COGGO Council of Grain Grower Organisations Limited ACN 091 122 039	**Final Report** **COGGO Research Fund for 2022 projects** **A project completion report covering the project. The acceptance of a satisfactory report against the objectives of the project, and agreement on the sharing of any commercial returns and/or IP will trigger payment within 4 weeks, by COGGO for any outstanding payments.**

This Final Report should be completed with reference to the Research and Intellectual Property Agreement (the Research Agreement) signed between the proponent and COGGO Pty Ltd.

1. Project information

Project title	**Identifying opportunities to integrate a spring-sown summer crop into winter wheat-based cropping system in WA**
Commencement Date	15/03/2022
Completion Date	14/03/2024

Name of Proponent	Chao Chen & Andrew James
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Project Number	
Date Received	

2. Project results	This section provides a final report against the Project Aim and the Planned Outputs for the Project.

Achievement of the Project Aim	Brief statement of achievement in relation to the aim of the project

This project aims to determine the potential to introduce soybean as a new crop option for WA growers to improve the productivity and profitability of cropping systems, and identify how best to fit soybean into current winter cereal-based cropping systems.

A combination of field experiment and simulation modelling was used to test the responses of soybean development, growth and yield to climate conditions in the wheatbelt of WA. A 2-year trial was conducted near Mingenew with first year trial sown in spring with two sowing dates and five cultivars. The second year trial was sown in winter with two cultivars and spring with five cultivars. The APSIM model was tested with trial data and then long-term simulations were conducted at 4 representative locations.

The project demonstrated that there was a potential to adopt soybeans in WA as a cash crop. Both trial and modelling simulations showed that there was an opportunity to sow soybean in winter in the northern wheatbelt of WA. In this part of the wheatbelt, sowing a soybean crop in winter could achieve comparable yield and profit to winter wheat. Due to limited rainfall during late spring and summer in the northern wheatbelt, the opportunity to sow a soybean crop after spring is limited. The simulation results showed that a soybean crop could be sown in either winter and spring in the frost-free high rainfall zone of the southern wheatbelt of WA. There was very limited opportunity to sow a soybean crop in the other rainfall zone of this part of the wheatbelt due to low temperature in winter and low rainfall after spring. Considering that this research project was conducted with a limited temporal and spatial scale of field experiment, which is not sufficient to test the model performance, more field and modelling research needs to be undertaken to confirm the suitable area of adopting soybeans and identify management practices.

Model simulation results demonstrated that soybean would serve as a good break crop. Subsequent wheat yield benefited from soybean as a result of available soil N fixed by legume soybean. We also demonstrated that the rotation of wheat and soybean had potential to enhance economic viability and improve soil nutrients. Integration of soybean into cereal-based cropping system would enhance the diversity of crop rotations, increasing the sustainability of cropping systems. More research needs to be undertaken to identify the rotation pattern of wheat and soybean to better use the climate conditions.

Project Outputs	Please provide a report on the achievement, or otherwise, of the project outputs as per the planned outputs provided in the Project Proposal.

1	-	Output 1 (from Project proposal) Growers can grow a new valuable cash crop.
		Comment: The field experiment and modelling simulation show that a soybean crop has potential to be grown as a new valuable cash crop in some areas of the wheatbelt of WA. For growers in the medium and high rainfall zones of the warm northern wheatbelt, soybeans could be potentially grown in winter. Although growing a soybean crop in winter would achieve lower yield than that of wheat, but soybean had higher gross margin ($901/ha on average) compared to that of wheat ($589/ha on average) in the high rainfall zone, and the gross margin of soybean was higher than that of wheat in about 40% of simulated years in the medium rainfall zone.

		For the growers in the high rainfall zones of the cool southern wheatbelt, soybeans could be potentially grown in spring. Growing soybean in spring achieved an average of $735/ha of gross margin. The simulations also showed the potential to sow a soybean crop in winter in this area. But the results should be interpreted with caution as the simulations did not consider the effects of frost. The lab measurement showed that soybean a high-quality food source for livestock.
2	-	Output 2 (from Project proposal) More sustainable cropping systems to achieve optimum yield and grain quality.
		Comment: Subsequent wheat yield and grain quality benefited from soybean sown as a break crop. An average of 26% of yield benefit to subsequent wheat was simulated in the high rainfall zone of the southern wheat thanks to N contribution of soybean. Grain protein of wheat following soybean was increased or sustained compared to that of wheat after wheat.
3	-	Output 3 (from Project proposal) Soybean used as a break crop option in cropping rotations.
		Comment: Soybean could serve as a break crop option in crop rotations in some areas of the wheatbelt of WA. Soybean as a break crop was simulated to be profitable in itself. Soybean sown in spring in the high rainfall zone of the southern wheatbelt as a break crop benefited to subsequent wheat yield and grain quality. The rotation of wheat and soybean achieved a higher gross margin than that of wheat-wheat.
4	-	Output 4 (from Project proposal)
		Comment:

Project results	Please provide brief statements on the results of the Project

This section should cover aspects identified in *Section 7.3* of the Research Agreement

- the results of the Project, including discoveries made and other achievements (including any Project IP and Project Confidential Information);
- the potential application of the outputs of the Project to the Western Australian grains industry and broader community;
- the actual or potential economic benefits flowing to the Western Australian grains industry and broader community from the Project;
- the difficulties encountered;
- the conclusions reached;
- the Researcher's recommendations for any further research;
- a list of scientific papers or publications resulting from the Project; and
- attach copies of any photos, diagrams or other artworks (including, if requested by COGGO, negatives, bromides or the like) which the Researcher has and which may be of assistance to COGGO in the dissemination of information concerning the Project to COGGO's stakeholders.

