
AberHybrid Ryegrass

Harnessing together the
best traits of Perennial
and Italian Ryegrass



AberHybrid Ryegrasses have been developed by the Institute of Grassland and Environmental Research (IGER) by crossing together the two main agricultural Ryegrass species.

Following rigorous testing at sites throughout Britain in National and Recommended List trials, these new “Aber” varieties are now recognised by independent scientists as offering significant benefits to today’s livestock farmers:

“We are seeing new Hybrid varieties which are very different. Among these, AberLinnet and AberExcel are very high yielding.

“The new Hybrid variety, AberEcho, is still undergoing evaluation and looks very promising.”

John Weddell, SAC
May 2002

“Hybrids now have improved quality and persistence, and are more like Perennial Ryegrasses. Our Hybrid testing has now moved to a three year system, reflecting the greater persistency of the newer Hybrids.

“AberEcho, the latest IGER-bred variety to be added to our Recommended List (category PG) , has exceptional yields, equal to the better Italian varieties without compromising quality, disease resistance or ground cover. ”

Steven Bentley, Herbage Trials Co-ordinator, NIAB
August 2002

This booklet summarises the progress of IGER’s Hybrid Ryegrass breeding programme and the performance benefits that farmers can expect when using these new varieties.



Why Hybrids have been developed

Good quality and reliable forage varieties underpin Britain’s beef, sheep and dairy industries. Ever since the 1920s, plant breeders at Aberystwyth have been working to improve the agronomic qualities and performance of the main forage crops, especially grass. These successful breeding programmes continue to this day at the Institute of Grassland and Environmental Research (IGER). The development of Ryegrass, the most productive agricultural species, has been the particular focus of IGER’s grass breeding activity.

In recent years, renewed interest in home-grown forage, and farmers’ desire to extend the grazing season, have prompted scientists to breed for new combinations of characteristics. Their efforts have concentrated on breeding for good early growth and the ability to produce heavy crops of silage, coupled with high quality throughout the grazing season.

Italian Ryegrass has good establishment and considerable growth potential, particularly in the spring and early summer. However, swards of Italian Ryegrass often contain a high proportion of stem, which has a lower digestibility than leafy material. Italian Ryegrass also has poor persistence and is therefore suitable only for short-term (two year) leys.

Perennial Ryegrass swards generally have higher leaf content and offer good grazing quality through the season. They are more persistent than Italians, although they may not produce high yields, especially if nitrogen fertiliser inputs are low.

By hybridising Italian and Perennial Ryegrass, IGER set out to breed new varieties that combine the most useful characteristics of both parental species. After four decades, the Institute’s breeders have finally achieved their goal.



How AberHybrids are produced

IGER's Hybrid Ryegrass breeding team have had the advantage of a wealth of high quality, proven material available as parental lines. This has come from the Institute's long-standing Italian and Perennial Ryegrass breeding programmes.

Pioneering work at the Institute during the 1960s and 1970s, which led to a Queen's Award for Technology, enabled Italian and Perennial Ryegrass to be successfully hybridised with sufficient genetic stability for their use in variety development as tetraploids (containing four sets of chromosomes, compared with diploids which contain two).

Early tetraploid varieties from this programme included Sabrina, Sabel and Augusta. Although stable, they tended to be closer to Italian rather than Perennial Ryegrass in character. They offered high yields but had poor ratings for persistency. By careful selection of parental material with strong persistency from IGER's own Perennial Ryegrass breeding lines, more successful Hybrid varieties were gradually developed.

Plant breeding is a lengthy process and it took around 15 years for the first truly persistent Hybrids to be developed with characteristics mid-way between the two parental lines. AberLinnet and AberExcel are two of the first such varieties, which were recommended for use by NIAB and SAC in 1996 and 1997, respectively.

These Hybrids behave in a similar way to Italian Ryegrass up to ear emergence, providing high yields of high quality forage for silage production. After that, they display typical Perennial Ryegrass traits, such as high tillering and leafy re-growth. They offer distinct advantages in terms of persistency and better quality through the season – and so have great potential for extended grazing systems.

