

KIT 2.1

Expand the area of high-value crops to boost average prices and profitability of farming systems, specifically: pulses, oats for food or industrial uses, linseed for industrial uses, sorghum for food, soybeans for food and/or animal feed.



Impact

Growers in non-traditional production areas have access to varieties of high-value and profitable crops and knowledge of how to integrate them into farming systems.

Summary

- High-value crop opportunities with production expansion potential are identified.
- Growers in non-traditional production areas have access to improved varieties of high-value crops.
- Growers in non-traditional production areas have tools and knowledge to optimise the integration of high-value crops into their farming systems.

OVERVIEW

An important global trend is the use of diet to prevent health issues, which is expected to provide many new opportunities for Australian grain growers. Pulses and various ingredients derived from pulses will become more prevalent for healthy dietary options in consumer diets. Oats, which are high in beta glucans, are already an important wholegrain ingredient in Western diets, and are increasingly being favoured in Eastern diets. While sorghum's main use has been as a stock feed, recent growth in demand has been driven by use in Chinese beverages, as well as biofuel production which could create more opportunities for this crop.

There is potential for Australia to become an important supplier of premium quality processed oat, pulse and other grain ingredients in global markets. However, for Australia to be well placed to meet some of the expected future demand growth for high value crops will require improvements in productivity in the current areas of production (KIT 1.4), and expansion into non-traditional production areas. Expansion into non-traditional production areas is the focus of this KIT strategy.

In parts of Australia, high-value crops such as food pulses and milling oats are already important components of the crop mix of profitable farming systems. These crops provide cereal dominant farming systems with the tools and opportunities to help manage seasonal risks, break pest and disease cycles, control different weed species and, for legume crops, add nitrogen to soils. While many of these high value crops provide rotational benefit, the major value comes from the relatively high prices these crops can deliver. Chickpeas and lentils, for example, can be the most important cash crops in some farming systems. However, the areas where these crops are the most important cash crop in farming systems is restricted to relatively small parts of grain producing regions of Australia.

Many Australian grain growers in non-traditional production areas desire suitably adapted varieties of high value crops and tailored farming systems incorporating these high value crops. Genetic improvement will be crucial to broadening the adaptation of these crops, however the expansion of crops into new areas will also require coordinated efforts to develop and extend to growers and agronomic advisors crop management knowledge and tools (including seed and suitable chemistry). Expansion into new areas will also require marketing and logistics options.

KIT 2.1 is partitioned into three linked phases which reflect the scope areas of this strategy. The strategy phases start with identifying those crop options with the greatest opportunity for growth in demand in the medium to long term, and which may, therefore, require expansion into new and non-traditional production areas. The second phase is to identify potential new production environments, and the constraints and opportunities for high value crops to be grown profitably in these areas. The third phase of the strategy is identifying and delivering solutions to the constraints and opportunities that are identified, to facilitate the cultivation of high-value crops in new production areas.



FUTURE RD&E FOCUS

SCOPE – High-value crop opportunities

Market intelligence ensures that opportunities to underpin the expansion of high-value crops are identified and captured.

The major objective of KIT 2.1 is to identify high-value crop opportunities, and to facilitate the availability of these crops for cultivation by Australian grain growers. This may include regional opportunities that have the potential to deliver a significant local impact such as linseed for food or industrial uses, or sorghum for use in beverages, through to supporting increased capacity to cultivate already large crops such as chickpeas and lentils by expanding the adaptation of these crops into new production environments. This may involve crop improvement, along with delivering a range of agronomic and other discipline area solutions.

While crop breeding can dramatically improve a crops adaptation or yield and therefore improving its viability for inclusion in a farming system, given the long-term nature of investment in crop improvement it is critical we choose the right crops to focus on. Therefore, to identify the most valuable crop opportunities it is critical to have access to strategic intelligence on medium to long term market drivers and trends. Understanding these market trends is critical to identifying and capturing high-value crop opportunities, ensuring that investment in long term crop improvement and other discipline areas is both targeted and commensurate with the specific crop opportunity. Understanding these market drivers is the first phase of this strategy.

Investment Outcome 2.1.1 – The grains industry has access to market intelligence to support the identification of high-value crop opportunities that have potential for expansion in new production areas and support more profitable farming systems for growers.

Good market intelligence will ensure that opportunities to drive demand for high-value crops are identified, captured, and translated to opportunities for Australian grains growers. For the larger crop opportunities, market information currently supports the expectation that crops including chickpeas, lentils, faba beans and milling oats will enjoy sustained growth in demand over the coming decade. However, more information is needed to identify demand drivers for other crops that may represent new regional opportunities for growers. Reliable information on market uses and trends is more difficult to obtain for smaller crops. Quantifying the current and potential future value of high value pulse, oat and oilseed crop varieties to the farming system is also required to fully assess the contribution these crops could make to farming system profitability.

GRDC will invest in the identification and capture of market information that ensures that high-value crop improvement and production expansion is aligned to demand drivers in new and existing markets. This information will be used to prioritise the allocation of resources towards the crops with the greatest potential to impact positively on the profitability of Australian grain growers, and to ensure that where appropriate, breeding targets are aligned where crop expansion opportunities are identified.