1. Method

1.1 Field trial

Soybean Trials were set up in 2022 and 2023 at the property of Brad Kupsch at Hunt Farm Rd, Yardarino near Mingenew, which was monitored by MIG. The trial was conducted near Mingenew due to the historical importance of agriculture and the warm spring that is important for the early establishment of soybean. And the trial site has a heavy soil with high water holding capacity that soybean prefers (Fig.1).

Fig. 1 Trial site which is located at Hunt Farm Rd, Yardarino near Mingenew

For the 2022 trial, soil was sampled to measure soil water and nutrients at sowing time. Soybeans were sown on 25 Aug and 22 Sep, with 5 cultivars (Burrinjuck, Gwydir, New Bunya, 0235-1, A6785) for each sowing day. Each cultivar had three replications.

For the 2023 trial, two cultivars (Burrinjuck and Gwydir) were sown on 20 May (winter sowing) and 5 cultivars were sown on 8 Aug (Spring sowing, Fig. 2). Each cultivar had three replications. The winter sowing trial was a demo trial to explore the possibility of sowing a summer crop in winter in the wheatbelt of WA.

During the trial, the plant establishment was monitored. Plants were sampled and growth characters were measured for each cultivar and each sowing date. The quality of silage of soybean was measured to evaluate the potential of soybean to be used as a feeding option.

1.2 Simulations

The Agricultural Production Systems Simulator Next-Generation(APSIM NG) (Holzworth et al., 2003) was used in this project to simulate the growth, development and yield of soybean. The performance of APSIM NG in simulating soybean growth and development was tested using soybean and soil data measured from the trials of the 2 years with different cultivars and sowing date. Climate data were obtained from the closest weather station.

The tested APSIM NG was then run with historical weather records (1900–2023) to assess the possibility of growing soybean in the wheatbelt of WA. Considering the water availability and water requirement of soybean, this project focused on the medium and high rainfall zones. Four sites (Geraldton, Mingenew, Albany and Jerramungup) were selected to represent the climate characteristics of different parts of the wheatbelt. The cultivar of Burrinjuck was used for all the simulations as it was trialed in both winter and spring. For winter sowing, a soybean crop was sown when 15 mm of rainfall was accumulated in 7 days during 1 May-30 June, otherwise it was sown on 30 June. For spring sowing, a soybean crop was sown on 31 Aug. A clay soil was used in the simulations and yields of the soils were averaged to represent a regional result. For wheat simulations, the cultivar Scepter was used. About 120 kg N/ha were applied at high rainfall sites and 60 kg N/ha were applied at medium rainfall sites at sowing. All other simulations of wheat setup were set up the same as winter-sown soybean.

The potential of soybean to be used as a break crop was preliminarily evaluated with the case of the rotation of spring-sown soybean and winter wheat in Albany. As APSIM NG is still under development and considering the complexity of simulating crop rotation, the rotation of soybean and wheat was simulated with APSIM classic (version 7.10) for the period of 1900–2023. A soybean crop was sown on 31 Aug. An existing early generic soybean cultivar in the model was used, instead of trial cultivar as it was calibrated in APSIM NG. Continuous wheat (wheat-wheat) was simulated as a comparison. In wheat-wheat sequence, wheat was applied 120 kg N/ha for each year, while for soybean-wheat sequence, wheat was applied 70 kg N/ha and no fertilizer was applied for soybean, considering the N fixation of soybean.

The gross margins of soybean, wheat and their rotations were calculated by using industry gross margin information (PIRSA, 2022), with simulated crop yields and amounts of N fertiliser applied. The price and variable cost of chickpea was used for soybean.

2. Results

2.1 Trial results

Soybean sown both in winter and spring established well, with more than 38 plants/m^2 for each cultivar (Fig. 2). Soil temperature installed in the nearby paddocks monitored by MIG showed that soil temperature was > 26 ^{o}C during winter growing season. Both the soil temperature measurement and trial results indicate that establishment would not be a major challenge for soybean to grow in the northern wheatbelt of WA.

Fig. 2. An example of crop growth monitoring conducted during the trial.

For soybeans sown in spring, the above-ground biomass was measured at about 2-3 months after sowing. It ranged from 0.75 t/ha to 1.22 t/ha among 5 cultivars sown on 25 August and from 0.38 t/ha to 0.65 t/ha sown on 22 September 2022 (Fig. 3, Table 1). The low biomass of soybeans sown on 22 Sep was partly caused by the damage of the herbicide applied in the nearby paddock. The above-ground biomass ranged from 0.81 t/ha to 2.35 t/ha among 5 cultivars sown on 16 Aug 2023 (Table 1). As the season of 2022 received little rainfall after September and the whole season of 2023 was a dry season, the soybean plants died before setting seeds for harvest. The 2-year trial results showed the challenges to grow a crop after spring (Late September) in medium rainfall zone due to the limited rainfall.

Fig. 3. An example of soybean growth during the 2022 trial.

Table 1. Above-ground biomass (t/ha) of each cultivar sampled on 21 Nov 2022 and 4 Oct 2023.

Cultivar	2022		2023	
	Sown on 25 Aug	Sown on 16 Sep	Sown on 16 May	Sown on 16 Aug
Burrinjuck	1.22	0.56	3.99	0.81
A6785	0.96	0.65	3.56	1.14
Gwydir	0.96	0.51	NA*	1.20
0235-1	0.75	0.38	NA	1.91
New Bunya	0.86	0.47	NA	2.35
Mean	0.85	0.51	3.78	1.48

* No trial was conducted for the cultivar.

