Proceedings of the International Symposium on Agro-Technology and Rural Sciences

"Innovative Agro-Technologies for a Climate-Smart and Sustainable Future"

26th June, 2025

ISATRS 2025

University of Colombo
Institute for Agro-Technology and Rural Sciences,
Weligatta New Town, Hambantota, Sri Lanka

Web:http://uciars.cmb.ac.lk

DIVERSE PASTURES OF COMPLEMENTARY SPECIES (DPCS) TO BUFFER DRY SUMMER CONDITIONS – A REVIEW

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Abstract

Climate change, through altered rainfall and temperature patterns, affects global pastoral agricultural systems by exacerbating environmental stresses such as extreme temperatures and rainfall deficit or surplus, thereby constraining agricultural productivity and farm profitability. Pastures are increasingly exposed to extreme climate - events, highlighting the needs for adaptive strategies in pastoral systems to cope with evolving environmental challenges. In Temperate Humid climates, traditional pastures combining white clover (*Trifolium repens*, Tr) and perennial ryegrass (*Lolium perenne*, Lp), both shallow-rooted species, are losing persistence under these varying climatic conditions. This paper reviews the Diverse Pastures of Complementary Species (DPCS), which are climate-smart pastures that aid to cope and deal with growing water restriction periods in pastoral systems. According to the recent studies, DPCS comprising these traditional shallow-rooted species, with the deep-rooted species pasture brome (*Bromus valdivianus*, Bv) and cocksfoot (*Dactylis glomerata*, Dg), expressing enhanced resource utilization, growth asynchrony and overyielding. Particularly in dry periods, DPCS exhibit significant production properties as the combination of hydraulic lift and pasture growth through the soil water restriction period. By managing species functional diversity, DPCS optimize soil water utilization, stabilize forage production, and increase pasture tolerance to climate change effects. However, DPCS implementation relies on - species selection and management practices. The selection of complementary species with functional traits that enhance resource utilization is crucial for addressing specific environmental constraints and management conditions. This facilitates asynchronous growth and overyielding, where different species reach their peak growth at different times a key ecological mechanism that promotes more stable pasture production throughout the year and reduces seasonal yield fluctuations. The selection of complementary species

with enhanced resource utilization functional traits to cope with specific environmental constraints and agricultural managements is important for the expression of the asynchronous growth and overyielding, where different species experience their peak growth at different times, a key ecological mechanism that contributes to a more stable pasture production across the year, reducing seasonal yield fluctuations. In addition, future studies should attempt to bridge the gap between theoretical understanding and practical application, especially concerning altered climatic conditions and economic sustainability.

Keywords: Asynchronous growth, Climate change adaptation, Diverse Pastures Complementary Species (DPCS), Drought tolerance, Over-yielding

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