

# Pasture characteristics perceived by farmers of Western Australia in relation to adoption of annual pasture legumes

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## Abstract

A number of annual pasture legumes have been released in Western Australia since 1990 with the aim of a successful fit into the existing farming systems. However, the success of adoption of these species/cultivars has not been encouraging. This study used a survey of farmers to characterise the desired attributes of annual pasture legumes. Altogether farmers mentioned 47 attributes in relation to a 'dream' annual pasture legume. These attributes were analysed using a systems approach and a framework to evaluate annual pasture legumes in Western Australia (APL-Characteristics-Framework for WA) was developed. This framework consists of six sub-systems: establishment and growth, abiotic stress, insect tolerance, feed quality and supply, weed control, and economics. The components and sub-components for each sub-system were also identified. A further analysis showed interactions of the sub-systems of the APL-Characteristics-Framework. Findings of this study can help understand how, if any, pasture characteristics relate to adoption of annual pasture legumes in Western Australia.

## Key Words

Annual pasture legume, Pasture characteristics, Technology adoption

## Introduction

The constraints to the use of traditional pasture species in Western Australian (WA) farming systems have been pointed out (Nichols et al. 2007). These include, poor adaptation to deep acid soil, false breaks, seedbank depletion from soft-seeded pasture legumes, high seed cost of re-sowing, increased ground water recharge and salinity. *Biserrula* (*Biserrula pelecinus*) addresses many of these constraints and so was introduced in WA in 1995 and appeared to be exceptionally promising (Howieson et al. 1995; Loi et al. 2005). However, its adoption was only 17% of all species sown during 2005 (Nichols et al. 2007).

In fact, a number of annual pasture legumes have been released in Western Australia since 1990 aiming to successfully fit into the existing farming systems. However the success of adoption, of these species/cultivars has not been as encouraging as was anticipated. It is therefore important to understand why *biserrula* and other similar, potential pasture species have not been widely adopted. Batz et al. (1999) emphasised that it is important to understand and assess farmers' perceived attributes towards a new technology in order to achieve its successful adoption. This study aimed to characterise the attributes of annual pasture legumes in WA, as desired by farmers.

## Methods

### Data collection

An open-ended questionnaire was developed through discussions with researchers, policy makers, agribusiness experts and farming systems practitioners. To understand farmers' perception of new annual pasture legumes, one specific question ("What is your dream pasture species?") was asked. The word "dream" was chosen here carefully to help open up the farmers' mind and to encourage speaking up about their feelings towards new pasture species. Data were collected during July 2007 to December 2007 through face-to-face interviews, personal mailouts, and distributing the questionnaire via Agricultural Memos, a Western Australian farmer publication. Altogether 78 farmers responded covering 35 shires of WA (Albany, Beverly, Brookton, Broomehill, Bruce Rock, Coorow, Corrigin, Cunderdin, Dalwallinu, Dandaragan, Dardanup, Dowerin, Esperance, Goomalling, Kellerberrin, Kojonup, Kondinin, Kulin, Mingenew, Moora, Mount Marshall, Mukinbudin, Naremben, Narrogin, Northam, Northampton, Perenjori, Quairading, Serpentine-Jarrahdale, Tammin, Toodyay, Wickepin, Wongan-Ballidu, Woodanilling, Wyalkatchem,

Yilgarn). This paper analyses the opinions of 62 farmers who responded to the question of “What is your dream pasture species”.

We developed the annual pasture legume characteristics framework for Western Australia (APL-Characteristics-Framework for WA) taking into account of the 47 attributes pointed out by the farmers in relation to a ‘dream’ annual pasture legume. The framework comprised of six sub-systems: establishment and growth (EG), abiotic stress (A), insect tolerance (I), feed quality and supply (Fsq), weed control (W), and economics (E). The APL-Characteristic-Framework for WA together with its sub-systems, components and sub-components is presented in Figure 1.

#### *Data analysis*

A systems approach of how component parts of a system interact and contribute to the behaviour of the whole system (Spedding 1975), was employed to analyse the survey data.

### **Results**

#### *Sub-systems, components and sub-components of APL-Characteristics Framework*

The sub-system EG was the biggest in terms of farmers’ responses (77%) and consisted of three components, establishment, growth and hard-seededness. Sixty three percent of the farmers who desired any component or sub-component of this sub-system, emphasised growth followed by 54% for establishment and 31% for hard-seededness. Thirty five per cent of the respondents were concerned with abiotic stresses and 19% with insect tolerance issues. Those who were concerned for the abiotic stress component wanted (27%) a species that could tolerate drought. Forty eight per cent of the respondents mentioned feed quality and feed supply attributes as an important issue which should be an integral part of any annual pasture legume. Out of them, 70% showed concern on feed quality and 60% on feed supply. Thirty seven per cent of the responding farmers felt that any annual pasture legume should be able to resolve weed control issues. Out of them, 70% emphasised the requirement for good chemical tolerance in the annual pasture legumes. Fifteen per cent farmers prioritised economics in relation to annual pasture legume technology. Of them, 44%, 33% and 22% put forward costs related to seed, establishment and harvesting, respectively.