For the soybean sown in winter, the average above-ground biomass was about 3.78 t/ha after about 4 months of sowing (Fig. 4, Table 1). Considering the very dry season of 2023, this amount of above-ground biomass was decent. The lab analysis showed that soybean provided high quality hay, with mean dry matter digestion coefficients (DMDC) of 61% and 38.8% of neutral detergent fiber (NDF). The silage quality analysis demonstrated that soybeans sown in winter had potential to provide a great feeding option.

Fig. 4. Biomass of soybeans sown on 16 May 2023.

The early cultivar Burrinjuck sown in winter podded well, yielding about 0.21 t/ha (Fig. 5). This yield was low as a result of the very dry season of 2023. However it was comparable to wheat yield in the nearby paddock, which was about 0.3 t/ha. The comparable yield of soybean to wheat showed the potential in warm northern wheatbelt of WA. The late cultivar Gywider sown in winter started forming pods in mid-December, but it did not reach full maturity later on due to the water stress. More field research is needed to identify the area where soybeans could have a chance to sow in winter, and determine the cultivar suitability, the magnitude of yield and limiting factors.

Fig. 5. Yield of soybeans sown on 16 May 2023.

2.2 Simulation results

2.2.1 Model performance

The APSIM NG was able to reflect the observed phenology and growth during the trial period (Fig. 6), providing some confidence in the ability of APSIM NG to simulate soybean growth and development. However the phenology and yield data from the trials conducted in this project are limited, more experimental data are needed to further test the performance of the APSIM NG in simulating the response of soybean to climatic variations and management practices.

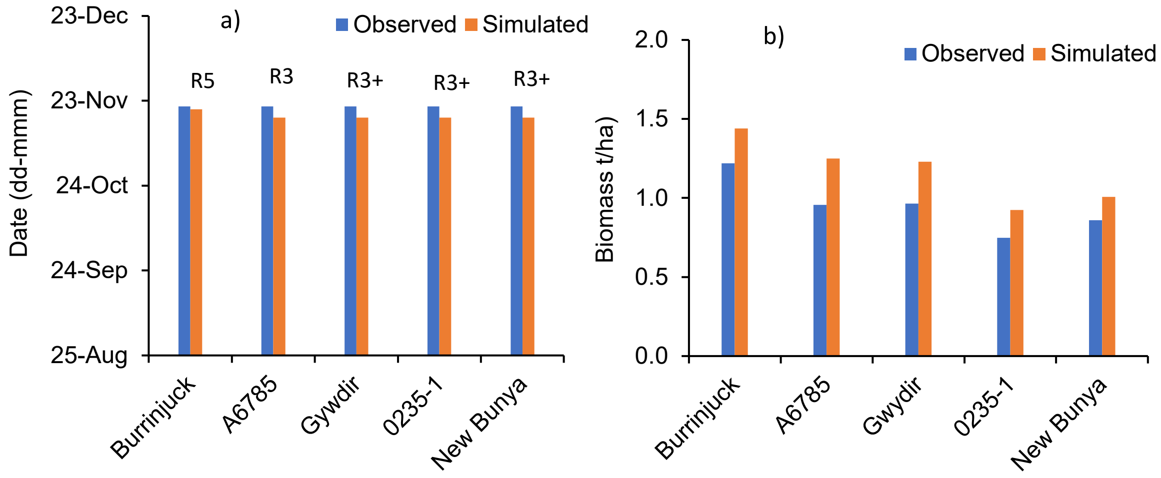

Fig. 6. The comparison of observed and simulated phenological stage (a) and the comparison of observed and simulated above-ground biomass for five soybean cultivars (b).

2.2.2 Winter sown soybean

In the high rainfall zone (represented by warmer Geraldton and cooler Albany), the long-term simulations showed that soybean sown in winter achieved good yield (Fig. 7a). Winter-sown soybean was simulated to achieve an average of 2.10 t/ha with a range of 0.15-3.18 t/ha at Geraldton and it achieved an average of 2.51 t/ha with a range of 1.71-3.13 t/ha at Albany (Fig. 7a). Simulated soybean yields were about 1.8 t/ha and 2.3 t/ha at Geraldton and Albany, respectively. Although soybean yield was lower than wheat yield at both locations in almost all years, the gross margin of soybean was higher than that of wheat, with an average of $901/ha at Geraldton and $1214/ha at Albany for soybean, compared with $589/ha at Geraldton and $537/ha at Albany for wheat (Fig. 7b). Both the trial and model simulation results indicate that there is a potential to sow soybean in winter in the high rainfall zone of wheatbelt of WA. But it should be noted that the simulations did not consider the effects of frost on soybean growth and yield. Climate warming has observed in WA. The projections show that climate warming is likely to continue in the future. All the GCMs project that average annual temperature increases by 2.6–4.2 °C by the end of the century in a high-emission scenario (CSIRO and BoM, 2015). With climate warming, sowing a summer soybean in winter may provide an opportunity to address climate change issue in the region like the high rainfall zone of the wheatbelt.

In the medium rainfall zone (represented by warmer Mingenew and cooler Jerramungup), winter sown soybean was simulated to achieve an average of 1.47 t/ha with a range of 0.11-2.64 t/ha at Mingenew, while the average soybean yield was 0.97 t/ha with a range of 0.02-2.48 t/ha at Jerramungup (Fig. 7a). At Mingenew, due to the low rainfall in some years, soybean was not able to achieve high yields in these years, with about 20% of the simulated years having < 0.9 t/ha (break even yield, Fig. 7a). In about 40% of years, the gross margin of soybean was greater than or equal to that of wheat (Fig. 7b). In these years, the sum of soil water at sowing and growing season rainfall (May-Nov) was generally >= 300mm, indicating the potential to sow soybean in winter in these years at Mingenew. At Jerramungup, there was about 50% of years to have < 0.80 t/ha (break even yield, Fig. 7a). More than

70% of years had <=300 mm of moisture (sum of soil water at sowing and growing season rainfall) at this site (Fig. 9), together with low growing season temperature, there was limited years (<10%) to sow a soybean in winter to achieve a gross margin greater than or equal to that of wheat at Jerramungup. This indicates that there was limited potential to grow a soybean crop in winter in the cool area of medium rainfall zone.