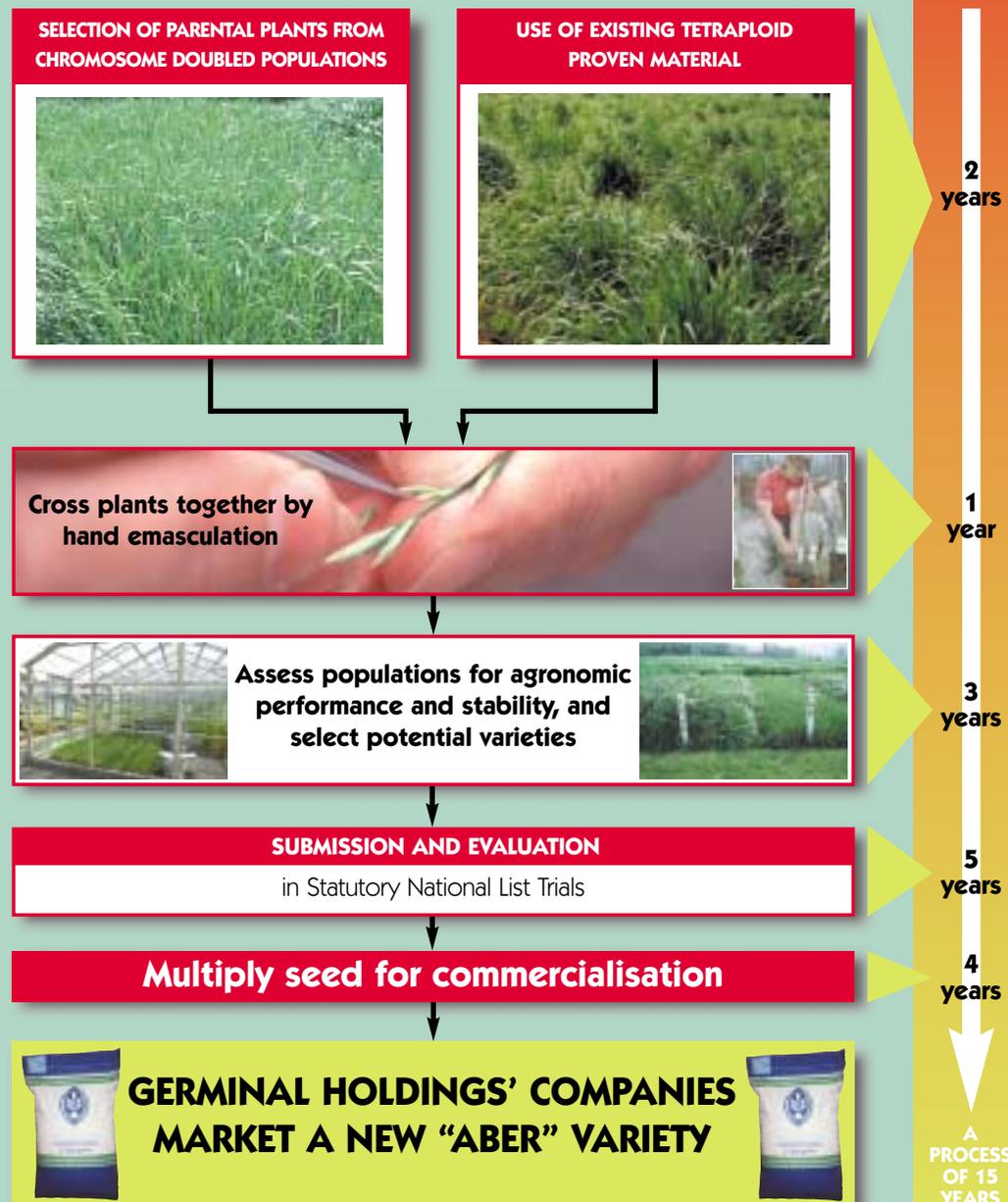


Other IGER-bred Hybrids have now been developed and have passed National and Recommended List trials. These include two varieties, AberStorm and AberEcho, which contain exceptionally high levels of Water Soluble Carbohydrate (sugar).

Following recommendation for commercial use by NIAB and SAC, all IGER-bred forage varieties are marketed under the "Aber" prefix. They are commercially available from Germinal Holdings' companies, British Seed Houses in England and Wales, and David Bell Seeds in Scotland.

Tetraploid Hybrid Ryegrass Breeding Programme

It can take 15 years to develop a new Hybrid Ryegrass variety.



