

Title: Breeding forage grass, legumes and herbs for Irish farm systems

Project start date: 1/1/2020 **Project end date:** 31/12/2022

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Abstract:

Clover is the cornerstone of organic farming and the engine that drives productivity through its ability to fix atmospheric Nitrogen (N) into a plant usable form thereby eliminating the need for inorganic N fertilizer. White clover (*Trifolium repens* L.) and red clover (*Trifolium pratense* L.) are the predominant clover species used in Ireland. White and red clover are complementary species with white clover contributing mainly to grazed swards and red clover mainly to silage swards. Together, they offer a more robust sward and greater flexibility for utilisation.

Evolving climate, pests, diseases and farming practices (as determined by economic and national policy, and new knowledge) mean new varieties are continually required. Sowing a new, improved variety offers a permanent increase in performance over the lifetime of the variety. In contrast, a management scheme designed to improve crop performance must be continually re-applied each year, at a recurring cost.

Teagasc has been breeding white clover for over 50 years at Oak Park, Carlow. The Teagasc white clover breeding programme is arguably the strongest in north-western Europe supplying the majority of new varieties to the Ireland and UK Recommended Variety Lists over the last decade. Present varieties include Galway, Coolfin, Iona, Buddy, Chieftain, Dublin and Aran. The programme has significant strength in depth with provisional results indicating the seven best candidate varieties currently in test in the official Ireland variety trials are Teagasc bred.

The Teagasc red clover breeding programme was initiated at Oak Park, Carlow in 2008 in light of the growing need for greater farm sustainability and lower inorganic N fertilizer use. From this programme, the first ever Irish red clover variety, named Fearga, was bred. While there are no official red clover variety trials in Ireland, Fearga is the highest yielding red clover in the official variety trials in England and Wales. Fearga is expected to dominant the market for years to come.

The ongoing incorporation of genomic selection as a routine breeding tool in the breeding programme is predicted to increase genetic gain by two-to-three-fold. The next generation of Teagasc clover varieties will be available to farmers from 2023.