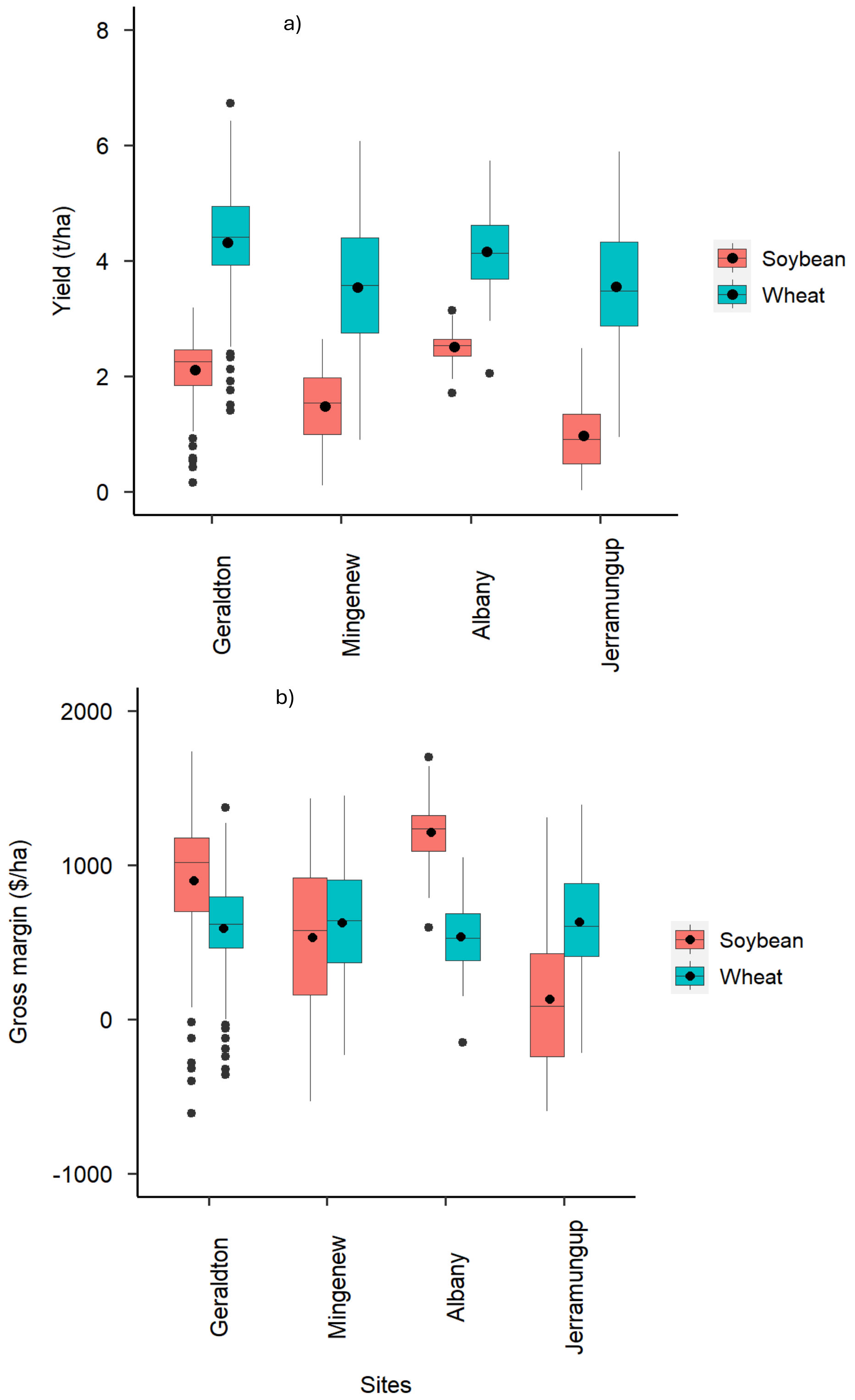

Fig. 7. Simulated yields of soybean sown in winter and yield of winter wheat at four sites (a) and the corresponding gross margin at four sites (b).