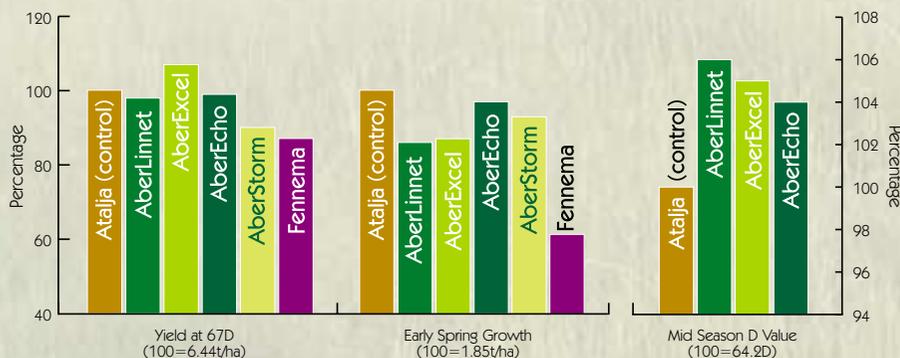
The fruits of IGER's Hybrid breeding programme

Recommended List Trials

The agronomic benefits of IGER's new generation of AberHybrid Ryegrasses have been confirmed during Recommended List trials, run by independent organisations at several different sites around Britain.

Figure 1 compares the performance of four AberHybrids against two standard control varieties, Atalja (Italian) and Fennema (Perennial). Taking Atalja's performance as the standard, this data clearly shows that AberHybrids, like Italian varieties, have good yields at 67 "D" and good early spring growth. Like Perennials, AberHybrids offer good grazing quality through the season, demonstrated by their high mid-season D values.

Figure 1: NIAB data showing performance of AberHybrids, compared with control varieties (expressed as a % of Atalja)



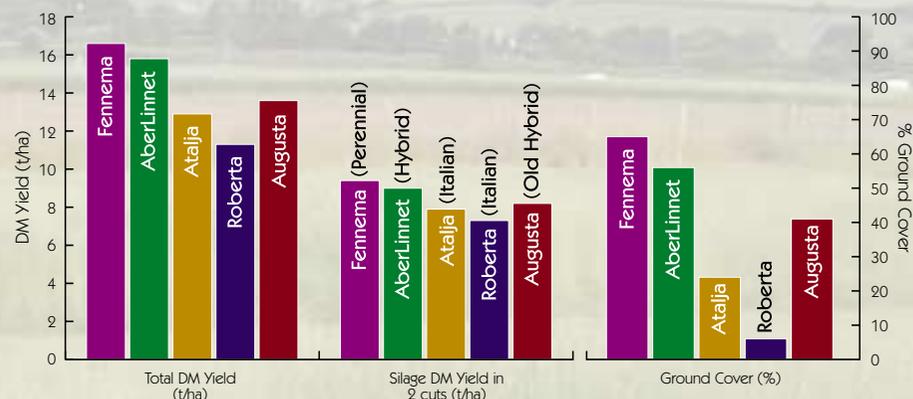
NIAB trial results showing AberStorm and Fennema's mid-season D value cannot be compared with other Aber Hybrid and Italian data due to different cutting dates.

IGER's long-term variety trial

Recommended List trials evaluate varieties over three consecutive seasons, however many leys are expected to last for longer than this. IGER therefore runs its own long-term trials to assess new "Aber" varieties against good quality benchmark varieties, which have also attained Recommended List approval. All variety plots are managed identically and are assessed under a combined seven cut management regime, two silage cuts and simulated grazing.

In IGER's long-term trial (Figure 2) the new AberHybrids consistently produced high yields of dry-matter, out-yielding many good quality Italian Ryegrass varieties, including the tetraploid Roberta. The new AberHybrids are also superior to early IGER bred Hybrids such as Augusta. AberHybrids have shown good persistency, excellent ground cover ratings, and produce yields that are close to those of some Perennial Ryegrasses in the 5th year of the trials.

Figure 2: Yields of Ryegrass varieties in the fifth harvest year of IGER's long term-grass trial



Water soluble carbohydrate (sugar) content

Two of the most recently proven AberHybrids, AberStorm and AberEcho, are also High Sugar Grasses. Data collected at IGER for AberEcho (Figure 3) illustrates the superior quality of this new variety.