SCOPE – Potential new production environments

For each identified high-value crop opportunity, new target production environments and key constraints and barriers to expansion are also identified.

The identification of potential new production environments and understanding the key constraints to achieving the profitable cultivation of new high-value crops in those environments is the second phase (scope) of this strategy. Unlike the more well-established Australian grain crops such as wheat, barley and canola, many current high-value pulses such as chickpeas, lentils and faba beans have been bred for Australian conditions for only a few decades and so the genetic adaptation of these crops to Australian environmental conditions is not as advanced. As a result, the growth of these crops tends to be limited to specific areas of unique adaptation and where the skills, knowledge and marketing options for those crops are readily accessible.



Investment Outcome 2.1.2 – For each high-value crop with expansion potential, growers and researchers have access to tools and knowledge that support the identification and characterisation of new target production environments.

In order to identify new production environments for high value crops it is important understand if using existing varieties, supported by extension of current agronomic knowledge, can by itself achieve the desired expansion. Alternatively, a longer-term approach may be required to identify and introduce new genetics and management approaches that can deliver specific adaptation to the new environments and/or assist in overcoming the constraints to expansion in those new production environments.

Characterisation of the new production environmental will be important. This will include characterisation of soil types and constraints, as well as rainfall and temperature patterns, along with an understanding of biotic risks to the production of each crop. This will in turn inform whether existing crop varieties and management approaches may be suitable or if new genetics and/or management approaches will be required.

Investment Outcome 2.1.3 – For each high-value crop with expansion potential, the key barriers to expansion are identified.

Pulse and other high-value crops such as oats in Australia have a reputation for being lower yielding or less reliable than cereals and canola when challenged with both biotic and abiotic stresses in existing production environments. Expansion into new production environments is likely to present similar challenges for growers. To enable these high value crops to become lower risk it is critical that we can gain an improved understanding of the key potential productivity constraints in the potential new production regions. GRDC will invest in identification of key barriers by region and crop to support a crop-by-crop expansion plan. Barriers related to grower access to the tools, post-harvest infrastructure and markets that support profitable crop cultivation will also be a key consideration.

GRDC expects that an important focus of this KIT strategy will be the longer-term objective of broadening the adaptation of high-value crops. There are, however, also likely to be near-term opportunities to research and extend crop management practices and technologies to help Australian growers in new production areas plant, grow and harvest current high value crop varieties and in turn deliver enhanced profitability.

The removal of barriers and constraints to achieving the profitable cultivation of high-value crops in new production environments is the third phase of this strategy.

SCOPE – Removal of barriers to expansion

Constraints to the expansion are addressed for each prioritised high-value crop. The incorporation of high-value crops into farming systems in new production environments is facilitated.

For some high-value crops, such as pulse crops, there is a shorter history of production in Australia in comparison with crops such as wheat and barley. Most high value pulse crops were introduced into Australian farming systems during the 1980's and 1990's compared to wheat which was introduced in the late 19th century. Consequently, there has been less time and research effort committed to genetic improvement and adaptation to Australian conditions.

Investment Outcome 2.1.4 – Growers in new production environments have access to high-value crop varieties that address barriers to production.

For crops identified with significant expansion potential, GRDC will invest in the identification and prioritisation of opportunities to improving yield potential in new Australian production regions, by addressing the key constraints to achieving yield potential in those areas.

Overcoming key soil constraints has been and will remain key breeding targets, however novel or improved management tools and genetic sources of tolerance to these constraints will also be required for the expansion of existing Australian crops into new production areas. For example, overcoming hostile soils will be a key constraint that will need to be addressed for the widespread adoption of pulse crops other than lupins in areas such as Western Australia.



Minimising the risk of yield loss due to sustained low or high temperatures at critical growth stages, along with temperature shocks, can significantly impact the yield of high value crops adapted to higher latitudes, for example. The identification and characterisation of genetic diversity to limit the effect of these environmental stresses is crucial to improving yield potential in Southern growing regions.

Understanding the physiological and phenological characteristics required to maximise yield – an improved knowledge of how germplasm develops in differing regions/growing environments and an understanding of the genetic and/or environmental drivers behind the phenological development of these crops is also important. This will advise breeders and pre-breeders in the design of new varieties with improved yield and yield stability in different growing environments and the development of farming systems optimised to deliver maximum profitability.

Crop constraints and opportunities will be continually assessed as further high value crop opportunities with expansion potential are identified and evaluated.

Investment Outcome 2.1.5 – Growers have access to knowledge and tools for production management and market information to facilitate the expansion of high-value crops into new production environments.

Determining the feasibility of deploying existing varieties of high value crops into new production environments will be an important focus of this KIT strategy. This may involve the direct evaluation and demonstration of high-value crop varieties in new production environments along with the extension of relevant agronomic practices to support building the knowledge of growers and agronomists in management options to optimise productivity and profitability

The introduction of new crops into an area is a significant undertaking requiring a multi-disciplinary approach, and potentially long-term investments and it can take many years to see the results. For this reason, it's critical that the resources are directed at the right expansion opportunities. Resourcing these programs will need to be prioritised, based on potential opportunities for significant improvement and benefit for Australian growers.