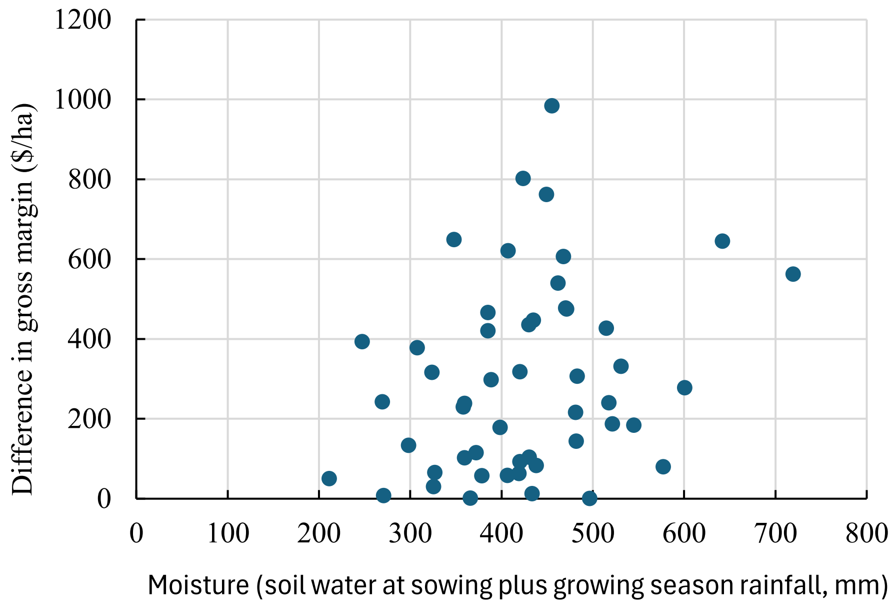

Fig. 8 The relationship between moisture conditions (the sum of soil water at sowing and growing season rainfall) and the difference in gross margin between soybean and wheat that is when soybean gross margin is equal to or greater than that of wheat at Mingenew.

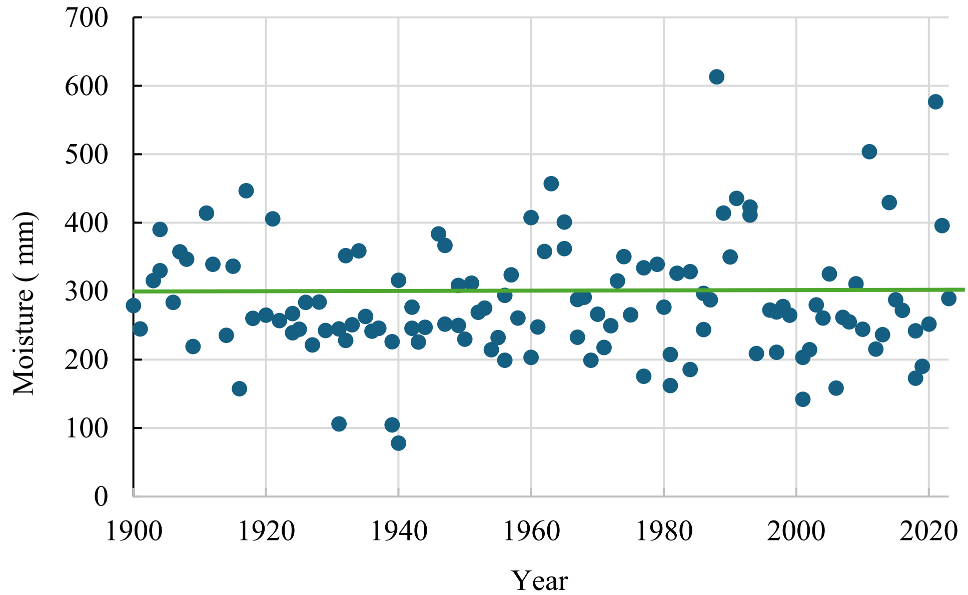

Fig. 9 Moisture (the sum of soil water at sowing and growing season rainfall) during 1900 and 2023 at Jerramungup.

2.2.3 Spring sown soybean

In the high rainfall zone, when a soybean crop was sown in spring (it was sown on 31 Aug in this study), the long-term simulations showed that it achieved 0.10-1.70 t/ha with an average of 0.70 t/ha at Geraldton and 0.72-3.61 t/ha with an average of 1.89 t/ha at Albany. The breakeven yield was 0.94 t/ha for high rainfall zone (Fig. 11 a), which needed about 250 mm of water (the sum of soil water at sowing and growing season (September-December rainfall). There was limited chance to have more than 250 mm of water at Geraldton, as a result, the gross margin of soybean grown in spring was negative in most of the simulated years at Geraldton. While at Albany, moisture was more than 250 mm in almost all of the years, thus growing a soybean crop in spring at Albany could achieve positive gross margin in about 95% of years. The simulation results indicate that there is a potential to sow a summer soybean in spring in the cool high rainfall zone of the wheatbelt of WA.

In the medium rainfall zone, when a soybean crop was sown in spring, its yield ranged from 0.04-1.35 t/ha with an average of 0.53 t/ha at Mingenew and 0.2-2.67 t/ha with an average of 0.58 t/ha at Jerramungup. At the two locations, it needed about 260 mm of water to achieve the breakeven yield, that was 0.8 t/ha. There was limited chance to have more than 260 mm of water at Mingenew, as a result, the gross margin of soybean grown in spring was negative in almost all of the simulated years. There was about 25% of years to have more than 260 mm. thus growing a soybean crop in spring at Jerramungup could achieve positive gross margin in about 25% of years.

