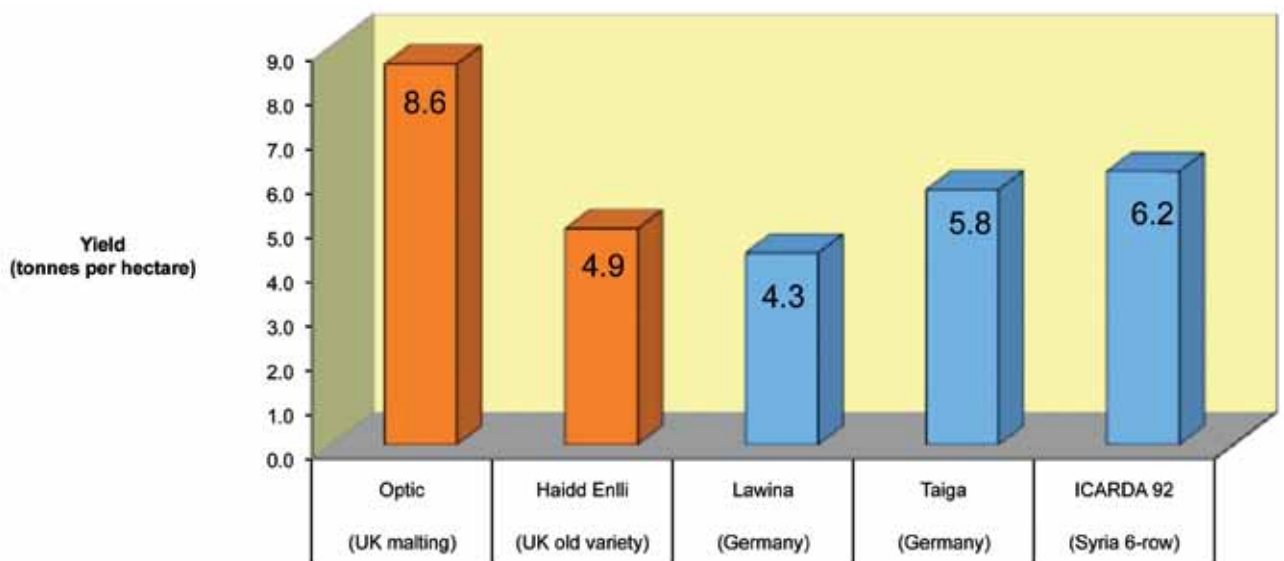


Agronomic information

Establishment of naked barley is 20% lower than covered barley and this is due to the vulnerability of the exposed embryo in the naked grain. Establishment can be enhanced by sowing in a warm seedbed and harvesting the grain for seed with the combine set to a slow drum speed (600-700 rpm).

Yield of naked barley is lower than modern covered barley (See graph). However, unlike the modern covered varieties, the naked barley varieties we tested were not developed through modern UK breeding programmes. Haidd Enlli ("Bardsey Barley"), a Welsh variety that was cultivated up to the mid-20th Century had a grain yield similar to the naked barleys.

Yield of hulled (orange) and naked (blue) varieties in 2009 spring barley trial at Henfaes Research Centre, North Wales.



- Specific weight of naked barley was about 20% greater than hulled barley.
- Treatment with a plant growth regulator increased yield of the naked barley variety Lawina.
- Conventional seed treatment for spring barley was detrimental to germination.
- Non-UK adapted varieties did not give a yield response to fungicide treatment.
- The wet summers during the project exacerbated the agronomic weaknesses of available naked barley varieties.

Selected naked barley lines from crosses made at Bangor University had strong straw and higher disease resistance, more like UK varieties. Some also had high establishment rates, suggesting that the poor establishment trait can be removed through breeding.

Future prospects for naked barley

Despite its lower yield, naked barley can be sold at a premium to food processing companies.

Further investigation is needed into the effect of barley beta-glucan on human health. Varieties with high beta-glucan would be better for food uses, however the effect of the growing environment and processing on beta-glucan content needs to be investigated further.

A supply chain for naked barley has yet to be established, and it depends on suitable UK-adapted varieties being developed.

Bangor University has started a breeding programme to improve naked barley for the UK.

Yield, disease resistance and fibre (beta-glucan) content of spring-sown naked and covered barley varieties tested at Henfaes Research Centre in 2009.

	Yield (t/ha)		Disease resistance (1-9)			Beta-glucan (g/100g)	
	U	T	Mildew	Rhynchosporium	Brown rust	U	T
Covered UK varieties							
Optic	4.8	8.6	8	8	2	5.1	4.0
Static	6.8	9.7	1	8	1	4.3	4.9
Cocktail	7.1	8.8	7	5	2	4.1	4.2
Naked varieties							
Lawina (Germany)	4.3	4.3	7	6	3	4.9	5.5
Taiga (Germany)	4.9	5.8	7	4	2	5.1	5.0
Darzac 5 (Germany)	4.1	6.9	6	5	9	4.9	6.3
ICARDA 92 (Syria)	4.7	6.2	8	3	1	5.0	5.9

Disease was scored on a scale of 1 to 9 where 1 showed least symptoms and 9 showed most symptoms
 T = fungicide treatment
 U = untreated (no fungicide)

Harvesting naked barley at Henfaes Research Centre.



For further information visit <http://barley.bangor.ac.uk>

