CROP SCIENCE SOCIETY
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NEWSLETTER

The next Crop Science Society Technical Forum is scheduled for Wednesday the 19th August at Roseworthy from 7.30pm.

Welcome to the August issue of the Crop Science Society of SA newsletter.

The next Crop Science Society technical forum is scheduled for **Wednesday the 19 August, 7.30pm at Roseworthy**. Available seats may be limited due to COVID restrictions and guidelines, so registration is essential.

This month's meeting will feature Dr Matthew Tucker (Adelaide University) who will delve into the current GM research & future potentials. Our second presentation will be on all things entomology (bugs, grubs, aphids & critters) and we will also hear from SARDI researchers Maarten van Helden and Rebecca Hamforf (Pestfacts) who will present on seasonal observations, future predictions & management implications.

The discussion will include the new incursion Fall armyworm, latest research findings on RWA management as well as Armyworm, DBM and GPA all being on the agenda.

If you are unable to attend in person you can participate online via Zoom. The Zoom link for this meeting is:
https://us02web.zoom.us/j/89706866401
Meeting ID: 897 0686 6401”

In this month's newsletter we explore:

- Managing soil acidity to stop it's spread in South Australia.
- The 'Heritage of Eight Lower North Towns', with a focus on Saddleworth
- GO Resources The Super High Oleic Safflower Crop Management Plan

We hope you are keeping well. Please contact us if you have any requests for content or information.

Many thanks
Craig Davis
President, Crop Science Society of South Australia

Managing soil acidity to stop its spread in South Australia

Growers are set to benefit from a new collaborative project designed to improve management of surface and subsurface soil acidity.

This is an issue that currently affects more than two million hectares in South Australia and has the potential to affect five million hectares, if not managed.

The collaborative project, 'New knowledge and practices to address topsoil and subsurface acidity under minimum tillage cropping systems of South Australia' (or Acid Soils SA) is a GRDC investment which brings together project partners from:

- Primary Industries and Regions South Australia (PIRSA);
- The South Australian Department for Environment and Water;
- The University of Adelaide;
- Trengove Consulting;
- Penrice; and
- AgCommunicators.
- Landscape Boards- Murraylands and Riverland and Hills and Fleurieu

They are researching soil acidification across a range of soil types and farming systems in SA.

GRDC manager of soils and nutrition, south, Dr Stephen Loss, says the project will generate new information regarding lime movement and effectiveness when applied to the surface of different soils and environments in modern farming systems.

"The project team is working to identify, develop and validate novel acidity management practices, such as lime forms, placement and incorporation methods...spading or topsoil slotting," Dr Loss says.

"Eleven new trial sites will be established across SA, including several sites where soil acidity is a newly-emerging issue. In addition, any suitable old monitoring or trial sites are being investigated to examine lime movement over time.

"We are also collaborating with the University of Adelaide on a new PhD project.

"This will investigate complementary products and innovative practices, including: quick paddock methods of determining pH buffering capacity; alternative methods to pH mapping; the impact of seeding systems and fertiliser applications on the movement of lime through the soil profile; and the generation of prescription dyes to help identify acid soils in a paddock."

PIRSA-Rural Solutions SA principal consultant Brian Hughes, who is managing the project, says soil acidification is an unfortunate result of a productive farming system which includes high nitrogen fertiliser use - as well as increased cropping or hay intensity.

New areas affected

In general, the more production the greater the acidification, but this hasn't had much impact historically on cropping soils in SA, which were often inherently alkaline or neutral. However, the issue is now emerging in previously unaffected areas.

"Historically, soil acidity was seen more on sandy soils in high-rainfall grazing and cropping areas, but it is starting to become more of an issue in low and medium-rainfall areas, such as the lower north of SA and the Yorke Peninsula, where soils are not well buffered against pH change," Mr Hughes says.

"Of particular concern is the fact that we are also seeing more issues in the subsurface (10 to 30 centimetres below the surface), even where the topsoil has been limed."

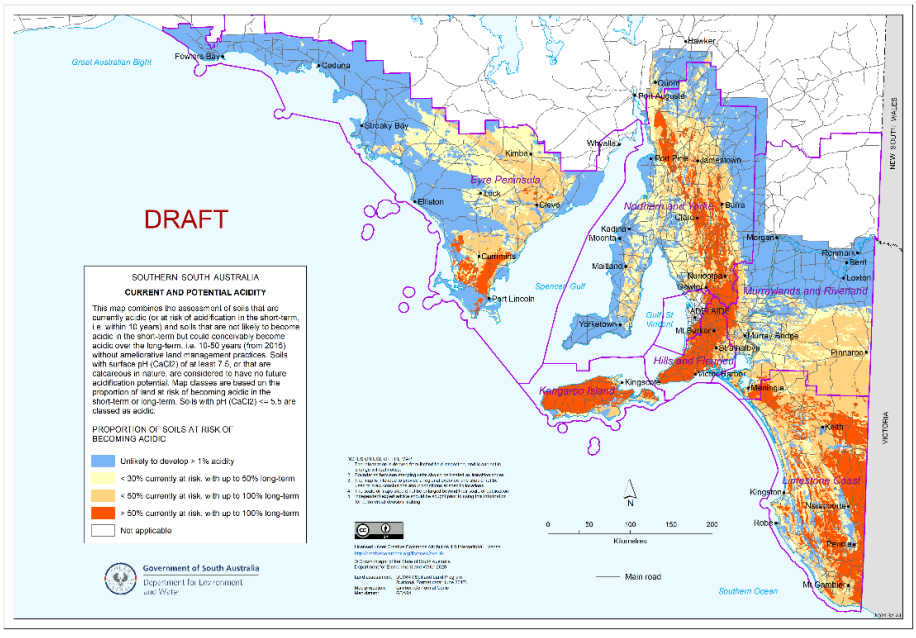
"Soil acidity can be corrected with lime, however total application rates in the state have been well below the rate of annual acidification.

"Between 2015 and 2018 about 100,000 tonnes of lime was applied in SA per annum, but this needs to increase to around 200,000 tonnes to correct current rates of acidification.

"More importantly, about three million tonnes of lime is required immediately to raise current topsoil pH to the critical value of 5.5 measured in calcium chloride."

Mr Hughes says many growers in the southern region appear to be unaware of the emerging acidity issue or are not convinced of the response to justify the cost, time and effort in implementing a liming program.

"If the soil pH is below 5.5, this directly impairs root growth and creates highly toxic forms of aluminium and manganese in soils," he says. "In addition, the rhizobial symbiosis in most pulses is particularly sensitive to acidity. The impact on yield and productivity can be significant, so management is a must."



Recently revised map highlighting areas affected or at risk to acidity (DEW, 2020)

Building knowledge

Mr Hughes says the new investment will build on current knowledge and provide important information to growers about the sustainability of their farming systems.

"Over the next three years we will be encouraging growers and advisers to rethink how they test their soils and then manage lime applications to maximise returns," he says.

"Soil pH stratification under no-till and subsurface acidification need different approaches to soil testing and treatment.

