AR0914 Generating and evaluating a novel genetic resource in wheat in diverse environments

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Breeding – a paradigm shift?

Current Status:

Modern wheat - pedigree pure lines with limited within-field diversity at the levels of genes and genotypes.

Evolved its own administrative framework.

Future Sustainability:

The study of evolution, populations and ecosystems indicate the value of diversity – this should be integrated into wheat production.

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Diverse plant communities:

- wider range of functions as the number of components increases
- niche differentiation improves exploitation of the local environment
- complementation among different components

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Historical

Suneson (1956) - a new method of plant breeding:

1. **assemble parents with diverse evolutionary origins**
2. **recombine by hybridisation**
3. **bulk the F1 progeny**
4. **prolonged natural selection of progeny in crop environments**

Conclusions (for barley): new varieties (superior populations or pure lines) at minimum cost and maximum assurance of adaptability.

Thomas et al., 1991, report yield improvements of a composite population of wheat of 15% over the mean of the parent components.

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Breeding for diversity

	Adaptation	Adaptability
Current – pure bred lines	High	Low
Composite cross populations	High	High

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Selection of Parent Lines

High Yield Potential	High Quality Potential
1 Bezostaya	1 Bezostaya
2 Buchan	2 Cadenza
3 Claire	3 Hereward
4 Deben	4 Maris Widgeon
5 High Tiller Line	5 Mercia
6 Norman	6 Monopol
7 Option	7 Pastiche
8 Tanker	8 Renan
9 Wembley	9 Renesansa
	10 Soissons
	11 Spark
	12 Thatcher

+ 4 male sterile lines

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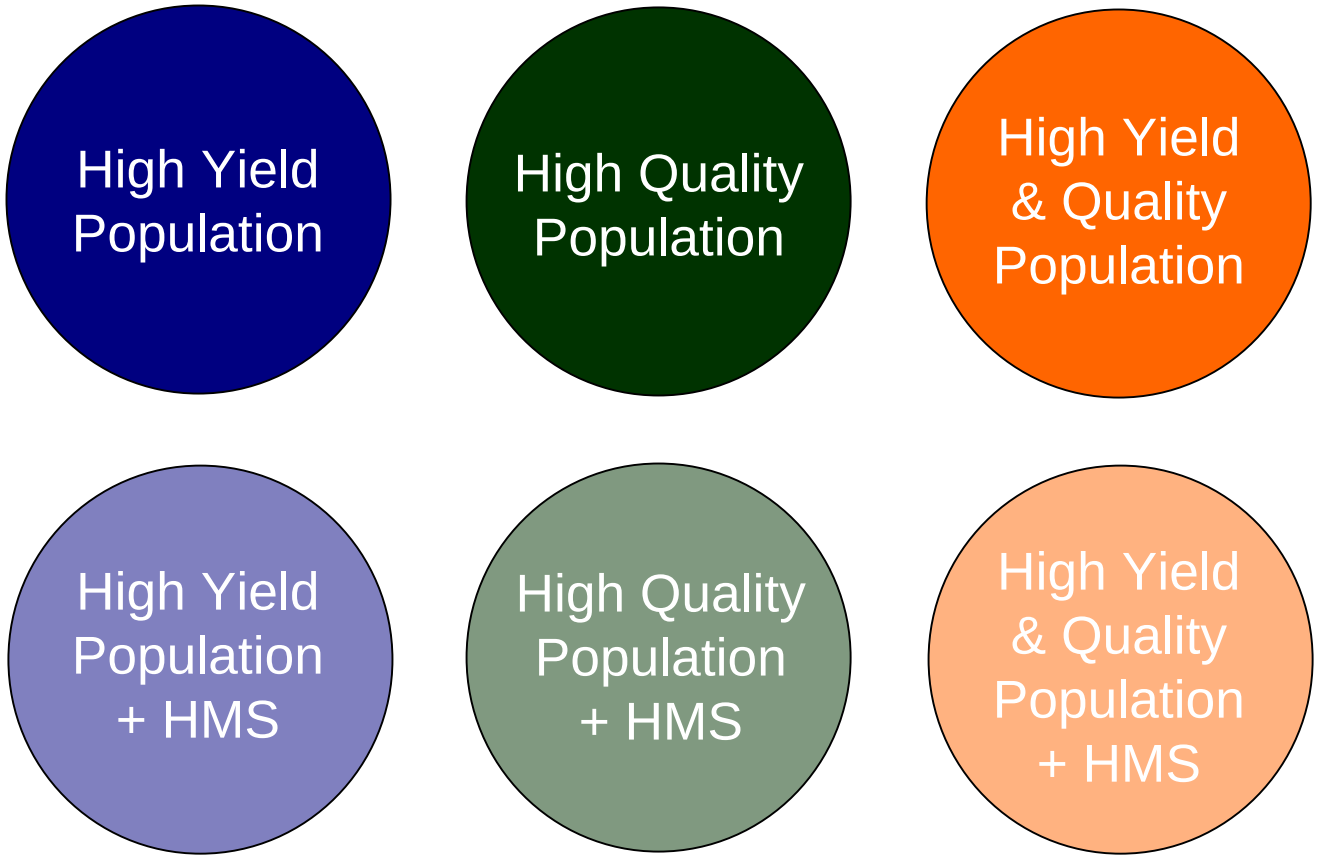
Composite Cross Populations



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Yield Composite (Growth stage 65)

Wakelyns (organic)

Metfield (conventional)

Morley (conventional, CSS)

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Expected Benefits

- Provide a unique insight into the evolution of genetically diverse wheat populations in a range of environments.

- Provide a valuable genetic resource for breeders - and for farmers

- Improve the sustainability of wheat production

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