#### *Interactions between sub-systems*

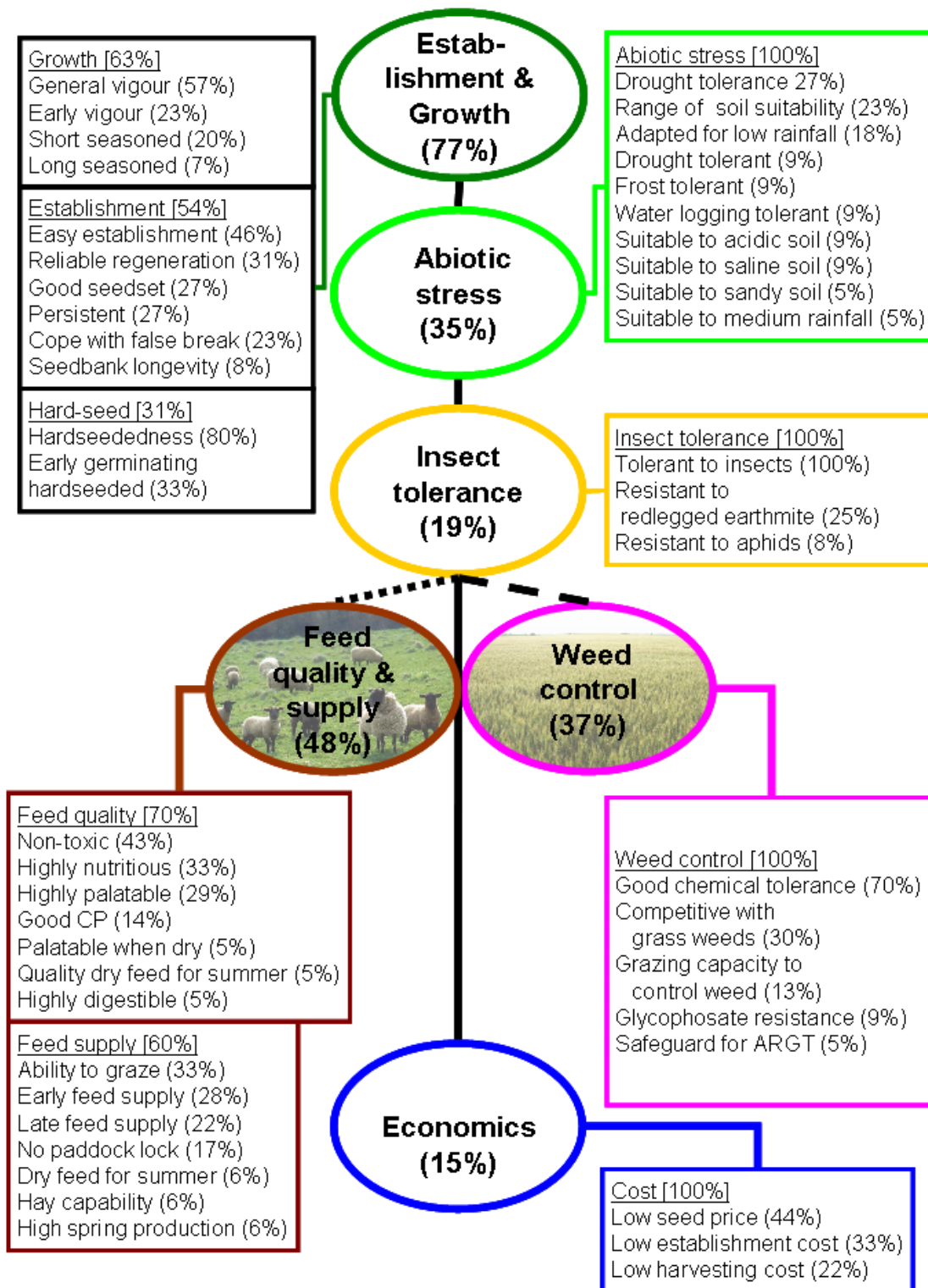
The APL-Characteristics as perceived by the farmers have been stratified into 63 possible combinations among the six designated sub-systems, as shown in Figure 2. Results indicate that no single sub-system would make significant impact on the adoption of an annual pasture legume in WA. Although 77% farmers desired an APL species/cultivar having improved establishment and growth attributes (Figure 1), its effect on ultimate adoption would influence only 13% farmers. To attract 20% and 40% farmers in adopting an APL species/cultivar a combination of at least two and three sub-systems would be required (Figure 2). Furthermore, these sub-systems combinations would have to be based on the EG (establishment and growth) sub-system; the combination of the other five sub-systems would attract less than 20% of the respondents.