"Soil pH should be monitored every five to six years to determine liming rates and application timing.

"It is also important to check the subsurface layer, as acidification occurs down the profile and, once affected, the subsoil is more difficult and costly to correct.

"In a no-till system, we need to work to get the lime down deeper because it has low solubility and moves slowly in undisturbed soils.

"Unfortunately, if acidity cannot be easily ameliorated with top-dressed lime under low disturbance systems strategic tillage may be necessary."

While current knowledge is useful, Mr Hughes says new data and information which considers rates, the mechanisms for moving lime down the profile and even the quality of the lime will give growers greater confidence in making management decisions.

"Careful management of soil acidity can produce great cost savings for growers in the short and medium term," he says.

"For example, acidity often occurs in patchy areas and mapping acid zones using on-the-go pH mapping and then applying lime with variable-rate spreaders can represent cost savings in the order of 30 per cent.

"The highest cost savings with variable lime applications are on paddocks with a high degree of variability, particularly those with a proportion of neutral to alkaline soils."

Lime trials established and monitored as part of this project include:

Site	Established	Contact site	Soil Type	Treatments
Wirrabara	2015	Andrew Harding	SL over brown clay	lime types, rates, cultivation
Koppio	2017	Brett Masters	SCL with Fest gravel over yellow-red clay	subsurface lime, rates, organic matter, ripping
Kapunda	2019	David Woodard	Fine SL over red-brown clay	lime type, rates, cultivation, gypsum
Koonunga	2019	David Woodard	SL over red-brown clay	rates of lime, cultivation, deep cultivation, gypsum, deep calciprill, CaNO3 demo
Sandilands	2019	Brian Hughes	LS+ with Fest gravel over red clay	rates lime, cultivation, gypsum, local lime, ripping
Bute North 1	2019	Sam Trengove	sand over clay	lime sources, rates, incorporation methods, ripping
Lameroo	2020	Brian Hughes	thick S/C	lime rate, incorporation methods, biochar, clay, lime types
Karte Demo	2020	Brian Hughes	thick S/C	Not replicated, treatments lime rate, incorporation, biochar, clay,
Brooker	2020	Brett Masters	shallow S/C	lime rates, S, incorporation
Spalding East	2020	Andrew Harding	LSCL sodic RBE	lime rates, comparison limes, cow manure, incorporation
Yumali	2020	Brian Hughes	40cm Sand/Clay	lime rate, incorporation, biochar, clay, lime types
Yumali Demo	2020	Brian Hughes	15 cm Sh sand/Clay	Not replicated -lime rate, incorporation by rotary hoe, biochar,
Mallala	2020	David Woodard	Shallow SL sodic RBE	lime rate, incorporation, biochar x 2 sources, lime types, chicken manure, gypsum

Note all sites have sulphur treatments as well

Note, additional new sites from other projects have been established at Sherwood, Kybybolite, Bute North and Kangaroo Island.

For more information visit the Acid Soils SA new website – www.acidsoilssa.com.au. *GRDC Research Code DAS1905-011RTX*

An exert from ‘Survey of the Heritage of Eight Lower North Towns - Saddleworth’.

Prepared for the State Heritage Branch of the Department of Environment and Planning by Rob Linn, Jane Linn and Chris Lane of Historical Consultants Pty Ltd, RMB 671 Cherry Gardens Rd, Blackwood FWD SA 5157 and John Gratton and Alistair Tutte of Hames Sharley Australia, 254 Melbourne St, North Adelaide, SA 5006 Funded by the State Heritage Fund

Physical Context Overview

As the 1982-3 survey of the Heritage of the Lower North noted, 'the present physical character of the Lower North is the result of the modification of the natural landscape by the actions of man' .1 The description continued of a varied environment settled by Europeans and then changed by them through agriculture and grazing. This environment has been classified into regions: Coastal Plains; Central Hill Country; and Murray Plains. Generally, the soils of the Lower North range from red-brown earths, with patches of sandy soils around Clare-Auburn and mallee soil towards the coast near Port Wakefield. The vegetation is also diverse. Much of the country is Eucalypt savannah woodland, but nearer to the coast there are regions of mallee and from Burra to Jamestown there is a sweep of grassland.

It was to this land that settlers came from the United Kingdom and Europe. Their task was to utilise the resources of the environment as best they could and to create new societies. As one commentator on land settlement wrote, 'it was innocently believed that these pioneers would at once settle down into an old country groove, with distinct lines of demarcation between the professions and occupations of the people'. 2 They did not, of course, and the rough and tumble settlement that took place, beginning with the pastoral era, phasing into a mining boom and then to a time of agricultural expansion- all these periods encompassing a gradual urbanisation in village settlements- created an extraordinarily rich and diverse series of farmsteads, rural buildings, improvised sites, town houses, civic works and engineering, transport centres and industrial groupings.

The eight towns- Angaston; Auburn; Burra; Clare; Kapunda; Port Wakefield; Saddleworth; and Tanunda- are spread throughout the Lower North. Their individual histories and heritage are parts of the overall journey of South Australia and its people.

In many ways their stories are microcosms of the general experience. Some of their industries, at Kapunda and Burra in particular, dictated the economic fortunes of South Australia. Others, like Angaston and Tanunda, were social and cultural laboratories in which the transplanting of small-scale European environments onto Antipodean soil were attempted. Angaston mirrored the hopes and prejudices of George Fife Angas, one of the powers behind the European settlement of South Australia. Tanunda and its outlying settlements were attempts by German settlers, again with Angas' assistance, to transpose their notions of village life and agriculture. Other towns evolved as service centres to local grazing or agricultural activity. While others again were stopovers on major transport routes, or the village settlement at an outport for primary commodities.

Unlike the hopes of E. G. Wakefield, the theorist, whose ideas were utilised in the colonisation of South Australia, the history and heritage of the towns appear to show that settlement was neither

restricted nor concentrated. Rather, the formation of these towns at various times grew from the desire to expand the boundaries of civilised existence. As one interested observer wrote: 'There is a constant tendency in civilised man to undue aggregation. The law of providence is dispersion, that the earth may be peopled and subdued'.3 Overall, the founders and settlers of South Australia-those who peopled the Lower North and established its towns- shared a common goal. That goal was the success of the new colony and later the State. Their tenacity, seen today in the buildings and sites of the towns that they constructed or used, was outlined by one prominent settler Edward Stephens:

... never, never can this Colony now retrograde; its moving power of 16,000 souls upon its fine hills and dales, and its immense internal resources stamp it with permanence, and will crown it with prosperity, and it shall remain for ages to come a proud monument of English skill and combined energy and exertion, seconded by British capital.4

Saddleworth

The impact of the opening, and the ongoing success, of the Burra Mines cannot be underestimated in South Australia's history. It was not merely fortuitous for the shareholders in the South Australian Mining Association, but a kindly light of economic goodwill spread throughout the Lower North, especially to Adelaide. New towns and villages sprang up along trade and transport routes, local economies benefited from the sale of foodstuffs, timber and provisions and from the hiring of workers. Almost every settlement in this region was touched by Burra's fortune. Saddleworth was no exception.

