Protein-i

Sustainable Healthy Nutrition

Cereal & Pulse Varieties for Food in Ireland

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In Ireland, cereals and pulses are grown annually but are mainly used for animal feed. Through the Protein-I project, varieties of barley, peas, rye and wheat were evaluated to assess agronomic performance and grain quality for potential human food markets under Irish growing conditions.

Trials were conducted across research sites and commercial farms in Donegal, Kilkenny, Carlow, Kildare, Laois, Tipperary and Waterford over multiple seasons (Figure 1, Table 1).

This factsheet summarises the key findings from crop variety trials carried out as part of the Protein-I project. The aim is to provide growers with practical information on the performance of selected cereals and pulses that may have potential for human food markets in Ireland.

The factsheet highlights yield performance, quality characteristics and key agronomic considerations to support growers in assessing the potential of these crops as part of diversified cropping systems.

A collaboration between Protein-I and OatFrontiers is assessing oat performance, with Protein-I testing best varieties at field level. For more information on this work please visit the website: https://www.interreg-npa.eu/projects/oatfrontiers/

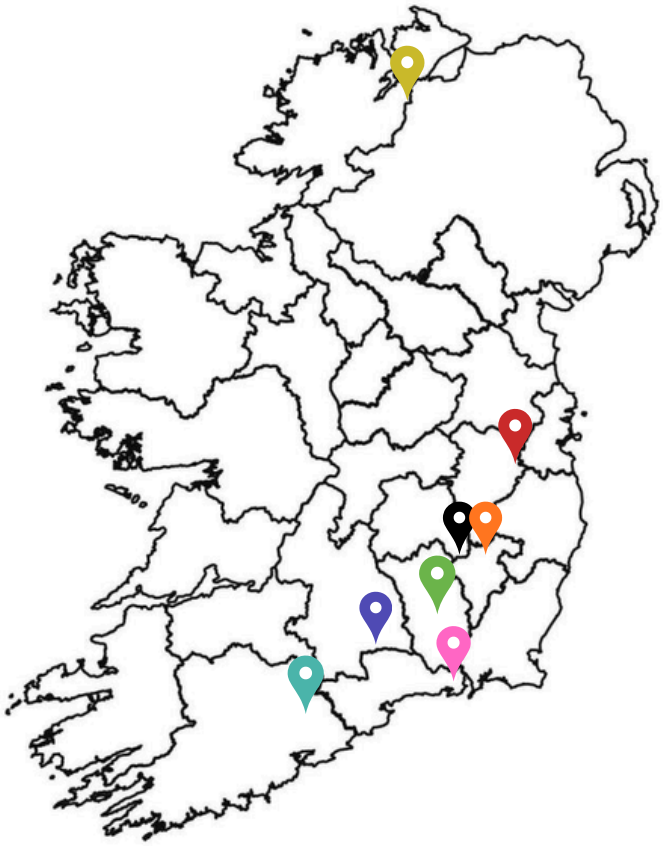

Figure 1: Map of Ireland with locations of Protein-I trials.

Map no	Site	County	Year(s)	Purpose	Crop(s)
1	*UCD Lyons Farm	Kildare	2023, 2024, 2025	Research plot trials	Winter wheat, Spring peas
2	Bennetsbridge	Kilkenny	2025	On-farm trials	Winter wheat, Spring peas
3	Clerihan	Tipperary	2025	On-farm trials	Winter wheat, Spring peas
4	Killea	Donegal	2025	On-farm trials	Winter wheat, Spring peas
5	*Kilworth	Cork	2023, 2025	Research plot trials	Spring wheat
6	*Knockbeg	Laois	2023	Research plot trials	Spring wheat, Winter barley
7	*Oak Park	Carlow	2023, 2024, 2025	Research plot trials	Spring wheat, Winter rye, Winter barley
8	*Faithlegg	Waterford	2023, 2024, 2025	Research plot trials	Winter rye

Table 1: Overview of field trial sites included in this study.

The Table summarises the locations and characteristics of research and on-farm trial sites used to evaluate crop performance across Ireland. "Map no." corresponds to the site identifier used in Figure 1. "Site" indicates the farm or research location, * representing controlled research sites and all others representing commercial on-farm trial locations. "County" specifies the geographic location of each site. "Year" indicates the growing seasons during which trials were conducted at each location. "Purpose" distinguishes between controlled research plot trials and on-farm trials under commercial conditions. "Crop(s)" lists the crop species evaluated at each site, including winter and spring cereals and legumes.

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Winter Wheat

The varieties evaluated included KWS Extase and RGT Ponticus. These were selected based on previous trial performance and their potential to achieve suitable grain quality. The crops were managed using standard conventional agronomic practices.

Varieties Evaluated:

Six varieties were sown in 10 m^2 plots with three nitrogen levels and no fungicide treatments to assess disease pressure and resilience.

