How widely have new annual legume pastures been adopted in the low to medium rainfall zones of Western Australia?

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KEY MESSAGES

- Pink Serradella (Cadiz(b)) and Biserrula (Casbah(b)) are the most widely grown new annual legumes, grown by 22% and 20% of respondents respectively.

- Cost of establishment and difficulties in managing weeds are the main barriers to adoption of new annual legumes.

- The recent droughts and unpredictable seasons in Western Australia have had a significant impact on the performance and perceptions of the new annual pasture legumes, hindering their adoption to date.

- Pastures continue to contain a significant proportion of subterranean clover, present on 83% of farms, in spite of the superior production values of new annual pasture legumes.

AIMS

Assess grower use of annual pasture legumes: both the traditional (subterranean clover) and new (biserrula, yellow and pink serradellas and gland clover) species.

Identify constraints to the adoption and management of new annual pasture legumes.

Determine the level of awareness and knowledge of new pasture technologies: twin-sowing, autumn cleaning and strategies to limit photosensitivity in biserrula.

METHOD

A survey was conducted at the onset of seeding 2008, mainly by telephone. Some surveys were distributed through grower groups, with respondents returning their questionnaires by email or fax. A total of 69 questionnaires were completed by growers from 37 shires across the low (275–325 mm) to medium (325–400 mm) rainfall zones of the wheat belt of Western Australia: 32 from the central agricultural region, 21 from the northern agricultural region and 16 from the southern agricultural region. 60% of respondents were a member of a grower group, the majority were from the Corrigin Farm Improvement Group, Ravensthorpe Agricultural Initiative Network, Liebe or Western Australia No-Tillage Farmers Association.

The questionnaire used mainly open-ended questions and had three variations, which depended on whether respondents currently grow new annual pasture legumes (biserrula, yellow serradella, pink serradella and gland clover). The survey asked:

- how pastures are being used in respondents farming system;

- the limitations/constraints to further adoption of new annual pastures;

- key considerations for farmers wanting to manage/establish new annual pasture legumes;

- awareness of 'twin-sowing', 'autumn-cleaning' and knowledge on photosensitivity in biserrula.

RESULTS

Experience with pastures

Subterranean clover was the most widely grown (83% of respondents) pasture legume in all three agricultural regions. Burr, strand and barrel medics, balansa, rose and persian clovers were also grown. On average 81% of respondents' pastures were self regenerating. Respondents indicated that the main purpose for pastures in their farming systems was for livestock feed (92%), nitrogen fixing abilities (51%), weed control (26%) or part a rotation (21%).

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Experience with new annual pasture legumes

Twenty-five per cent of the respondents had not grown annual pasture legumes other than subterranean clover. Half of them were actively seeking information about annual pasture legumes with their main interests being hard-seeded serradellas and aerial seeded clovers, in particular gland and bladder clover.

Twenty per cent of respondents previously grew annual pasture legumes other than subterranean clover, but no longer do so. Species previously grown included pink serradella: Cadiz♭ (57% of former growers), biserrula (43% of former growers), yellow serradella varieties (21% of former growers) and 7% of former growers had un-adopted both pink serradella (Margurita♭) and gland clover (Prima♭).

The main reasons for ceasing to grow the legumes were technical problems relating to performance, including unreliable establishment and persistence (50%) and weed management problems (36%); financial considerations (36%) and the inability of these species to cope with seasonal variation (21%) were also major deterrents.

Pink Serradella, especially Cadiz♭ was the most widely grown of the new annual legumes (22% of all respondents). Casbah♭ biserrula was grown by 20% of respondents (Table 1). This survey was unable to determine the area over which these new annual pasture legumes are grown as many respondents grow mixed pastures, however the areas reported ranged between 25 and 700 ha. Some respondents did not specify which cultivars of biserrula (2), yellow serradella (3) and pink serradella (4) they were growing.

Table 1 **Number and per cent of total respondents who currently grow new annual pasture legumes**

Species	Cultivar	Number of respondents	Per cent of 69 survey respondents
Biserrula	Casbah♭	14	20%
	Mauro♭	1	1%
Yellow Serradella	Santorini♭	3	4%
	Charano♭	7	10%
Pink Serradella	Cadiz♭	15	22%
	Erica♭	3	4%
	Margurita♭	4	6%
Gland Clover	Prima♭	5	7%

Issues to consider when establishing and managing new annual pasture legumes

Respondents who still grow a new annual pasture legumes suggested pest control (79%) together with paddock preparation (41%) were the key issues when establishing these new annual pasture legumes. Weeds were identified as a particular problem in biserrula because of the lack of registered herbicide.