A choice of three arterial roads connected the Burra to Adelaide. Ian Auhl has pointed out in detail how these routes developed. He described them as 'one via Gawler, Kapunda, Tothill's Creek, Apoinga and Black Springs; a second via Gawler, Kapunda, Springfield (north of Marrabel) and Black Springs; and a third, via Gawler, Templars Inn, Stockport, Gilbertown, Stone Hut (now Saddleworth) and Black Springs'. Which of these roads proved the most fortuitous at any given time depended on the natures of the creeks and rivers to be crossed, the availability of water for stock and men, and the distance of daily travel between stopovers.171

There can be little doubt that these roads were incredibly exacting. Some of the principal watering holes attracted the attention of bush publicans. At Saddleworth, as it was later called, the Stone Hut Inn began life in March 1846 even before the land was purchased from the Crown. Like institutions were along the length and breadth of Burra's roads. As one traveller reported of a road to Burra in 1856

“All along the route empty flasks of every description may be seen-pale ales, London stouts, Martell's, Hennessy's, square Schiedam's and unlabelled bottles in abundance. These memorials of a thirsty race are interspersed with the skeletons of hapless bullocks, whose toil was over before their work was done. In fact bottles and bones are the characteristics of the wayside.”172

Tonnes upon tonnes of bullocks, drays and their cargoes slogged ponderously over these rough roads bound for their destination. As the waste products of British colonial culture began to

discolour the Australian bush and enterprising individuals opened their rough pubs for business, other settlers and businessmen began purchasing land along the transport corridors. They were apparently certain that the Burra mines would provide sufficient trading opportunities along these

road networks. In 1846, one James Masters bought section 2800 on which he laid out a town in 1853. Masters was a memorable character. He kept the Commercial inn, Grenfell Street Adelaide during the 1840s, invested in pastoral enterprises and possibly financed others who wanted to buy land and stock-certainly prominent landowners patronised his hotel.173

Masters, claimed one writer on South Australian pastoralists, first looked at taking occupation of the land around present day Riverton and Saddleworth in 1840. He took part in this venture with his nephew Charles Swinden and Dr Matthew Moorhouse. Masters chose his country well, making sure that he gained watering points along the Gilbert and Wakefield Rivers. His headquarters were at a station homestead he named Saddleworth Lodge. Eventually he moved from his Adelaide hotel to this place and was a benefactor to many people supporting the Church in its efforts to provide places of worship and schooling. He was a man of enterprise and hospitality. In 1861 he returned on a visit to his Yorkshire origins and died while at York, never again to see that rich grazing land he owned, nor the seemingly endless succession of bullocks pulling their loads from Burra to the railheads at Gawler and Kapunda.174

Even though Masters' pastoral interests were successful, for some seven years the trade from Burra fell away as Port Wakefield and the Gulf Road from Burra took the bulk of cargo. His town at Saddleworth took years to even begin to look like a village settlement on the 'Old World' model. One who intimately knew the story behind the survey and sale of Saddleworth's allotments claimed that the town 'had a singular origin', due mostly to Masters' beneficent character. It was decided that:

... from a compact entered into between Mr. Masters & others that the selling price of land was not to exceed more than £5 an allotment to any purchaser ... also two allotments were given to Bishop Short, one for an Anglican Church on which he, Mr. M, built a school room, & house & to which I was appointed teacher by the Diocesan Society, say 1857 .. . the adjoining allotment was set apart as a cemetery, in which several bodies were buried. The two allotments were fenced by public subscription, & before the work was commenced Mr. Masters gave a written memo stating for what object these two allotments were intended.175

Unfortunately for the Church of England the necessary information needed to retain these allotments apparently vanished with Masters.

The dynamic formation of the town and apparent activity in the early years were not true indicators of the overall situation at Saddleworth. One journalist reviewing the Mid North in 1866 wrote quite disparagingly:

“Saddleworth is quite embryotic, so much so that in the neighbourhood it is still called by the original name of the public-house that formed the nucleus of it -The Stone Hut. The first building you come to is the store, a good-sized, well-stocked est. whose bustling appearance speaks well of the consumptive powers of the other three householders. In saying three we a speak a little at random, there might be four or even five but there are certainly not more than the half dozen.”

“The store has one side of a prospective street nearly all to itself. On the other side, and at the further end is the public house. It looks none the better for wear, and not overdone with custom. Sensible people these at Saddleworth, who invest their money in tea rather than colonial ale.

From circumstantial evidence we should infer that there is a flourishing Temperance Society in the place.”176

Such caustic journalism perhaps hid the fact that the town was considered 'a postal township' in 'essentially an agricultural district, producing large quantities of wheat, but very little else ... There is one steam flourmill, just erected, a post-office and a public pound. There is one hotel (Stuart's).'177

The quiet atmosphere of this settlement was to change markedly three years later, in 1869, when the navvies working on the Burra railway set up camp. One writer described the scene as 'a hive of industry’.178

The Burra line was the first constructed during the railway boom of the 1870 s- 80s. Prior to this expansionist period there had only been the Port Adelaide and Kapunda lines, a small branch line from Port Adelaide and a tramway from Goolwa to Victor Harbor. Naturally the first thoughts for the creation of this line grew from the mighty success of the Monster Mine. It would be a railway to transport ore, smelted copper and supplies. However, by the time that construction was agreed, in 1866-7, the mines themselves were working at a fast diminishing output. The construction of the line, therefore, was stimulated by the knowledge that the district around it was becoming of prime agricultural importance.179

In December 1869, seventeen months after construction began, the public were 'respectfully informed that the Northern Extension Railway will be temporarily opened ... to Riverton, Saddleworth, and Manoora Stations for the carriage of wheat and agricultural produce only'. The Engineer in Chief seemed pleased with both the quality and cost of construction and felt that goods sheds were 'substantially and well executed'. At this time, the stations were of basic design and built of weatherboard with skillion roof. The whole project was a triumph of economy.

While the bare essentials served the needs of agricultural transport, few of the passengers who used the line enjoyed the Spartan conditions. In August 1885, Saddleworth residents met 'to consider the unsatisfactory accommodation for passengers going to and returning from the railway station and to take steps to try to have a more convenient and direct road to the station'. These folk also asked for a verandah to be erected in front of the passenger station. While they may not have gained immediate satisfaction, by 1897- 8 a number of new stations were being erected along the line and Saddleworth gained a fine building. The Railways Commissioner noted in 1899 that 'during the year new stations have been built at Saddleworth, Manoora, Mintaro and Farrell's Flat out of loan funds, the original cost of the old structures having been charged to working expenses and credited to the capital account'. 181

The railway was without doubt the catalyst for the growth of Saddleworth. The town became a coaching terminus for those living in Auburn, Clare and that section of the Mid North. Such traffic encouraged trade, building and an influx of population to service these needs. In 1861, the Primitive Methodist cause got in before this rush and built a chapel. Then, in 1869, the local Baptists began building a fine chapel. By 1870 this building was finished as was the superbly positioned Roman Catholic Church.182

By January 1879 the National Bank of Australasia announced that it had built a branch office at Saddleworth. Daniel Garlick had been the architect for this bank chamber-dwelling that was

constructed from local stone by the Burra builders Sara & Dunstan. Such a fine building showed a degree of confidence, on the Bank's part, in the future of the town.