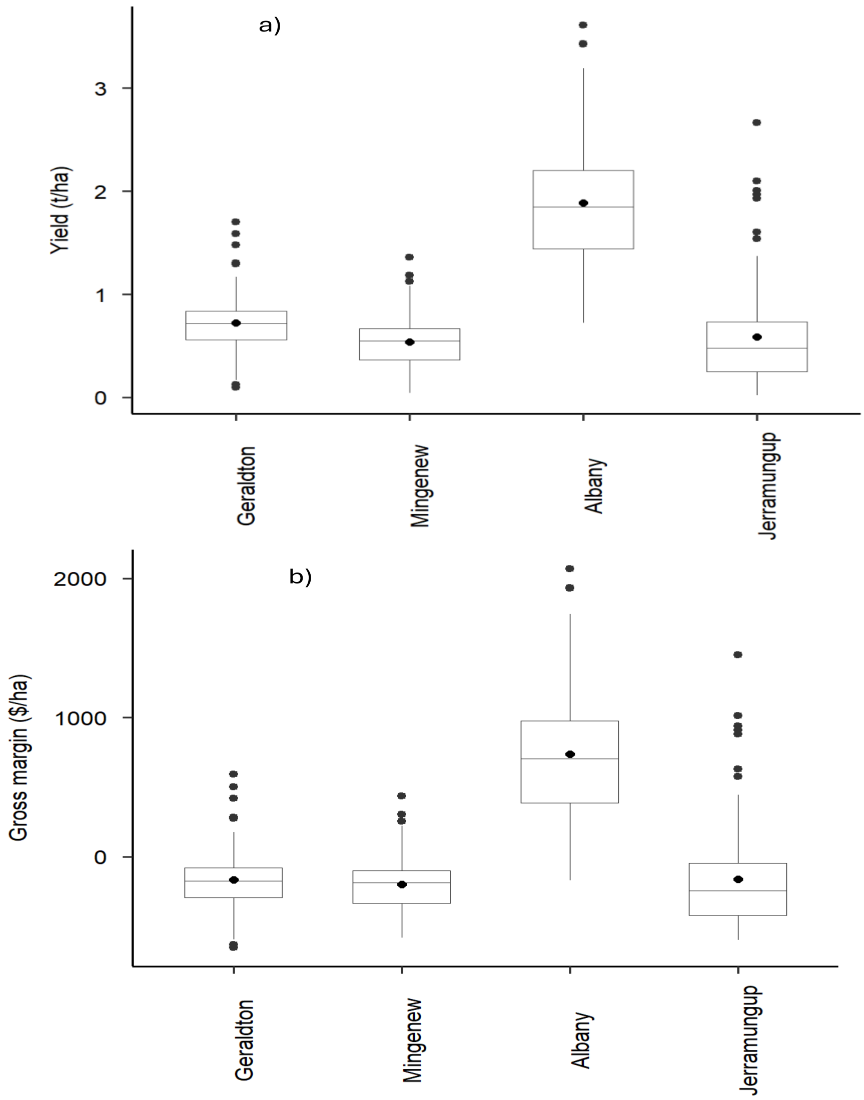

Fig. 10. Simulated yields of soybean sown in spring (a) and the corresponding gross margin at four sites (b).

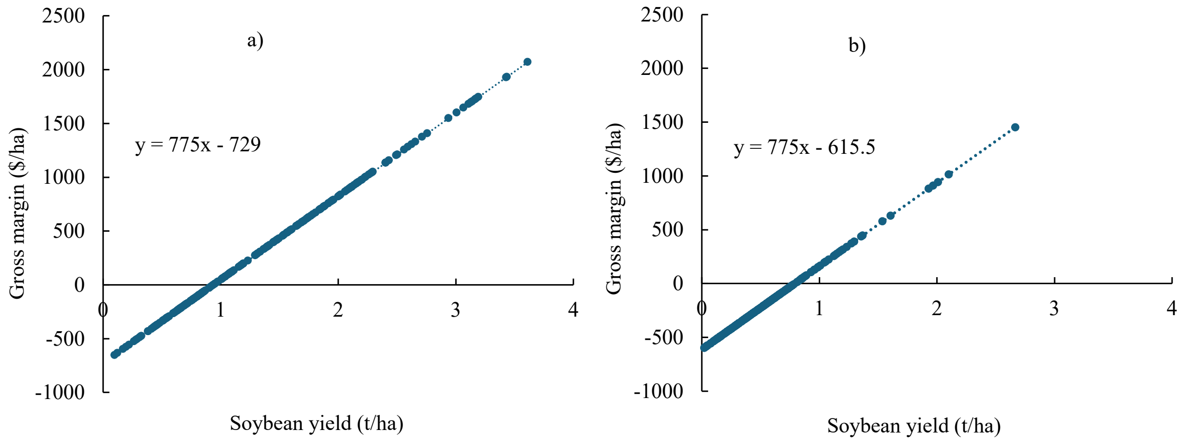

Fig. 11. The relationship between soybean yield and gross margin in the high rainfall zone represented by Geraldton and Albany (a) and in the medium rainfall zone represented by Mingenew and Jerramungup (b).

