Teagasc grass and clover breeding programme

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Summary

- The Teagasc grass and clover breeding programme breeds new varieties of perennial ryegrass, white clover and red clover for Irish farm systems.
- The breeding programme is supported by Goldcrop Ltd., an Irish seeds and inputs company, that commercialises all new varieties.
- Two new perennial ryegrass varieties were released in 2019: Oakpark and Smile.

History

Forage breeding offers a cost effective and successful means to increase the profitability and sustainability of animal production from grassland. Teagasc has a strong history of forage breeding with the programme initiated in the early 1960's at Oak Park, Carlow. To date, the programme has bred and commercialised 40 grass and clover varieties. The programme is supported by Goldcrop Ltd., an Irish seeds and inputs company with headquarters in Carrigtwohill, Co. Cork and DLF-Trifolium, a plant breeding and seed production company with headquarters in Denmark. Goldcrop have exclusive world-wide rights to commercialise and market all new varieties.

Breeding goals

Our emphasis is on breeding improved varieties of perennial ryegrass, white clover and red clover for Irish farm systems. The main plant traits for genetic improvement are: (i) spring and autumn growth, (ii) quality, particularly at mid-season, (iii) sward persistency and density, and (iv) disease resistance. The perfect variety should provide sufficient yield to match the animal feed demand curve over the entire grazing season and also provide additional yield during the mid-season that could be conserved for use during the winter when grazing is not possible. We want a grass variety that heads only once in a compact period of time for seed production. For the rest of the year we want a leafy, high digestible sward. We want a variety that produces a dense sward with no bare ground and that will persist indefinitely. Finally, we want a variety resistant to diseases particularly foliar diseases such as crown rust.

Breeding methods

The release of a new variety is the culmination of a 10–20 year process consisting of three main stages: (i) forage breeding, (ii) independent variety evaluation and (iii) commercial seed production. The breeding process consists of a multistep and cyclic process where the best plants (genotypes) are evaluated, selected and intercrossed to produce a new variety. Plants are selected based on their individual performance, progeny performance or DNA (genomic selection). A new variety is produced by crossing, in all possible combinations, a number of selected plants. The new variety is then independently tested under cutting and grazing by the Department of Agriculture, Food and Marine. If it excels and its botanical characteristics are distinct from other varieties, uniform and stable (DUS), it is added to the Ireland Recommended List. Commercial seed of Teagasc bred varieties are produced and sold under license by Goldcrop Ltd. or DLF-Trifolium.

Varieties

In 2019, farmers may choose among nine perennial ryegrass and six white clover varieties bred by Teagasc for reseeding. All varieties are included on the Grass and Clover Recommended List Varieties for Ireland 2019. Two new, late diploid perennial ryegrass varieties were released in 2019: Oakpark and Smile.

Perennial ryegrass varieties

- Early diploid: Genesis.
- Intermediate tetraploid: Elysium.
- Late diploid: Oakpark, Smile, Glenroyal, Majestic and Kerry.
- Late tetraploid: Kintyre and Solas.

White clover varieties

- Medium leaf size: Buddy, Chieftain and Iona.
- Small leaf size: Coolfin and Galway.
- Large leaf size: Dublin.

Forthcoming Teagasc varieties, currently undergoing seed increase for release in 2020–22, include the late diploid perennial ryegrass varieties Glenmore, Gleneagle, Glenrock, and the red clover variety Fearga.

Fearga is the first ever Irish red clover variety. Red clover is a relatively drought tolerant, deep tap rooting, nitrogen fixating legume primarily used for silage production. It offers high yields of high quality forage with greater animal intakes and performance than grass silage. Fearga was selected for superior yield, persistency and longevity. There are no official red clover trials in Ireland. However, Fearga has completed the UK official trials across Northern Ireland, Scotland, England and Wales where it excelled. Fearga was found to be the highest yielding variety in the UK yielding 22% and 31% more than the control variety Merviot in the second and third harvest years, respectively. Fearga also offered significant improvements in persistency with 54% higher autumn ground cover than Merviot in the third harvest year.

Conclusions

The Teagasc forage breeding programme continues to develop improved varieties of grass and clover for Irish farmers. Farmers may currently choose among nine perennial ryegrass and six white clover varieties bred by Teagasc for reseeding. A number of other new varieties are currently undergoing seed increase for future release.