Figure 3: Data on sugar content (g/kg dry-matter) from IGER trials for AberEcho, compared with control varieties (figures in brackets are as a percentage of Polly)

Variety	Second Conservation Cut (28th June)	Cut Five (30th August)
AberEcho	423 (124%)	364 (135%)
Polly	339 (100%)	269 (100%)
Atalja	335 (99%)	260 (97%)

Research by animal scientists at IGER in a number of grazing trials has clearly demonstrated that a small increase in the sugar content of grass can result in a big improvement in animal performance. Improvements such as 6% more milk over the grazing season and a 20% increase in the daily live-weight gain of beef cattle and lambs have been recorded in grazing trials with High Sugar Grass varieties. Preliminary trials at IGER indicate that significantly higher levels of sugar are also retained in inoculated HSG silage, compared with conventional varieties.

For more information about the benefits of high water soluble carbohydrate levels in grass, ask for the IGER booklet "High Sugar Grass".

Figure 4: Summary of the performance of modern AberHybrid Ryegrasses, compared with Perennial and Italian Ryegrass

Trait or Characteristic	Ryegrass Species		
	IRG	PRG	HRG
Rapid Establishment	●●●	●	●●●
Early Spring Growth	●●●	●	●●
Dry-matter Yield of Silage	●●●	●●	●●●
Silage Quality	●●	●●●	●●●
Total Annual Dry-matter Yield	●●●	●●	●●●
Leafiness of Re-growth	●	●●●	●●
Grazing Quality	●	●●●	●●
Length of Grazing Season	●●●	●●	●●●
Disease Resistance	●	●●●	●●
Winter Hardiness	●	●●●	●●
Persistence Over 5 Years	●	●●●	●●

On-farm performance of AberHybrids

AberHybrids have been widely used with great success on commercial farms, including three dairy units monitored independently as part of a “Practice Into Profit” demonstration, sponsored by DEFRA, MDC, MLC, British Seed Houses and Barclays Bank. AberHybrids were included in new grass ley mixtures, which significantly out-yielded the average of all other leys on each farm. (See figure 5).

Figure 5: Dry-matter yields (t/ha) from Hybrid/Perennial grass mixtures measured on the “Practice into Profit” demonstration farms.

Demonstration Farm	All Farm Average	AberHybrid Ley Average	% Increase
Newton Rigg (Cumbria)	10.7	13.5	+26
Gelli Aur (Carmarthen)	10.5	13.8	+31
Duchy (Cornwall)	10.3	14.5	+41
Mean	10.5	13.9	+33

This study also showed the growth pattern of AberHybrids to be spread evenly throughout the season. They were persistent, being retained in the sward in the fourth year and beyond. Good yields of high quality silage could be made early in the season, allowing the area closed up for conservation to be reduced. More land was then available for early turnout, increasing the total number of grazing days available (See figure 6).

Alternatively, silage requirements could be met from just two cuts of AberHybrid leys, rather than three. This increased the grazing area in mid to late season and reduced the need for buffer feeding. When a third cut was not required, the overall cost of silage per tonne could be reduced from around £82/tonne to £60/tonne. (See Figure 7).

Figure 6: Extra grazing days achieved at “Practice into Profit” sites, using a rotational paddock grazing system

Site	Grazing Season		Total Grazing Days		Extra Days	
	Previous Year	AberHybrid Ley	Previous Year	AberHybrid Leys	Spring	Total
Newton Rigg	May 7 - Sept 30	April 8 - Nov 11	147	217	28	70
Gelli Aur	April 12 - Oct 15	Feb 9 - Nov 30	186	293	62	107
Duchy	April 15 - Oct 10	Feb 14 - Nov 15	179	273	60	94

Figure 7: Comparative cost of producing silage from traditional and new Hybrid based leys on “Practice into Profit” demonstration at Gelli Aur

	Average Farm Leys			New Hybrid Leys		
	Total Yield (t)	Total Cost	Cost £/t	Total Yield (t)	Total Cost	Cost £/t
1st cut	305	£23,790		406	£23,790	
2nd cut	145	£12,035		193	£12,035	
3rd cut	111	£10,656		Not Needed		
Total	566	£46,481	£82	599	£35,825	£60

Areas conserved were the same for farm leys and new Hybrid leys. 1st cut 72Ha, 2nd cut 42Ha, 3rd cut 42Ha (existing farm leys only).

Management guidelines for AberHybrids

The “Practice into Profit” demonstrations provide clear pointers to getting the most from AberHybrid Ryegrasses. Livestock farmers who follow these guidelines could achieve a net performance gain worth around £3,500 for a 100-cow herd.