Trial Performance:

Variety	Average Yield	Average Protein
KWS Extase	9.7 t/ha	11%
RGT Ponticus	10.2 t/ha	12.8%

Table 2: Average yield and protein content of selected wheat varieties. Note: top quality milling grain is >13%. (https://www.nfuonline.com/news/milling-wheat-protein-essential-information/)

Key findings:

- Septoria disease pressure strongly influenced yield.
- At a target yield of 10 t/ha, winter wheat returns a gross margin of €310/ha, with total growing costs of €1,839/ha and a break-even yield of 9.7 t/ha. Profits are vulnerable to poor seasons.
- Extase showed particularly strong Septoria resistance.
- Both varieties performed well across farm sites (Table 2).
- Protein levels ranged from 10-13% (Figure 2) which are suitable for human food use, with little response to additional nitrogen application.

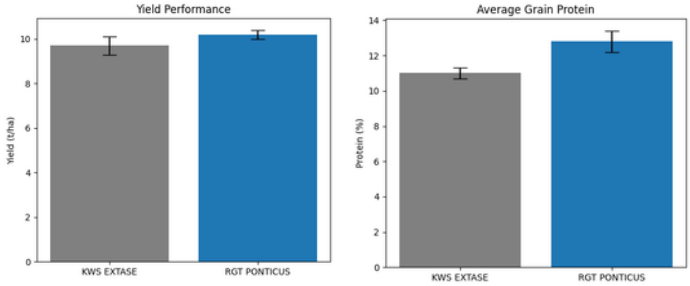

Figure 2: Yield performance and protein % in Extase and RGT Ponticus.

Take-away messages

- Prioritise disease resistance, particularly septoria.
- Winter wheat for food markets is feasible with good disease management.
- Variety selection is the most important decision.

Winter Rye

Replicated plots trials were established in mid-October. The maximum target plant population was 250 m^2.

Varieties Evaluated:

A subset of the varieties were evaluated under conventional management: Hybrid (KWS Tayo, KWS Serafino, SU Baresi, SU Karlsson, SU Bendix, SU Glacia, SU Bendix, SU Thor) and Population varieties (Elias, Elego, Existo, Dukato, Inspector).

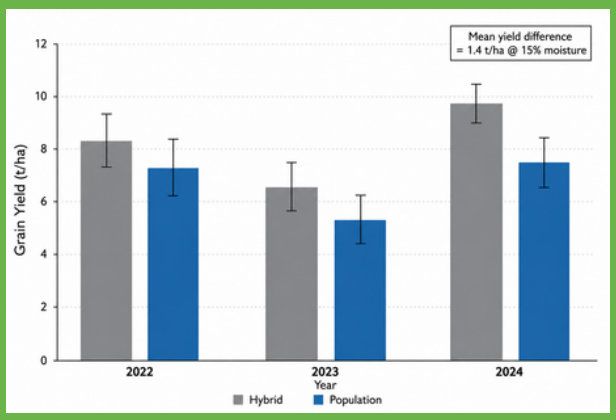

Figure 3: Grain yield performance by variety type (hybrid and population) as presented at National Tillage Conference, 2026..

Key findings:

- Hybrid varieties out-yielded population varieties in all years (Figure 3).
- Ergot sclerotia was observed in some seasons, particularly in the 2024 harvest.

Take-away messages

- Hybrid rye varieties offer higher yield potential (Figure 3).
- Grain quality specifications for some example UK food markets can be achieved.
- Ergot and slug pressure may present risks in certain seasons as witnessed in this research.

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Winter Barley

Historic winter barley varieties (1904–2013) were assessed for beta-glucan (dietary fibre) levels and agronomic performance in 2023. The varieties which presented with the highest grain beta glucan and acceptable agronomic performance (in terms of disease and lodging) were selected for further field testing in replicated plot trials. In each season, trials were October sown and managed conventionally as per winter barley advice in Ireland (180 kg/ha in Index 1 for N scenario).

Trial Performance:

Trait	Range/result	What it means for growers
Beta-glucan	<3%-5.69% across varieties & seasons	Some varieties showed higher fibre levels, but overall values remain moderate
Grain yield	Up to 71% of DAFM recommended list yield	Yields were lower than standard commercial barley varieties
Lysine (essential amino acid)	Mean 0.376 g/100g in high beta-glucan panel (n=35)	Moderate protein quality

Table 3. Trial performance results.

Take-away messages:

- Hagberg Falling Number frequently exceeded 300 seconds, indicating suitability for malting markets.
- Overall yield was lower than standard recommended barley varieties, as anticipated.
- Grain beta glucan content in our variety panel was lower in Ireland (Table 3) than observed in Scotland.

Spring Peas

Spring pea trials were conducted at the same locations as the winter wheat trials (see Figure 1). Seeds were grown at a target rate of 70 plants per square metre.