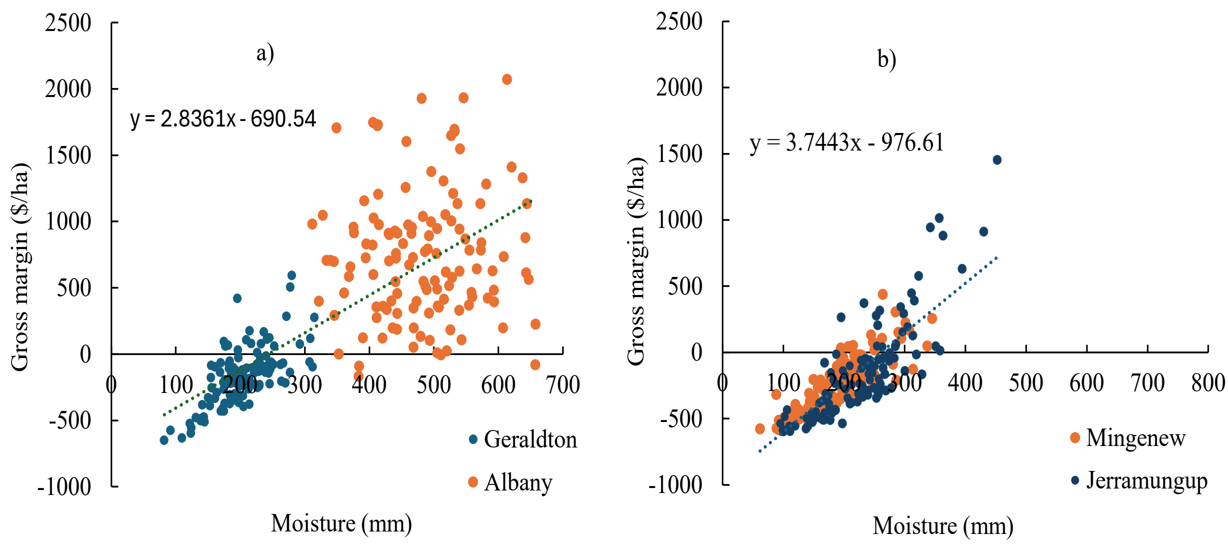

Fig. 12. The relationship between moisture (sum of soil water at sowing and growing season (September-December) rainfall and gross margin in the high rainfall zone represented by Geraldton and Albany (a) and in the medium rainfall zone represented by Mingenew and Jerramungup (b).

2.2.4 Soybean as a break crop and rotation option

The yield response of subsequent wheat to soybean expressed as the relative yield difference between wheat after soybean and wheat after wheat is shown in Fig. 13. There was a great response of wheat yield to soybean (Fig. 13a). Grain quality of wheat after soybean was improved or sustained compared to wheat after wheat, even wheat after soybean was applied less fertilizer (Fig.13b). Soybean was able to fix N to contribute to the subsequent wheat (Fig. 13c). The results indicate that if soybean could grow into a decent biomass/yield, it could potentially be a good break crop to increase the subsequent cereal crop (wheat) yield, improve or sustain grain quality and improve soil nutrient conditions. Greater benefits to wheat were expected when soybean grown as a break crop contributed to reducing pest, disease and weed. Further research is needed to determine the effect of soybean on the control of weeds, diseases and pests.

The rotation of wheat and soybean achieved a higher gross margin than that of wheat-wheat (Fig. 14), indicating the potential to integrate legume soybean into cereal-based cropping system as a rotation option.

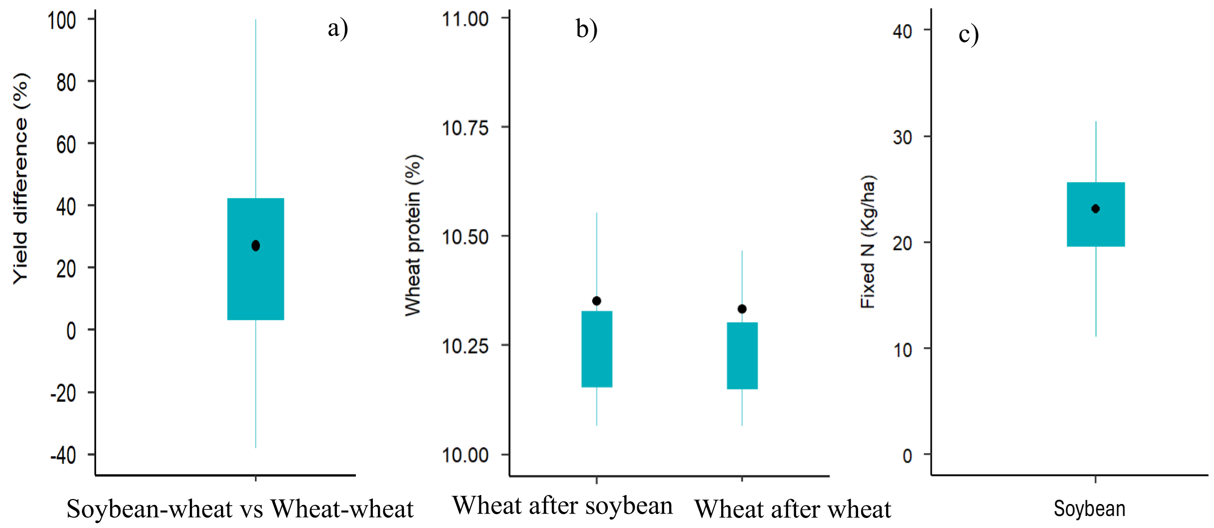

Fig. 13. The yield response of wheat to soybean (a) and the additional soil N at wheat sowing after soybean in Albany.

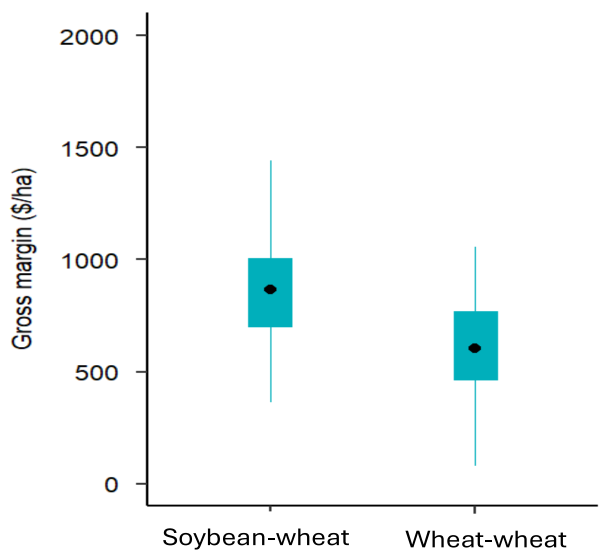

Fig. 14. Comparison of the gross margin of the rotation of soybean-wheat and wheat-wheat. The gross margin was averaged for each 2-year rotation of soybean-wheat (wheat-wheat).

