

Producing south Australian grain legumes for an overseas plate

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Summary. Grain legume production and research is becoming more market orientated, but there are impediments to achieving this. We cannot always economically grow what the market requires. We do not fully know what the required product is, or we do not have the appropriate varieties. Market information available to growers before sowing and then after harvest at marketing time could be improved. Part of the long term future is to breed varieties with genetic solutions to the agronomic limitations, as well as meeting market requirements. However, management problems need to be overcome; herbicide-resistant weeds, in-crop herbicides, soil degradation, erosion, fertiliser choice, and crop establishment. New products need to be developed to open new markets and allow value-adding within Australia. This paper addresses known production, breeding, marketing and end-product issues with grain legumes in SA.

Introduction

To produce grain legumes in SA for an overseas plate we have to know the market requirements for food products, have clear market signals on what to produce and where and when to sell, have the appropriate crop and variety available, and be able to economically and reliably grow the crop relative to alternatives.

Discussion

Produce what the market requires

SA exports most of its grain legumes. The premium human consumption food markets are sought, but livestock feed markets are necessary backups also. The broad requirements of the export food markets are known (1,2,7). National export standards set by the National Grain Legume Consultative Committee ensure that a well presented and quality product is exported. Marketers constantly say that we should be market-driven and produce what the market requires. To achieve this the appropriate crop types must be grown, and the best variety selected to service that market. A variety may not be available, or the yields too low to enable farmers to economically produce for that market (Table 1). Peas (*Pisum sativum*) of the dun type are widely grown, yet they are the least preferred pea for food markets. The highly marketable and preferred large smooth white pea varieties like Dinkum are not grown because the yield penalty exceeds the small premium payable. The green cotyledon, blue boiler pea is a premium pea overseas, yet Australia produces little, and poorly adapted varieties serve a limited domestic market. Maple and marrowfat peas are not grown for similar reasons. Dun type peas enter the food market as a cheaper product of lower priority overseas, although a market demand is being met. Growers are missing out on other products with greater demand and higher price. Desi chickpeas (*Cicer arietinum*) are a preferred food product to dun type peas, and overseas market signals suggest the change would be desirable (1,2,7). The economics of production, risk factor of growing a new crop, poor subsequent wheat yields in crop rotations, and the absence of an established feed market as a market backup restricts the chickpea area sown. Kabuli chickpeas, which are sold at a premium price, are becoming recognised as having the potential for high returns to growers, despite the lower yields compared with desi types. Large-seeded kabuli types, like Macarena, receive the highest premium and are the most marketable, but cannot be grown economically because of low yields and poor adaptation. Lentils (*Lens culinaris*) are being developed in SA as a high value grain legume with potential to enter volume export and value-added split markets (1,2,7). As with chickpeas, economics and crop suitability will determine the acceptance of lentils by SA farmers. Blanche fleur vetch (*Vicia sativa*) developed rapidly in SA as a widely adapted, high yielding and premium priced grain legume. Its market niche had been establishing as a cheap alternative to lentils, but questions as to its suitability as a food product (8) has necessitated a reappraisal. Narrow leaf lupins (*Lupinus angustifolius*) from SA are not exported to food markets, and will need the development of that market potential. The lower feed market price causes some marketers to question the merit of growing lupins. Lower costs of production, less risk and their suitability for acidic soils and infertile sands ensures the continuation of lupin production. A speckled seed coat now signifies low

phomopsis and low alkaloid varieties, and could become a marketing focus for food lupins. The mediterranean white lupin (*L. albus*) is being developed for niche food markets, but lower yields and narrower adaptation may be a limitation. Beans (*Vicia faba*) are widely grown in SA, and the small-seeded variety Fiord now has established export food markets. A growing interest in large-seeded beans for niche markets is hampered by the restriction that the current largest seed size is too small, and the graded out smaller sizes are harder to sell. Very large-seeded beans or green-seeded beans are needed by marketers, but we have no varieties. The growing trend in Europe for low tannin, pale seed coats may see a necessity for this type of bean to be developed in Australia in order to compete.

Table 1. The market requirements and varietal suitability of winter grain legumes in SA.

Crop	Type	Size or colour	Varieties	Yield	Comments	Marketing preference	% of sown area
Peas	Smooth white	large size	Drinkum, Bonzer	low	small/(widely adapted)	Preferred	1%
	blue boiler	small size	Wirrega (4163-5 coming)	medium/(high)		Suitable?	5%
	flm types		Bluey, Blue Prussian etc.	low		Preferred	1%
	maple		Alma, Dun, (Glenroy) etc.	= standards		Marketable	92%
Beans	marrowfat		unknown (eg Violetta)	low		Niches	1%
			none ?			Niches	0%
	green seeded	large size	none (137 coming?)	(low?)		Preferred	0%
		medium size	none (Paras coming)	(high/low?)	(high rainfall only?)	Desired	0%
Chickpeas	very large		none (286 coming?)	(low?)		Preferred	0%
	medium large		Aquadulce	low/high	too small/high rainfall	Niches	10%
	small seeded	(low tannin)	none	-		Future need?	0%
		pale seeds	Fiord, (selections coming)	= standard	(less ascochyta)	Satisfactory	90%
	desi	small size	Tyson	high/low	too small/low rainfall	Marketable	5%
		medium size	Doen, Amethyst,	= standards		Suitable	70%
			(Devruic)	(high)	(low-medium rainfall)	Suitable	0%
	kabuli	larger size	Sensen, (940-26 coming?)	low/(high)		Preferred	20%
Lentils		medium size	Kanva, Garnet	low		Suitable	5%
		large size	Macarena	very low		Preferred	0%
	red	small size	Kye, Callisto	low		Satisfactory	100%
	green	medium size	(LL-5750 coming)	(improved)	(medium rainfall)	Preferred	0%
Vetches		large size	Laird,	low		Desired	0%
	<i>V. sativa</i>	red	Blanchefleur	= standard		Declined?	70%
		yellow	Languedoc	high/low	use as food debated	Niches	10%
	other		Namoi, Popuny	very low	feed/forage use	Niches	20%
Lupins		speckled	Gungurna, Yorrel, Merrit	= standards	low phomopsis	Future need	75%
	<i>L. angustifolius</i>	plain	Warrah, Danja etc	high/low		Suitable feed	24%
			Kiev Mutant, Hamburg, Ultra	low		Niches	1%
	<i>L. albus</i>						