Varieties Evaluated:

The varieties evaluated were Bagoo and Kameleon.

Trial Performance:

Variety	Average Yield
Bagoo	~3.2 t/ha
Kameleon	~2.9 t/ha

Table 4: Average yields across farm sites.

Key Findings:

- Protein levels varied between 20–25% across varieties and seasons (Figure 4).
- Yield varied significantly between years (Figure 4).
- Yields were below the break even yield of 4.3 t/ha in both sites (Table 4).
- Lodging was the main challenge in wetter seasons.
- Diseases such as ascochyta and mildew reduced yield and quality.

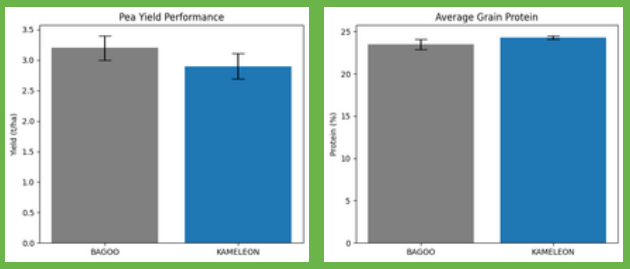

Figure 4: Yield performance and protein % in Bagoo and Kameleon.

Take-away messages:

- Spring peas provide strong protein potential for human food markets (Figure 4).
- Input costs are relatively low compared to many cereal crops.
- At a target yield of 5 t/ha, peas return a gross margin of €663/ha, more than double winter wheat.
- Qualifies for Protein Crop Scheme subsidy
- Lodging risk should be considered when selecting fields.
- Best suited to fields with good standing ability and harvest condition.

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Spring Wheat

Spring wheat trials were sown in late March-late April of each season into index 1-3 for Nitrogen scenarios. Plots (12 x 2.5 m) were managed with standard spring wheat nitrogen, in 3 splits and pesticide inputs (herbicide, insecticide, plant growth regulator) as per recommendations for spring wheat in Irelands.

Varieties Evaluated:

The varieties evaluated included; Fixum, Helium, Hexham, WPB Duncan, WPB Nolan, Everlong, KWS Talisker (feed varieties) & Akvitan, KWS Harsum, KWS Ladum, Broca, Licamero, Zenon, Mylo (bread wheat varieties).

Trial Performance:

Category	Average Yield
Feed wheat varieties	5.9 t/ha
Bread wheat varieties	5.1 t/ha

Table 5. Average yields for feed and bread wheat varieties.

Key Findings:

- Feed varieties consistently yielded more than bread wheat varieties (Table 5), offering higher gross margins.
- Bread wheat varieties often meet established bread wheat specifications (protein, Hagberg Falling Number and test weight) as implemented in other regions but produce low to negative gross margins.

Take-away messages:

- Feed wheats provide higher yields and higher gross margins using year specific input costs from Teagasc Cost and Returns of growing seasons and product specific costs available with variety specific grain yield data.
- Bread wheat quality can be achieved under Irish conditions.
- Premium prices are required to compensate for yield reductions.

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Which crop to grow?

This summary table (Table 6) highlights the main opportunities and risks identified in the Protein-I trials to help growers compare crop options for human food markets under Irish growing conditions.

Traffic Light Key:
- Strong/Favourable
- Moderate - depends on management conditions
- Limitation or higher risk

Crop	Yield Potential	Market Opportunity	Production Risk	Input Requirement	Key Agronomic Challenge	Overall Suitability
Winter Wheat		(milling markets)			Septoria disease pressure	Best current opportunity
Spring Peas		(plant protein demand)			Lodging	Good diversification crop
Spring Wheat (feed)					Standard cereal management	Reliable cereal option
Spring Wheat (bread)		Niche markets			Economic viability without premiums	Viable with premiums
Winter Rye (hybrid)		Niche / export			Ergot risk	Promising alternative cereal
Winter Barley		Malting markets			Limited fibre advantage	Best suited to malting sector

Table 6. Summary table of crop opportunities and risks identified in the Protein-I trials..

If your goal is:	Best Crop Option:
High yielding cereal	Winter Wheat
Diversifying crop rotations	Spring Peas
Lower input cereal	Hybrid Winter Rye
Reliable spring cereal production	Spring Feed Wheat

Table 7. Quick crop selection guide based on observations within this research.

Overall messages for Growers:

- Irish agriculture has opportunities to diversify into cereals and pulses for human food markets.
- Based on the Protein-I trials, winter wheat currently provides the strongest opportunity for food-grade cereal production, while spring peas and hybrid rye may offer additional rotation options where agronomic risks such as lodging and slug feeding are managed appropriately (Figure 7).
- Introducing these crops into rotations may help diversify farm systems, spread risk and support the development of new markets for Irish-grown plant-based foods.