By this time, too, John Gurr had built his large two storey shop in Belvidere Road. Soon this thoroughfare would be lined with shops small and large. The town gained an Institute building, finely constructed with materials from the best quarries in the region, and other stores and an hotel on the Burra Road.

Down by the railway station a building on two levels was erected. At one time the land on which the building stands was owned by Frederick Gray, a carrier from Clare. While much of the origins of this building are shrouded in mystery there are some clues available. The building was well constructed of regional bluestone and in the underground rooms are numbers of large concrete pickling baths- used in the process for manufacturing ham and bacon. Outside is a brick smokehouse used for curing the product. A brand hangs on a rafter- Murmac Ham & Bacon Factory. So, possibly, Gray leased the site to this factory in the 1880s. This was also the time of the rapid rise of dairy co-operatives in the district and any ham and bacon industry would have been a direct offshoot of the establishment of a creamery or dairy factory.183 In 1899 Walter Henry Bee and Christopher Columbus Hill, partners in a Saddleworth trading, storekeeping and wheat buying business, took the building over to be used as a warehouse and store. Their trading name was painted on the railway-facing wall in bold letters.184

Christopher Columbus Hill had a share in other Saddleworth property. Another allotment, lot 4, was jointly owned with Joseph Coleman, stockowner, and Frederick Richardson, licensed surveyor. This was in a particularly fine position on the Burra Road, adjacent to the Institute and close to the Post Office and Bank. In June 1894, a Society of the Church of England formally acquired this piece of land. The transaction must have been accomplished earlier for on 10 April 1894 the Bishop of Adelaide, Archdeacon Dove and the incumbent Rev. E. K. Yeatman, laid the foundation stone of a church to be called St Aidan's. This building was designed by W. K. Mallyon of Port Pirie, said by one writer to be 'the hon. architect to the Anglican Church in South Australia' and James & Monroe of Kapunda were builders. Mallyon waxed lyrical to the Clerk of Works about St Aidan's and called it 'my greatest triumph in Church Architecture'. On 23 August 1894 St Aidan's Church was opened and dedicated.185

St Aidan's was the last major building in Saddleworth in the nineteenth century. By the early 1900s, the town had assumed a major role in the district. The *Cyclopedia of South Australia* drew this picture of Saddleworth in 1909:

“Several cross-country roads converge on Saddleworth, and as it has also a railway station the importance of the town, both as a gathering and distributing centre, is enhanced thereby ... One result of its geographical position is that it has been a suitable and favourite place for stock sales, and the extensive yards which are used for that purpose are a feature of the town. Wheat-growing exceeds in importance all other industries in the neighbourhood, and a very extensive area is under crop. The public buildings of Saddleworth include a fine Institute (which has a very good library), a handsome post office, and a good public school. The eye of the passing traveller is caught by its well-stocked stores and busy shops. There are four Churches-Anglican, Baptist, Methodist, and Roman Catholic-and two benefit societies.”186

From this time there has been little change in the face of Saddleworth. A recent resume of the town's history concluded: 'After the First World War the serious drift from the land started, and this became even more evident after the Second World War . . . rural employment ceased almost entirely.187 Pessimistic words such as these hide the fact that the major part of the town's business is still the storage and shipment of wheat and fertilizers. While the slow tramp of the bullock drays from Surra have been left far behind, the role of people like James Masters, early farmers and traders, are left in the very fabric of the town.

GO Resources Super High Oleic Safflower Crop Management Plan

Issue of licence DIR 158 on 27 June 2018.

The Australian Government Office of the Gene Technology Regulator (OGTR) issued the licence DIR 158 to Go Resources in accordance with the Gene Technology Act 2000 and as applicable, corresponding State Law. This licence authorises the commercial release of Super High Oleic Safflower genetically modified for enhanced levels of oleic acid and containing the OECD Unique Identifier Event GOR-73226-6 (Event 26) or GOR- 7324Ø-2 (Event 40) throughout Australia. Food Standards Australia New Zealand (FSANZ) has approved the use in human food and animal feed of material derived from this genetically modified (GM) safflower. Note that cultivation of GM safflower is subject to restrictions in some Australian States and Territories for marketing reasons. The Risk Assessment and Risk Management Plan relating to this licence can be found at the website www.ogtr.gov.au.

About Super High Oleic Safflower

Super High Oleic Safflower Oil (SHOSO) is a specialist ingredient oil for the industrial market due to its very high levels of oleic acid fatty acid.

Oleic acid (also known as Omega-9) fatty acid is from a family of unsaturated fats that are commonly found in vegetable oils and fats and referred to as monounsaturated fats. These can often be found in high quantities in olive oil, canola oil, safflower oil and nuts such as almonds.

Super High Oleic Safflower Oil has the highest levels of the oleic acid (>92%) making it a superior ingredient for the industrial market when compared to other currently available vegetable oils.

SHOSO is highly valued in industrial uses due to the oil being:

- Biodegradable
- Renewable
- Higher oxidative and thermal stability
- Technically superior specifications
- Reduces costly post-production and/or use of additives

As the world becomes more environmentally aware, a growing proportion of lubricants and chemicals will be derived from biodegradable sources such as Super High Oleic Safflower Oil, replacing mineral oils derived from fossil fuels.

Major industrial uses for Super High Oleic Safflower Oil are lubricants, emulsifiers and transformer oils.

Further, oleic acid derived from Super High Oleic Safflower Oil can also be transformed into azelaic acid for the rapidly growing cosmeceutical market and pelargonic acid for use in polymers and biobased lubricants and pesticides.

For Australian growers, Super High Oleic (SHO) Safflower offers the opportunity to participate in the large and growing market for renewable oils. Growing Super High Oleic Safflower utilises similar agronomic practices to conventional safflower and does not require any specialist equipment.

Super High Oleic Safflower Crop Management Plan

Overview of stewardship practices for GO Resources Super High Oleic Safflower. From an agronomy, crop rotation and farming systems perspective, SHO Safflower is no different to conventional safflower. However, it produces an oil with a unique profile which has specific applications in the oleochemical sector.

The Super High Oleic Safflower Crop Management Plan (CMP) aims to support industry best management practice and meet GO's stewardship program key objectives including:

- Protect the integrity of the end oil product (SHOSO) – this is critical to the success of the crop
- Achieve the best results from the technology and enhance grower capability in safflower production
- Preserve integrity of the planting seed / grains/ oilseed supply chain

Compliance with the principles and best management practices recommended in the CMP will help ensure that these objectives are met.

This CMP aims to benchmark best management practices for crop rotations in combination with stewardship of Super High Oleic Safflower covering the key elements of user accreditation; stakeholder communications and compliance management and align with established industry principles to enable market choice and preserve the integrity of grain entering the supply chain.

