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THE DISPERSAL, IMPACT AND MANAGEMENT OF BUFFEL GRASS (*CENCHRUS CILIARIS*) IN CENTRAL AUSTRALIA

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INTRODUCTION

Buffel grass (*Cenchrus ciliaris*) is a perennial tussock grass native to Africa, India and Asia with a wide naturalized distribution in Australia. In central Australia it has spread widely from introduction points and now occurs extensively across all land tenures. In the early years of establishment, buffel was generally viewed as a desirable species for land rehabilitation and pastoralism in the region. In recent years there has been growing concern about its impacts on biodiversity in conservation areas.

Under the new Desert Knowledge CRC, a collaborative project involving CSIRO, James Cook University, Parks and Wildlife and the Threatened Species Network has been established with the aim of providing land managers and policy makers with reliable information and the appropriate tools to maximize any benefits associated with buffel while minimizing the adverse impacts. The project has three main objectives; (1) to identify the impacts of buffel on biodiversity in the Alice Springs region (particularly invertebrates and ground cover vegetation), (2) to identify buffel dispersal patterns and mechanisms in different cultivars using landscape genetics techniques, and (3) to evaluate the use of aerial survey as a method for detection and mapping of buffel spread in areas of conservation value.

IDENTIFYING IMPACTS OF BUFFEL ON BIODIVERSITY

Buffel is now perceived as a major threat to those managing for biodiversity values because of its ability to modify vegetation structure and reduce species diversity. Threats include increased competition with native vegetation for nutrients, water and light, allelopathic alteration of soil properties that inhibit germination and growth of other plants, alteration of ecosystem processes such as fire regime and succession, and displacement of native animals through changes to habitat structure and composition (Butler and Fairfax 2003, Miller 2003, Best 1998, Cheam 1984).

The present study aims to test whether buffel colonization reduces the diversity of ant, small reptile and short lived plant communities in the Arunta Block hill slope communities north of Alice Springs, and to examine the recovery potential of those same communities once buffel is removed from the system.

IDENTIFYING DISPERSAL PATTERNS & MECHANISMS IN DIFFERENT CULTIVARS

Observations of areas of dense buffel along roadsides and watercourses, coupled with the existence of extensive areas dominated by buffel, have lead to suggestions that range expansion is a two-step process, involving 'infiltration' along road and/or riparian pathways followed by 'infill' of surrounding areas. However, such an interpretation confounds the separate processes of dispersal and establishment, and may be misleading or incomplete. The factors behind the observed variability in population dynamics after introduction, from failure to establish persistent populations, through limited establishment over years or decades followed by sudden irruption, to immediate establishment and rapid spread, need to be explicitly identified as a starting point for managing or controlling buffel dispersal.

Landscape genetic techniques using Inter-Simple Sequence Repeat markers will be applied to reveal patterns of dispersal and develop a model of dispersal processes. Since buffel usually produces seed that are genetically identical to the maternal plant, these molecular tools discriminate between

individual varieties. When used in conjunction with records of the original spread of seeds, these techniques allow both improved reconstruction of subsequent dispersal and the identification of differences in the ecology of varieties.

EVALUATING AERIAL SURVEY FOR DETECTION AND MAPPING

The extensive spread of buffel across large areas of conservation land prohibits conventional methods of mapping from the ground. It also means that new outbreaks are difficult to detect. Park managers need appropriate weed mapping tools for effective planning and management of buffel control on park. As part of the current project, aerial survey will be trialed as a tool for mapping buffel.

The two main objectives are:

1. To trial the efficacy of aerial survey in mapping the distribution of buffel on park, and
2. To trial the efficacy of aerial survey in detecting early infestations of buffel on park.

The aerial survey will be flown in a helicopter at a constant speed and altitude and buffel percentage cover will be visually estimated by two observers along flight transects. The data recorder will run real time mapping software on a laptop connected to a GPS which will attribute a spatial point when each observation is made. The point data collected from flight transects will be used to characterize the distribution of buffel over the entire area via probabilistic modeling of the data.

FUTURE DIRECTIONS

The research outcomes will support the development of better policy and practice for the management and use of buffel grass in a variety of settings in central Australia. The knowledge gained will underpin subsequent investigation of the socio-economic impacts of buffel grass spread on tourism, pastoralism and bush-food industries and also the development of management systems to control the spread of buffel into susceptible or high conservation value areas.

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