Thesis Abstract

DEVELOPING EFFICIENT WHITE CLOVER (TRIFOLIUM REPELS L.)
Breeding Strategies for the Dryland Summer Moisture Stress Environments of Australia

M. Z. Z. Jahufer
Abstract of a Thesis submitted for the Degree of Doctor of Philosophy at The University of Queensland

Summer moisture stress has been identified as a major constraint to vegetative persistence and herbage yield of white clover in Australia. Genetic improvement of vegetative persistence and herbage yield of white clover for dryland summer moisture stress environments is a key objective in the development of new cultivars for the Australian grazing industries.

The Ph.D. research program was focused on: (i) studying the genotypic variation for stolon and other morphological attributes, including seasonal herbage yield, present in a world sourced collection of white clover germplasm accessions maintained at the Genetic Resource Centre, Glen Innes, New South Wales (NSW); (ii) examining the effects of environmental variation for level of moisture stress during summer on the expression of variation for stolon attributes and herbage yield; (iii) estimating quantitative genetic parameters for stolon morphological attributes and herbage yield; (iv) testing the hypothesis that crossing of morphologically diverse plants may be a useful strategy for breaking the negative association between vegetative persistence and herbage yield; and (v) developing an efficient breeding strategy for the improvement of vegetative persistence and herbage yield of white clover under dryland summer moisture stress conditions of Australia.

Morphological characterisation of the total world sourced collection of white clover germplasm (439 accessions) was conducted on different batches of accessions over a period of five years under dryland summer moisture stress conditions. There was significant (P<0.05) genotypic variation among accessions for all the morphological attributes including herbage yield. The performance of the two check cultivars, Haifa and Huia, included in each batch provided a basis for adjustment of the data for attributeby-year interaction effects by estimation of Best Linear Unbiased Predictions (BLUPs). Pattern analysis enabled identification of germplasm accessions that could be used for the development of white clover cultivars through recurrent selection. The germplasm collection was also found to be deficient in genotypes with high stolon density, high number of branches, high number of rooted nodes and large leaves.

Genetic families produced using the North Carolina I (NCT) mating design were evaluated for herbage yield and key stolon attributes conferring vegetative persistence in dryland summer moisture stress and...

View This Item Online: https://www.biodiversitylibrary.org/item/173873
DOI: https://doi.org/10.5962/p.361419
Permalink: https://www.biodiversitylibrary.org/partpdf/361419

Holding Institution
Smithsonian Libraries

Sponsored by
Biodiversity Heritage Library

Copyright & Reuse
Copyright Status: In Copyright. Digitized with the permission of the rights holder
Rights Holder: Royal Society of New South Wales
License: http://creativecommons.org/licenses/by-nc-sa/3.0/
Rights: https://www.biodiversitylibrary.org/permissions/

This document was created from content at the Biodiversity Heritage Library, the world's largest open access digital library for biodiversity literature and archives. Visit BHL at https://www.biodiversitylibrary.org.

This file was generated 27 June 2023 at 12:03 UTC