Importantly, as the Super High Oleic Safflower technology is an end use trait, the aim of the identity preservation supply chain for the product is both to ensure the integrity of the oil produced and the integrity of the broader oilseed/grain supply chain.

As such, GO has developed the Closed Loop Identity Preservation (CLIP) supply chain system of which this CMP is an integral component.

The Super High Oleic Safflower technology

Super High Oleic Safflower Oil was developed by CSIRO using RNAi technology. This innovative plant breeding technology enables targeted genes in the safflower plant to be silenced resulting in the oil extracted from the SHO Safflower grain having:

- Enhanced levels of oleic acid - min 92%, up from around 75% in conventional safflower
- Reduced levels of Linoleic acid – down to 2%
- Zero Linolenic acid

Importantly, the RNAi technology does not insert genes that express proteins.

Table 1: Fatty Acid Profile of Super High Oleic Safflower

Average Content (%)	Stearic acid (C18:0)	Oleic acid (C18:1)	Linoleic acid (C18:2)	Linolenic acid (C18:3)	Palmitic acid (C16:0)
Super High Oleic Safflower Oil	2	>90	2	0	3
High Oleic sunflower	3-6	75-90	2-17	Max 0.3	3-5
High Oleic soybean	4	75	7	2.5	6.5
High Oleic Canola	2	68	20	3	4
Palm	5	39	11	0.2	43

Super High Oleic Safflower Crop Management Plan

The Super High Oleic Safflower CMP is a part of the GO stewardship program that incorporates practices to maintain the integrity of the trait, seed and grain. GO is committed to ensuring that growers and their advisors are fully informed and supported to ensure effective implementation of good agricultural practices that support the responsible use of the Super High Oleic Safflower technology.

Farmers growing either Super High Oleic Safflower planting seed and/or grain will be required to implement the CLIP CMP. The CMP aims to support industry best management practice and meet GO's stewardship program objectives including:

- Preserve market integrity of the Super High Oleic Safflower trait
- Preserve integrity of the grains supply chain
- Achieve the best results from the technology and increase grower capability in safflower production
- Sustainable use of the Super High Oleic Safflower technology in the farming system

The Super High Oleic Safflower CMP aligns with industry principles and good agricultural practices that:

- Ensure supply to GO standards of Super High Oleic Safflower oil
- Enable users of Super High Oleic Safflower to maximise the overall benefits of this crop in their farming system
- Ensure appropriate records are kept by licensed growers that show implementation of best management practices in alignment with this document and in compliance with stewardship practices for Super High Oleic Safflower in the "Technology Stewardship License Agreement" with growers
- Allow co-existence of different safflower production systems and enable market choice along grain supply chains

Super High Oleic Safflower crops may only be grown in the following Australian states which allow its production: Victoria, South Australia, New South Wales, Queensland and Western Australia.

Maximising results with Super High Oleic Safflower

As Super High Oleic Safflower technology is an end use trait, from an agronomy, crop rotation and farming systems perspective, SHO Safflower is no different to conventional safflower. Crop inputs and machinery requirements are similar to conventional safflower and cereal production.

Safflower is not a widely grown crop in Australia, with average production in the five years to 2014 being around 5,500 tonnes. Safflower production peaked in 1978 at just short of 60,000 tonnes. In the period 1970 to 2000 production averaged over 20,000 tonnes but fell to around 12,000 tonnes in decade 2000- 2010. There is minimal safflower grown today and Super High Oleic Safflower provides the opportunity to re-establish safflower in the crop rotation.

Safflower is a winter/spring growing crop and is a highly adaptable crop. It is:

- Heat and drought resistant
- Suited to both dryland and irrigation
- Low input, low maintenance and easy to grow

Safflower can play a role in dryland and irrigated crop rotations across a range of farming systems with benefits including:

- Increased tolerance to sodic soils when compared to many other crops
- Potential to double crop out of summer crops such as sorghum
- Heat and drought tolerant oilseed crop suited to high, medium and lower rainfall areas
- Broadleaf crop option i.e. break crop for cereal diseases such as Crown rot, Common root rot, Yellow leaf spot
- Improve soil structure when used strategically in cotton and rice rotations
- Utilises soil water deep in the soil profile / lowers the water table
- Assist in weed management as has a different weed spectrum to most other crops and sowing window offers opportunity to control late germinating weeds

Sustainable use of Super High Oleic Safflower

The following section provides a guide to:

- Management decisions and practices that need to be addressed to deliver crop safety and yield advantage when growing Super High Oleic Safflower. It is important to keep in mind the Industry principles and best management practices that are appropriate in all safflower production systems
- Stewardship requirements and practices to meet supply chain market choice requirements

Managing Super High Oleic Safflower to ensure integrity of grains supply chain

Seed quality assurance

GO's Quality Assurance program[1] ensures that growers have access to quality planting seed of approved Super High Oleic Safflower varieties that are of commercially acceptable performance. In addition, the Quality Assurance program helps to ensure the integrity of grain that enters the grain supply chain.

The GO Quality Assurance program for planting seed includes:

- *Trait purity* - confirmed to provide an assurance that the Super High Oleic Safflower variety contains the Super High Oleic Technology
- *Seed lot verification* – the tag on each bag of Super High Oleic Safflower planting seed contains information relating to the line number; seed count; minimum purity; minimum germination; packing date and net weight. This confirms that any commercial seed lot sold as Super High Oleic Safflower meets GO's minimum standards
- *Variety performance* – the objective is to ensure GO Super High Oleic Safflower varieties are agronomically sound and commercially acceptable
- *Product labelling* - allows identification of approved GO Super High Oleic Safflower varieties for commercial sale and compliance with all applicable labelling laws including use of proprietary trademarks. All seed of Super High Oleic Safflower varieties must be labelled in accordance with best practice guidelines and are subject to random audits under the voluntary code of conduct of the Australian Seeds Federation (ASF)
- *Pre-applied Seed Treatments* – pre-application of seed treatments by GO prior to delivery ensures that the planting seed is protected at germination and during early growth from any potential pathogens that may affect the seed
- *Records* - Validate compliance with the quality assurance processes for commercial sale of Super High Oleic Safflower varieties. Data collection and accurate documentation of the breeding process and compliance with the GO Quality Assurance Guidelines must be available for audit by GO.
- *Industry Standards for UP/LLP* - The Australian Seed Federation (ASF) recognises the potential for unintentional mixing of trace amounts of seed from one variety with another in agricultural production systems -referred to as 'unintended presence' (UP).

The grains industry utilises practical thresholds to manage UP of foreign materials, that in an agricultural context include occurrences such as seeds from other crops, weed seeds, soil, insects or foreign materials such as stones, bits of wood or plastic. Thresholds set at the commodity level to meet end-product requirements such as customer expectations or regulated labelling requirements.