- AberHybrids perform best under rotational cutting or grazing regimes, or when grazed with back fencing. This enables the grass to re-grow on a 3 to 6 week cycle, giving maximum yield and quality, coupled with extended seasonal growth.
- When leys containing AberHybrids are cropped for silage, the first cut should be timed to coincide with first ear emergence, when the D value will be around 70. A second cut taken 6 weeks later will also have a D value of 70 or above. Further cuts can be taken with a five to six week frequency.
- When used to provide high quality grazing, leys containing AberHybrids should be used rotationally on a 3 to 4 week basis.
- AberHybrid swards should not be cut or grazed below 5cm.
- AberHybrids are suitable for use under high or low fertiliser regimes, including organic farming systems.
- AberHybrids are very vigorous and will establish well in spring or autumn. Higher seed rates should be used for mixtures of pure Hybrids. Seedbeds should be fine and moist, and the grass seed is best broadcast and rolled. Seed can be drilled, but experience shows that this is best done if the mixture does not include clover, which may be buried too deep.
- AberHybrids can be grown in a pure stand, or with mixtures of other species. Intermediate diploid Perennial Ryegrasses, such as AberDart, are recommended because these will give more base to the sward when grazed, and reduce the moisture content of the crop when cut for silage.
- Red clover can be added to cutting leys of AberHybrids, and a blend of white clover varieties is recommended for leys that will be cut and grazed. The white clover blend, AberDairy, is particularly suited to AberHybrids because it provides a mixture of large and medium leaved varieties.

For more details of AberHybrid mixtures, see the back page.

Hybrids – the future

IGER’s Hybrid Ryegrass breeding programme has produced stable varieties that combine equally the benefits of their Italian and Perennial heritage. It has also yielded varieties with a range of flowering times, which allows greater flexibility in cutting and grazing management. AberLinnet and AberExcel are both “intermediate” heading, while AberStorm and AberEcho are earlier heading varieties.

IGER continues to breed AberHybrids and has several new varieties nearing the end of their development. These have been bred for later heading, persistency and digestibility, as well as high levels of sugar. The programme is also looking at ways of improving stress tolerance by breeding fescue characteristics into Italian Ryegrass.



Commercially Available AberHybrid Varieties

All new AberHybrids are recommended by NIAB and SAC.

AberExcel – Similar yields to Italian Ryegrass, with excellent early spring growth and good mid-season D Value. Typical heading date: May 23.

AberLinnet – Good yields and excellent mid-season digestibility and, as with all AberHybrids, very good disease resistance. Typical heading date: May 23.



AberStorm – The first Hybrid High Sugar Grass, with very high yields for conservation and grazing, with good early spring growth. Typical heading date: May 13.

AberEcho – The latest Hybrid from IGER, which is the highest yielding variety of Hybrid Ryegrass available. It has yields up to 106% of Italian Ryegrass varieties, with the added benefit of persistence and a very high sugar content. Typical heading date: May 18.

All new grass and clover varieties bred by IGER are marketed under the “Aber” prefix. They are exclusively available through British Seed Houses in England and Wales and David Bell Seeds in Scotland.

Several “AberHybrid” HSG (High Sugar Grass) varieties have already been tested and approved in Recommended List trials. They will soon be available in the second HSG mixture, AberHSG2 – Hybrids.

This mixture has been formulated to complement the first HSG mixture, AberHSG1. Varieties in both these mixtures offer all the advantages of HSG, coupled with the benefits of improved grass varieties from IGER, such as high annual yields and extended growth periods - particularly in the spring. In addition, they are bred and produced in the UK.

AberHSG2 – Hybrids, has been developed for short to medium term leys for rotational grazing or conservation. Options include the addition of AberDairy white clover blend or the persistent Red Clover variety, Mercury. AberHSG2 – Hybrids, offers the potential for livestock farmers to increase grass production and extend the grazing season, thereby reducing feeding costs.

The new AberHSG2 – Hybrids mixture offers many benefits:

- **Extremely high yields up to 16.8t/ha of dry matter in NIAB trials**
- **Strong persistency for up to five years**
- **Good early growth characteristics**
- **The potential to extend the grazing season**
- **Rapid establishment**
- **Improved tillering capacity**
- **Leafy re-growth**

Research work at IGER is sponsored by BBSRC and DEFRA.

Other data in this publication was reproduced with the kind permission of NIAB and the sponsors of the “Practice into Profit” demonstration.

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