Summary

Both trial results and simulations showed that there was a potential for soybean to be adopted in WA as a cash crop, and a high-quality feed source. In the warm high rainfall zone of the wheatbelt, it was possible for soybeans to be sown in winter. In warm medium rainfall zone, soybeans could be adopted as an opportunity crop to sow in winter. The results are inspiring in addressing solutions to tackle climate change. Sowing a species which has traditionally been considered a summer crop in winter might be a practical management option for growers to adapt their cropping systems to climate warming. This research provides a foundation for further study which could explore optimal management options for this crop. In the high rainfall zone of the southern wheatbelt, soybeans could be sown in spring. Results which showed that it was possible to sow soybean in winter in the cool high rainfall zone need to be interpreted with caution as frost was not considered in this study. Soybean could serve as a good break crop in WA farming systems since we showed a benefit to wheat yield in crops that followed soybean in the high rainfall wheatbelt region. Growing soybean in a well-planned rotation pattern with wheat in WA would provide potential advantages in terms of enhancing crop

productivity/profit, enhancing crop diversity, reducing pest and diseases and fertilizer application and mitigating some of the losses associated with climate warming.

References：

D. Holzworth, N.I. Huth, J. Fainges, H. Brown, E. Zurcher, R. Cichota, V. Snow. APSIM next generation: overcoming challenges in modernising a farming systems model Environ. Model. Softw., 103 (2018), pp. 43-51.

PIRSA (Primary Industries and Regions South Australia). Farm Gross Margin and Enterprise Planning Guide. A Gross Margin Template for Crop and Livestock Enterprises, 2022. https://grdc.com.au/__data/assets/pdf_file/0032/571496/21112.01-Gross-Margins-Guide-2022_WEB.pdf

CSIRO, BoM. Climate Change in Australia Information for Australia's Natural Resource Management Regions: Technical Report CSIRO and Bureau of Meteorology Australia (2015)

3. Project resources	This section describes use of the funding listed in the initial plan and any refunds due to COGGO

Expenditure of funds requested from COGGO	$ Total funds budgeted	$ Total funds expended (actual)	$ Total funds requested from COGGO*	$ Total COGGO funds expended	$ Refund due to COGGO of any unexpended COGGO funds
Salary/Contractors	$128,866.84	$128,866.84	$96,750.98	$96,750.98	
Operating costs	$84,570.14	$84,570.14	$52,655.00	$52,655.00	
Capital					
TOTAL	$213,436.98	$213,436.98	149405.98	149405.98	

*Funding provided by COGGO.

IMPORTANT: Return of unused funds to COGGO is required as per *Clause 3.3* of the Research Agreement.

4. Commercialisation	Insert details of the proposed commercialisation process,as applicable, with reference back to the planned commercialisation plan in the project proposal) for any outputs from the project. This should include recommendations for the commercialisation of the results of the project and the registration or other protection of Project IP and Project Confidential Information as per the Research Agreement.

As outlined in the proposal this was public good research with direct benefits for growers. However, the five cultivars (Burrinjuck, Gwydir, New Bunya, 0235-1, A6785) used in this project remain the IP of GRDC, NSW DPI and CSIRO. APSIM is third party IP and will not form part of the Project IP.

It is understood that this may require further discussion and agreement with COGGO via its' agent GIWA, as per the undertakings given and terms agreed, in the project proposal. This can be the subject of an appended letter and attachments. In all cases such discussion and subsequent agreements need to be governed by *Section 8 Project IP, Improvements and Project Confidential information* of the Research Agreement.

5. Communication/ Extension	Insert details of how the communication and extension of the project outcomes has been achieved to date and recommendations for future activities to disseminate and promote adoption of the results of the Project.
Due to the staggered growth of winter-sown crops and spring-sown soybeans that was the main trial in this project, the opportunities to have field days were limited. However MIG has discussed the outcomes with growers through an artcile: Winter sown Soybeans. Furthermore, An abstract entitled Opportunities to sow summer soybeans in Western Australia for a resilient future has been submitted to the Agronomy conference 21st Agronomy Australia Conference. A corresponding full paper will be submitted and presented in the conference that is going to be held during 21-24 Oct 2024, Albany. About 250 delegates including growers and consultants are expected to attend the conference. There would be opportunity to discuss this topic with more growers and consultants.	

Note: As per *Clause 7.3 (b) (ii)* of the Research Agreement COGGO may require the Researcher to produce an edition of the Final Report in a form suitable for general distribution. If so required by COGGO, the Researcher must produce a non-confidential version of the Final Report within 28 days of receiving a request to that effect from COGGO.

6. Certification	

The Project Supervisor and the Research Organisation certify that all information contained in, and forming part of, this final project report is complete and accurate. The project supervisor and research organisation further warrant that the project complied with all the relevant guidelines affecting the conduct of research, for example in relation to ethics, bio-safety, environmental legislation, GMAC or National Health and Medical Research Council Codes.

Project Supervisor's signature __ Chao Chen _______

Name (in Capitals)

____________ CHAO CHEN _________ Date: 12/04/2024

Research Organisation signature ___ J M Lilley

Name and title of authorised signatory (in Capitals)

____Julianne Lilley__(Group Leader – Future Systems)___ ___

____18/4/2024_______________Date:

Completed Final Project reports

Email to coggoresearchfund@giwa.org.au or mail to
COGGO Research Fund, GIWA, PO Box 1081, Bentley DC, WA 6983

For any further enquiries please email questions to coggoresearchfund@giwa.org.au

Or phone (08) 6262 2128

COGGO representative

For the purpose of this Project agreement contract, COGGO will be represented by Grains Industry Association of Western Australia (GIWA), or such other representative that is nominated by COGGO as authorised to operate on behalf of COGGO.

PROJECT SYNOPSIS SUITABLE FOR GENERAL PUBLICITY AND COGGO WEBSITE