In relation to the introduction of GM crops within the seed supply chain, the ASF has established a non-GM canola tolerance threshold for the Low Level Presence (LLP)[2] of 0.5 per cent GM seed in non-GM planting seed. GO's quality assurance program implements a similar LLP for Super High Oleic Safflower planting seed.

Paddock selection

Decisions on seeding rate, sowing technique, sowing depth, row spacing, row orientation, soil type, soil moisture, pre-emergent herbicides and fertiliser management are important aspects of achieving effective crop performance and maximising the potential of Super High Oleic Safflower. GO will provide growers with variety and agronomic information as appropriate.

Paddock identification

Paddocks sown to Super High Oleic Safflower are to be clearly identified on farm maps.

Seed identification

All Super High Oleic Safflower planting seed packaging is marked with the GO trademark. To avoid unwanted crop damage ensure that all crops are sown with proprietary seed from packaging marked with the GO trademark. Under the GO CLIP program, growers are required to purchase seed from GO each year as this ensures production of a consistent quality product.

Always use the registered herbicide at recommended label rates and comply with all directions on the product label to achieve the best result from Super High Oleic Safflower.

Super High Oleic Safflower planting seed will be sold to growers through nominated parties once a grower has signed a GO production contract. Planting seed not used will be returned to GO. To ensure product integrity and to avoid cross contamination with conventional safflower no Farmer Saved Seed will be allowed.

Communication and consultation

Communication with neighbours is fundamental to best management practice to determine if they are growing conventional safflower crops. The CMP supports:

- Talking to neighbours throughout the growing season to determine if there are sensitive situations and to avoid potential conflict e.g. management of common land and across boundaries
- It is the responsibility of the licensed grower to ensure all contractors are informed and always follow good agricultural and stewardship practices in this document
- The GM status and variety grown of Super High Oleic Safflower must be declared to contractors, marketers and on grain delivery

An outreach program to engage key stakeholders and relevant grower organisations is part of separate communications from GO to manage risks to the integrity of grain-supply chains and promote the sustainability of coexistence in Australian agricultural production systems.

Seed handling and planting practices

Planting Seed and grain produced from Super High Oleic Safflower crops and conventional safflower must be kept separate. Growers should take steps designed to prevent mechanical mixing and maintain product integrity (e.g. genetic and physical purity) and quality. Practising good seed and on- farm hygiene prior, and subsequently, to the storage, transportation and planting of the crop will assist to manage the risks of seed impurity to the integrity of grain supply chains and sustainability of the new technologies.

Key practices to help prevent mechanical mixing and the presence of seed impurities include:

- Super High Oleic Safflower crops may only be grown in the following Australian states which allow its production: Victoria, South Australia, New South Wales, Queensland and Western Australia.
- Growers are required to purchase quality assured seed of Super High Oleic Safflower seed from GO
- Seed storage areas should keep the seed separated and paddocks sown to Super High Oleic Safflower should be clearly identified in farm records and at the entry points/boundaries of these paddocks
- Seed storage areas, transportation vehicles and seeding equipment should be cleaned thoroughly both prior, and subsequently, to their use. Farm hygiene should include all equipment used in the planting and growing of crops (e.g. fertiliser spreaders, spraying equipment, and transport vehicles/bikes).

The aim is to avoid mechanical mixing/ contamination of the seed and prevent the unintended physical movement of seed and weed seeds between paddocks

- Create and follow a plan that incorporates a systematic approach to control of seed set in weed populations along fence lines, roadsides and crop borders
- The recommended separation distance for growing Super High Oleic Safflower near other conventional safflower in Australia is five (5) metres.

It is recommended to always follow good farm hygiene and best management practices as it important to maintain the integrity of Super High Oleic Safflower oil:

- Talk to neighbours with respect to real or perceived impact of pollen flow
- Do not grow consecutive safflower crops
- Where possible, avoid growing Super High Oleic Safflower in paddocks adjacent to conventional safflower varieties
- Maintain a separation zone (5 metre) between neighbouring paddock boundaries and/or neighbouring crops of conventional safflower. The separation zone should be slashed and/or cultivated prior to the onset of flowering
- Control all Carthamus sp. related weeds both in-crop and in adjacent sites such as fence lines

before flowering

- Cover loads during harvest and transport to avoid dispersing seed
- Control all safflower volunteers in the following year

Agronomy

Seedbed Preparation

Seedbed preparation is no different from that of wheat or barley. A moist, firm, weed-free seedbed is required. Safflower is ideally sown into moist soil with equipment such as press wheels to provide good seed-soil contact. Sowing depth is normally between 2cm and 5cm. One advantage of safflower is that it compensates for poor emergence by producing extra branches, extra heads, and extra seeds per head.

Planting Date

Safflower development is controlled by a combination of temperature and day length. Large delays in the time of sowing therefore have a much smaller effect on the timing of flowering. The development of safflower is hastened in seasons that are warm and dry due to higher temperatures in the crop canopy.

Target Population and Seeding Rate

	Favourable conditions	Drier conditions	Irrigated crops
Northern & central NSW	20 – 25 plants/m2	15 plants/m2	40 – 50 plants/m2 (25 – 31kg/ha)
	(12 – 15kg/ha)	(9kg/ha)	
Southern NSW	30 – 35 plants/m2	25 plants/m2	
	(18 – 22kg/ha)	(15kg/ha)	
Victoria & SA	30 – 40 plants/m2	20 – 30 plants/m2	
	(18 – 24kg/ha)	(12 – 18kg/ha)	

Fertilizer

Safflower's deep taproot allows it to reach nutrients that may be unavailable to small grains. Growers may need to apply more fertilizer if safflower follows deep-rooted crops in rotations.

At least 30kg/ha of nitrogen should be applied to most dryland crops and this can be increased to over 100kg/ha for high yielding crops under irrigation. No more than 20kg/ha of nitrogen should be drilled with seed to avoid toxicity, which will reduce crop establishment.

As a general rule of thumb 12 to 20kg/ha of phosphorus is recommended on deficient soils. Responses to phosphorus are unlikely on soils with Cowell P levels above 40mg/kg, although small amounts can still be applied at sowing to improve early growth and maintain soil levels.

Safflower uses moderate amounts of potassium, but most soils in the cereal growing regions of Australia contain adequate levels.

Soil sulphur levels should be monitored with soil tests and sulphur can be applied as gypsum or as a component of a blended fertilizer when necessary.

On certain soil types, such as the black soils in northern New South Wales, safflower does respond to manganese, iron and/or zinc. These are best applied as a foliar application around six weeks after sowing if necessary.

Weed control

Safflower competes poorly with weeds, especially from early growth through the rosette stage, when branching has not yet occurred. It is critical to have effective pre-plant weed control.

To maintain the integrity of the SHO Safflower it is critical that any volunteer oilseed or pulse crops present in the SHO Safflower crop are controlled in-crop by registered herbicides.

Diseases

In periods of higher than normal rainfall, fungal diseases such as Phytophthora root rot, Alternaria leaf spot (Alternaria carthami), Pseudomonas bacterial blight (P. syringae), and Sclerotinia rot can cause serious losses. Fusarium and Verticillium wilts and Botrytis head rot also have caused serious losses.