Constraints to wider adoption

Unreliable and/or unpredictable seasons emerged as a major barrier to adoption of the new annual pasture legumes in all 3 agricultural regions (Table 2). Several years of drought in the northern agricultural region and unpredictable/unreliable seasons in the central and southern agricultural regions had been experienced prior to this survey. New cultivars introduced into these drought conditions have not yet had a chance to show their full potential. The cost of establishment was considered a barrier to adoption by almost half of the respondents from the southern (44%) and central (47%) agricultural regions but only 24% of respondents in the northern region. In the central region, 34% of respondents suggested that the increasing and greater profitability of cropping enterprises in comparison to sheep production was a disincentive to adoption of any new annual pasture legumes. The inter-related problems of weed control and impact of herbicide residues on growth and seed-set were also considered barriers to adoption.

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Table 2 **Respondents perception of the main barriers to adoption of new annual pasture legumes**

Constraints to adoption	Northern (%)	Central (%)	Southern (%)
Unreliable/unpredictable seasons	38	38	44
Cost of Establishment	24	47	44
Weed Control	29	9	19
Problem soils and inability to match to right soil	5	6	38
Relative economics of sheep and crop	14	34	13
Herbicide residue problems	14	9	0
Pest Problems	10	3	31
Lack of persistence	10	19	6
Lost time and grazing during establishment	10	9	25

Desirable qualities of annual pasture legumes

Respondents across all three regions indicated that the most desirable characteristic of an ideal annual pasture legume was production of large amounts of fodder for grazing and the ability to self-regenerate. However there was some regional variation. Over one third of respondents in the northern agricultural region suggested the ideal pasture legume should contribute to cropping rotations and allows easy weed control. In the southern agricultural region respondents placed greater priority on insect resistance whereas in the central region seed production was considered an important trait Table 3).

Table 3 **Characteristics of the 'perfect' annual pasture legume, according to farmers**

Plant attribute	Northern (%)	Central (%)	Southern (%)
High fodder production	43	50	50
Self regenerating	43	47	56
Asset to rotations	38	19	25
Easy weed control	38	31	19
Good grazing	38	19	25
Drought tolerant	33	22	31
Insect resistant	14	16	38
Easy seed producer	10	38	31

Awareness of this project's technologies

This Pastures Australia Project focuses on three new technologies:

1. 'Twin-sowing': sowing hard seeded annual legumes with grain crop to enable establishment of the pasture legume the following year (Loi et al. 2008).

2. 'Autumn-cleaning': exploiting delayed germination of yellow serradella and eastern star clover pastures for weed control using broad spectrum herbicides (Ferris 2009).

3. Developing effective management systems for biserrula to reduce the risk of photosensitivity.

Awareness of 'autumn-cleaning' is limited (30% of respondents) in comparison 'twin-sowing' which was known to 85% of respondents. Although most respondents had heard about 'twin-sowing' there were a variety of practices that they confused with the specific technology being developed by the project. Some said they had under-sown crops with subterranean clover, others with lucerne.

More than 60% of respondents were aware of the photosensitivity risk of pastures dominated by biserrula. Many of these had not actually grown biserrula. Only 29% of respondents had grown biserrula, the remainder obtaining their knowledge from agricultural magazines and newspapers.

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CONCLUSION

Pink Serradella (Cadiz ⓑ) and Biserrula (Casbah ⓑ) are the most widely grown of all new annual pasture legumes.

The recent droughts and unpredictable seasons in Western Australia have had a significant impact on the performance and perceptions of the new annual pasture legumes, hindering their adoption to date. There should be ongoing trials and extension activities across all regions as climate conditions tend to cycle through wet and dry years.

Pastures in the Wheatbelt of Western Australia continue to contain a significant proportion of subterranean clover (present in 83% of respondents' farming systems).

The new annual pasture legumes are sometimes perceived as inferior to subterranean clover due to cost of establishment and difficulties in managing weeds and insect pests. In order to improve perceptions and ultimately increase adoption of new annual pasture legumes, 'twin-sowing' establishment techniques and 'autumn-cleaning' weed control techniques need to be refined and their comparative economics calculated. In due course the presentation of these techniques in management packages will provide consultants a basis in which to advise farmers for long-term farm system sustainability and profitability.

KEY WORDS

annual pasture legumes, adoption of pastures, serradellas, biserrula

ACKNOWLEDGMENTS

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