Table 1 highlights current market preferences, but it has been possible to take a product and develop a food market. Fiord faba beans, Blanchefleur vetch and dun type peas have export markets for human consumption which developed from feed crops. The latter two became cheaper alternatives to traditional, widely traded products. Lupins are expected to ultimately achieve this also. Quality, price and market development are the driving factors. It is important to understand the product and establish where it can fit into traditional markets. Cooking tests and physical quality attributes of all our legume products must be determined. New value-added products must be developed if we are to expand our market options (eg dhal, flour, snack packs). Value-adding is expensive, and SA is a volume producer, so to benefit most growers, a unique, large-scale, quality product must be developed. Otherwise processing and marketing must be off-shore in Australian owned mills using cheaper labour, but using only our raw products. In the past, some of our value-added markets have been undermined by our bulk sales. We need both markets.

A research direction has been determined in SA to enable the economic and sustainable production of marketable grain legumes in the future (5). Breeding marketable grain legume types is the highest priority because of the absence of suitable types or low yields (Table I).

Reliable production

The SA farmer must be able to reliably and economically grow grain legumes in a system which is sustainable. The occurrence or threat of herbicide-resistant grassy weeds is a major barrier to grain legume production. Crop rotations need to be revised and continuous cropping avoided to overcome or avoid the resistance. Preventing seed-set of resistant-weeds is necessary, even within the legume crop before harvest to salvage the crop and reduce resistance carryover. Broadleaved weeds which escape in-crop herbicides are restricting the area that some crops can be grown. Wild radish (*Raphanus raphanistrum*), Bedstraw (*Gallium tricornutum*) and Bifora (*Bifora testiculata*) cannot be adequately controlled in chickpeas and lentils, but can be managed in peas. Weeds alone may restrict the farmer from growing the otherwise more marketable or profitable crop. Weed presence in grain (eg *Popover hybridum*, *Emex* spp.) can exclude some food market options. Disease is the major factor limiting yield and sometimes quality in all the grain legumes grown. Breeding for resistance is a major goal (4), but progress is slow and not always possible. Modified agronomic practices, crop rotation, and fungicide use are the only current disease control options available to growers. Foliar fungicides are usually applied in response to the presence of disease to avoid costs, and are often applied too late or too infrequently in severe years. Disease susceptibility may limit the production of a more marketable variety. In areas prone to powdery mildew (*Erysiphe polygoni*), Glenroy peas will be grown because of its resistance and major yield advantage, despite more marketable, but susceptible, peas becoming available (6). The most marketable grain legume crops, like beans, may not be grown because of disease risk, or the necessity to use fungicides. Disease on grain can exclude a product from human food markets (eg *Ascochyta fabae* on beans, *Pseudomonas syringae* pv. *pisi* on peas). Conservation farming practices with grain legumes are becoming essential in SA because of the high risk of wind and water erosion affecting crop establishment or loss of stubble ground, especially with peas. The risk of degrading soil structure through continuous cropping using grain legumes can be minimised with reduced tillage. Ultimately it is economics, soil fertility and structure, weeds, and disease build up which influence the final cropping practice and rotation selected.

The direction of agronomic research has been determined in SA to reduce production risks and to enable economic and sustainable production of grain legumes (5). Implementation of the plan is proving difficult as funding becomes tighter.

Market information and development

Market forecasts made before sowing do not always eventuate. Growers feel they sow crops aimed at a moving market target. With a growing season of eight or more months, and with a northern hemisphere crop harvested in between, the export market can change dramatically from the best possible predictions. This cannot be changed, but futures, options and contracts are available to assist in the decision to sow and subsequently how to market a crop. Some growers subscribe to regular copyrighted forecasts sent

by facsimile (3) to ensure they get personalised market information. The majority of growers sow on intuition, agronomic necessity, and the information available at the time. They rely on marketing board

pools or cash buyers to sell their grain. SA is a volume producer, and while niche markets can be serviced by individual farmers or companies, the majority of grain legumes are exported whole and in bulk. Growers need to be more market conscious, even if they rely on others to sell their crop. Independent market information is needed to ensure awareness of the most marketable and profitable grain legume crops. The proposed Australian Grain Legume Corporation should be formed to assist in coordinated, national market development. Confidence in market information and development may only come if more stable human food markets are targeted.

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