Do not plant safflower before or after safflower, pulse crops, sunflower, mustards, or canola. These crops are susceptible to Sclerotinia head rot. Leave at least 4 years between susceptible crops.

Insects

Safflower is most susceptible to damage by insects during establishment and between budding and harvest. There are a few insect problems in safflower. Red Legged Earth Mites, Wireworms and cutworms can damage seedlings. Rutherglen Bug, Grasshoppers and Lygus bugs can damage the crop, but control them only if they reach levels that cause serious losses.

Harvest and storage

The crop is ready for harvest when most of its leaves have turned brown with only a tint of green remaining on the bracts. The stem must be dry.

Moisture content should be 8 percent or lower for proper storage. If the crop is cut at higher moisture content, dry it.

Grain harvest, transport, handling & storage practices

Always ensure good farm hygiene practices are maintained as a top priority up to, and subsequently to, harvest of the crop and including transportation and delivery/storage of grain produced from the crop.

Good hygiene is also important for post-harvest and fallow management practices in the paddocks sown to Super High Oleic Safflower and potentially in neighbouring paddocks.

Recommended grain hygiene best management practices include:

- Harvesters, transportation vehicles, field bins and grain storage areas should be cleaned thoroughly both prior to and subsequent to their use with the harvest of grain produced from the crop
- Always thoroughly clean all equipment before moving to a new location, paddock or crop, especially if moving from an oilseed crop (e.g. canola)
- Using recommended harvester settings will help to reduce grain losses from harvest increasing grower returns and further overcome volunteer plant numbers that require control post-harvest
- Ensure any contractors involved in transporting grain comply with the Grain Carriers' Code of Practice
- Be particularly careful when filling on-farm grain storages to prevent spills of SHO safflower
- Trucks should be properly fitted with tarpaulins in good condition to help avoid grain spillage on-farm and externally to the farm (e.g. roadsides)
- If trucks are not returning to the same paddock, clean the truck over the grain grid at the receival site
- Clearly identify the GM status of the grain to truck drivers, in storage areas on-farm and at delivery to approved, external receival sites
- Check maximum residues limits (MRLs) requirements of contracts
- It is essential that growers and spray operators adhere to herbicide 'Directions for Use' so that products are applied at the correct crop growth stage, to ensure that Australian and International MRLs for grain and forage are not exceeded
- Always follow industry safety guidelines and wear appropriate personal protective equipment

Equipment clean-down practices

Always follow industry safety guidelines and wear appropriate personal protective equipment.

Any time equipment enters the paddock/s growing Super High Oleic Safflower, the equipment must be cleaned while still in the paddock, ensuring that the tyres are also cleaned. Equipment may include but is not limited to tillage implements, planters, windrowers, harvesters, chaser/ field bins, augers and transport machinery.

Keep records that document cleaning of equipment and storage associated with growing Super High Oleic Safflower.

Any safflower seed found when cleaning out equipment shall be properly labelled and stored or destroyed using an approved destruction method.

If the equipment is cleaned outside of the paddock/s boundaries, then that additional land will be subject to monitoring and farm hygiene practices as described in this document.

Delivery and testing of grain

Super High Oleic Safflower crops will be grown under contract where all production is contracted to GO.

Growers are required to confirm designated delivery sites and declare all Super High Oleic Safflower grain as per GO standards. The variety must also be specified.

GO has developed standards for Super High Oleic Safflower. These standards may change from time to time and variations in market contract specifications are the responsibility of the grower to understand and ensure compliance. These standards align with the Australian Oilseeds Federation (AOF) trading standards for the LLP in GM crops.

Where grain of Super High Oleic Safflower and non-GM safflower varieties are mixed together, the grain must be identified prior to delivery and delivered according to GO advice.

Post-harvest and volunteer management

Post-crop management in summer fallows is an important component of Australian farming systems in terms of weed management, water use efficiency, nutrient cycling and profitability.

In croplands - Volunteer safflower is a weed of cropping and non-cropping situations throughout southern Australia. Chemical and cultural options currently exist for the control of volunteer safflower

On roadsides - Safflower is not a common volunteer species in roadside populations and competes poorly with other plants. Control practices recommended for volunteer SHO safflower include using a knockdown herbicide and/or mechanical options (mowing, slashing or chipping)

Volunteer management practices recommended for Super High Oleic Safflower:

- The key is to ensure good harvest hygiene in conjunction with best management practices for control of volunteer safflower
- Create a plan and follow crop rotations that incorporate effective weed management practices including competitive crops
- Stimulate germination of volunteer safflower plants post- harvest to allow early control with tillage or herbicide
- Avoid deep cultivation (greater than 5cm) as it can extend the seed dormancy in safflower
- Target control measures early when volunteer plants are small (prior to four leaf stage)
- Monitor for volunteers in both crop and non-crop situations and control prior to flowering (prevent seed set)
- Use cultural methods where appropriate (e.g. crop windrow burning, grazing, mowing, crop/pasture rotation)
- Ensure minimum re-cropping intervals are adhered to following herbicide application in fallows;
- Use all herbicides at full label rate including recommended tank mix partner herbicides for improved control
- Know what herbicides are registered and the best options for volunteer safflower control

Re-cropping interval

There are no additional cropping restrictions in the season/s following Super High Oleic Safflower to best management practices for conventional safflower.

Records

Growers should use appropriate record keeping systems to facilitate good paddock records available for compliance audit/s to meet regulatory requirements, tracking of management stewardship

practices in line with data collection for industry stewardship programs or traceability of Identity Preserved (IP) grain production under supply chain agreements/contract specifications.

Meeting supply chain market choice requirements

GO supports the Australian oilseed and grain industry's market choice platform in relation to crops derived from biotechnology. GO's CLIP program and stewardship processes comply with the industry market choice framework.

While there is very little safflower grown in Australia today and very little of that is exported, GO recognises that not all supply chain participants may choose to grow SHO safflower.

Successful coexistence of different agricultural production systems and supply chains are being successfully managed and is a hallmark of the Australian grains industry.

The principles of coexistence and being a good neighbour underpin the ability of growers to pursue innovation, utilise diverse production systems and respond to consumer demand for safflower in Australia. Growers should always follow best management practices outlined in this document to:

- Maintain or enhance trade in Australian safflower
- Enable market choice along the supply chain
- Ensure predictable market access using transparent, science-based regulation
- Provide confidence to all stakeholders, from growers and end users to consumers and governments

This document is aligned to the principles and criteria that the Australian grains industry agreed to encompass under the GTA Market Choice Framework (2017).

Super High Oleic Safflower will be produced, processed and managed under a closed loop identity preservation program, with all Super High Oleic Safflower being processed in Australia. Only SHOSO will be exported.