### **Conclusions**

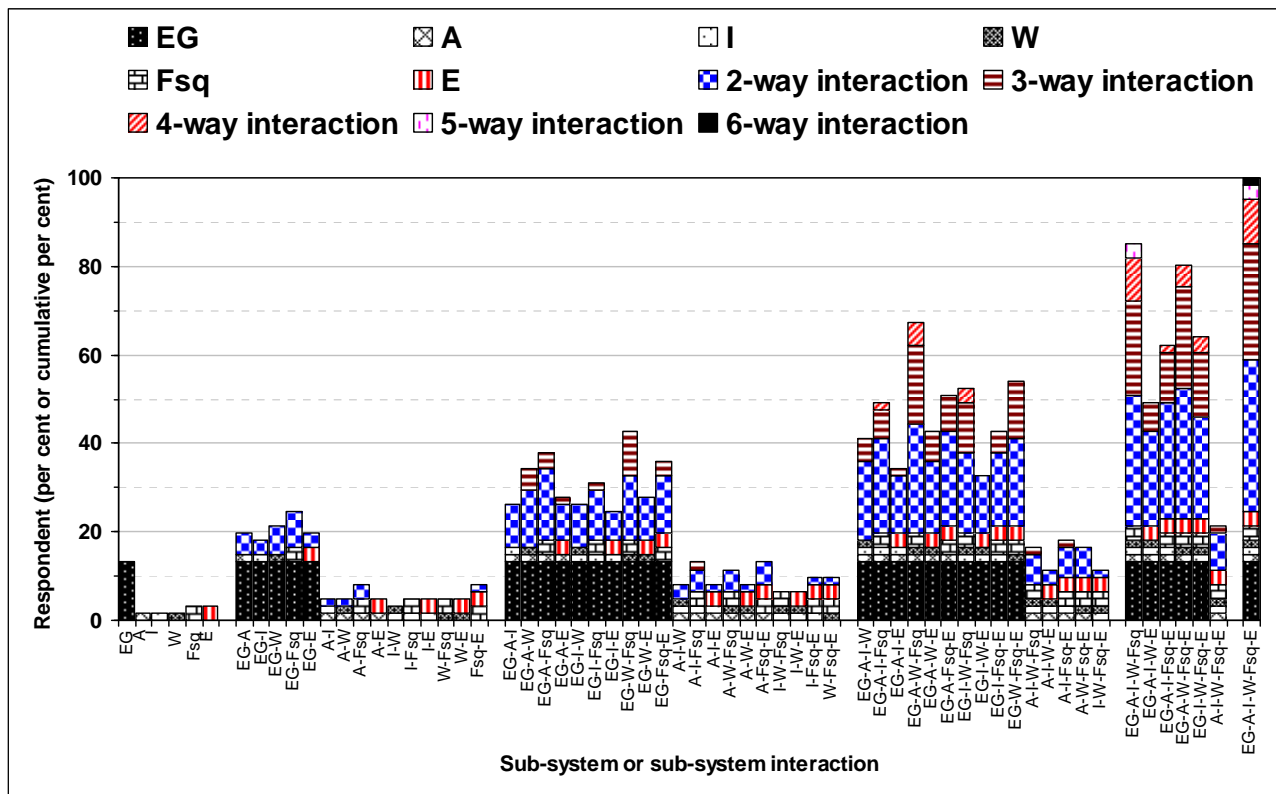
With the development of the “APL-Characteristics-Framework for WA”, this study highlighted the pasture characteristics perceived by farmers of Western Australia as important for the adoption of annual pasture legumes. This framework was characterised with defined sub-systems, and components and sub-components of each sub-system, and interactions were measured among the sub-systems. The APL-Characteristics-Framework can be used to improve our understanding of why biserrula and other similar potential pasture species have not been widely adopted in WA.

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**Figure 1: The APL-Characteristics-Framework for Western Australia.** Each oval represents a sub-system and the figure in the parenthesis indicates the percentage of the respondents. Each rectangle denotes a component (underlined) and sub-component (not underlined) of a sub-system. The figure in the parenthesis of a component indicates the percentage of the number of respondents who suggested the relevant sub-system. A figure in the parenthesis of a sub-component indicates the percentage of the number of respondents who suggested the relevant component.



**Figure 2: Interactions between the sub-systems of the annual pasture legume characteristics framework for Western Australia. Abbreviations of sub-systems, EG: establishment and growth; A: Abiotic stress; I: Insect tolerance; W: Weed control; Fsq: Feed supply and feed quality; E: Economics. Two- through six- way interactions indicate cumulative responses in relation to all possible combinations of sub-systems shown in X-axis.**

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