Super High Oleic Safflower meets the following requirements for market choice criteria:

- Approved for cultivation by the Office of the Gene Technology Regulator
- Market segments and supply chain logistics identified to gain understanding of their requirements
- Approval by FSANZ for food and feed importation
- The GO CLIP program will protect the broader oilseeds/grain industries and preserve the integrity of the end product for GO. The GO CLIP program includes the crop management plan and supply chain processes to ensure the integrity of Super High Oleic Safflower supply chain
- Validated testing methodologies will be available for the accurate identification and identity preserved production of SHO Safflower that allows segregation of grain on delivery to satisfy specific marketing requirements

The above processes will assist the supply chain capability to provide product traceability, verification and contingency plans.

Regulation and compliance management for Super High Oleic Safflower

Regulation

GO will undertake compliance management of Super High Oleic Safflower in line with Australian government regulatory approval, the stewardship practices defined in the *Super High Oleic Safflower Special Terms & Conditions 2019* and industry guidelines.

The approval of Super High Oleic Safflower is the responsibility of the Office of the Gene Technology Regulator (OGTR). Approved varieties of SHO safflower can only be grown in Australian states that allow its commercial production.

All persons involved in the growing and management of Super High Oleic Safflower have a duty of care that all best management practices and actions are in accordance with this document and GO guidelines.

Food Standards Australia New Zealand (FSANZ) has approved the use of food derived from Super High Oleic Safflower under Standard 1.5.2 of the Food Standards Code. Per the FSANZ approval, food derived from SHO Safflower has been found to be as being as safe for human consumption as food derived from conventional safflower already in the food supply chain.

Industry stewardship

GO is committed to supporting appropriate stewardship practices and quality assurance standards that minimise risks in the use of Super High Oleic Safflower in line with industry best practices.

Training may be part of the Super High Oleic Safflower stewardship program to provide users with the information needed and ensure the commitment is fully understood.

Monitoring, records and traceability

It is the responsibility of GO to monitor Super High Oleic Safflower crops to ensure compliance and facilitate good record keeping practices in accordance with the CMP. This responsibility also includes training and accreditation provided to stakeholders to enable meeting the standards for approved industry stewardship programs.

The primary responsibilities of the Super High Oleic Safflower licensed grower in conjunction with GO are to:

- Ensure compliance with the “Super High Oleic Safflower” license agreement;
- Prior to the sowing, paddock planning to confirm “where” and “how” the Super High Oleic Safflower technology is to be used appropriately;
- Follow good agricultural principles and that the best management practices in the CMP are recommended and implemented for Super High Oleic Safflower
- Maintain records as directed by GO to ensure the objectives and stewardship commitments in Super High Oleic Safflower crop are available for audit as required
- Monitoring of a paddock to determine a representative sample for records of stewardship practices and compliance management set forth in this document e.g. the level of volunteer plants, surviving plants, should aim to meet an approved procedure
- Monitoring and traceability will require each Super High Oleic Safflower stakeholder creating

and maintaining good records of stewardship practices implemented throughout the supply chain. records will need to be sufficient to provide evidence and allow verification of completion of activities aligned to stewardship practices set forth in the CMP

Auditing stakeholders

As appropriate and as part of the Super High Oleic Safflower contract for grain production of Super High Oleic Safflower, stakeholders may be audited by GO to ensure compliance with all relevant standards and grain delivery declarations. Stakeholders to be accredited for Super High Oleic Safflower will include, but are not limited to 3rd party seed company/seed distributor licensees, licensed growers, professional agronomists, grain marketers handlers and processors. Audits and compliance management will be coordinated by the GO Compliance Manager.

Adverse event reporting

GO is committed to stewardship and providing an appropriate response to a real or perceived adverse event(s) throughout the product and technology lifecyclefor Super High Oleic Safflower. Adverse events may include theft of seed, spillage of seed or grain during shipment, and delivery of grain to an unapproved location or a wrongful declaration. All adverse events must be reported promptly to GO. The appropriate GO teams will follow an appropriate resolution process to develop, recommend and communicate a specific incident action plan as soon as is achievable and fairly with all stakeholders as required after receiving the report.

It is the responsibility of the licensed grower to undertake and implement the recommended management practices from an accredited agronomist(s) to bring the grower back into compliance with the CMP and all applicable laws.

GO is committed to assist growers to ensure compliance is maintained with the “Super High Oleic Safflower” license licence agreement terms and conditions.

Training and accreditation

The grower of Super High Oleic Safflower is responsible for making the on-farm management decisions and may be required to complete training to ensure a good understanding of the recommended on-farm practices to protect the sustainability of SHO Safflower.

Training and professional accreditation will also be undertaken with advisors (agronomists and consultants) to ensure appropriate and responsible use of the technology.

Agreements, dispute resolution and arbitration

The stewardship practices set forth in this document and applicable regulatory requirements will form part of the “SHO Safflower” contract with growers and third party service providers.

Liability and warranties for the Super High Oleic Safflower are also described in these agreements. The designation, “SHO Safflower”, indicates the safflower contains a patented, proprietary trait and use of a Super High Oleic Safflower variety without entering into the “Super High Oleic Safflower” license agreement amounts to patent infringement.

Seed of Super High Oleic Safflower varieties may only be purchased from a licensed seed supplier following the execution of an “Super High Oleic Safflower” license agreement. Seed may not be saved

from a crop produced from the Licensed Commercial Seed and seed may not be supplied to others for planting. Additionally, unless authorised by GO, selling seed derived from a crop of safflower with the Super High Oleic Safflower trait will amount to patent infringement.

GO is committed to assist growers to ensure compliance is maintained with the "Super High Oleic Safflower" license agreement terms and conditions. If a dispute occurs between the grower and GO regarding effective implementation of the Crop Management Plan, the dispute will be referred to arbitration by GO for resolution.

Industry codes of practice

The Australian grain industry uses common processes that are outlined in various industry developed documents and procedural guidelines such as

- Growing Australian Grain (Grain Producers Australia/ Grain Growers Limited)
- Australian Grain Industry Code of Practice (Grain Trade Australia)
- Technical Guidelines, Industry Management Guidelines, with a focus on
- Use of Commodity Vendor Declarations
- Knowledge of grain quality
- Consistent testing processes

Australian Government, Department of Health and Aging, Office of the Gene Technology Regulator "The Biology *of Carthamus tinctorius* L. (safflower)" (Version 1: February 2015).

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[1] Ref: Super High Oleic Safflower Quality Assurance Manual. AS/NZS ISO 9001- 2016, Quality Assurance Program

[2] The Global Initiative on LLP defines Low Level Presence (LLP) as: "low levels of recombinant DNA plant materials that have passed a food safety assessment according to the Codex Guideline for the Conduct of Food Safety Assessment of Foods Derived from Recombinant-DNA Plants (CAC/GL 45-2003) in one or more countries, but may on occasion be present in food in importing countries in which the food safety of the relevant recombinant-DNA plants has not been determined".

Co-Founder

Barbados Nutrition is a new startup working in the food sector.

- Do you have a passion for the future of food? Are you highly ambitious, love to build, and get excited about solving global problems?
- Agronomist or engineer
- Minimum of 5 years of experience
- Founder, terms to be negotiated
- To find out more email Rob - rblum@blum21.com