



HEMP INSIGHTS

Thursday 10th February 2022



HEMP INSIGHTS FIELD DAY

This project was funded by the Australian Government under the Murray–Darling Basin Economic Development Program.



Australian Government
Department of Agriculture,
Water and the Environment



**Western Murray
Land Improvement Group**

www.westernmurraylig.org



Western Murray Land Improvement Group:

Phone: (03) 5453 1557 Email: admin@wmlig.org Website: www.westernmurraylig.org

Hemp Farming Systems:

Email: info@hempfarmingsystems.com Website: www.hempfarmingsystems.com

The Wedge Group:

Phone: 0423 378 803 Email: karl.mathers@thewedgegroup.com.au

Joe D'Alo: The Hemp Building Company

Phone: 0417 517 081 Email: joe@thehempbuildingcompany.com.au

Information provided in this booklet is gained from our own trial data and to the best of our knowledge, correct at the time of printing. Western Murray Land Improvement Group (WMLIG) is not responsible for any outcomes associated with the information provided. Current information may change as further data and knowledge is gathered. Seeking further information and data is advised before commencing hemp production and should not be based solely on WMLIG trial data, results and information.

Programme

5:00pm		Registration
5:30pm	WMLIG: Welcome and introduction	Program Overview: Why Hemp? Presentation of aims and goals Hemp Trial Map explained
5:45pm	Hemp Farming Systems:	Hemp Growing 101 Phases, preparation, seed. Handout: Checklist Q&A
6:15pm	WMLIG and Hemp Farming Systems	Trial walk and talk visiting 9 sites <ul style="list-style-type: none">• Germination rates• Sowing issues• Weed control: Bromicide 200 trial• Weed control: Grass trial• Growth rate along tree line• Irrigation spread• Water logging issues• Fertiliser application• Fibre and dual-purpose hemp discussion
7:15pm	Dinner	Sandy's Kitchen

Programme (Continued)

7:30pm	Damian Jones: Soil Tests	Soil test demonstration including dispersion tests.
7:40pm	Hemp Farming Systems and WMLIG	Harvesting Gross margins and comparisons Potential value add products Current market opportunities Q & A
8:00pm	Joe D'Alo	Introduction to his business Hemp building industry insights Products: Hurd, fibre, bricks
8:10pm	The Wedge Group	Pre-feasibility scope and cooperative business models overview. Q & A
8:30pm	Close	

NOTES

Hemp report overview info:

Aim

The aim of this trial is to develop an understanding of the requirements and management practises needed to successfully grow industrial hemp in the Murray River Local Government Area (LGA). The secondary aim is to demonstrate to local producers/farmers and agronomic advisors that industrial hemp is an alternative and viable cropping option for this region.

Key Objectives

1. Identify from the six varieties trialled, which variety/varieties suit local growing conditions best
2. Determine at which point the moisture stress is too high and causes the THC levels of the hemp crop to rise above acceptable levels
3. Identify necessary management practises to maximise productivity
4. Anecdotally assess the outcomes of standard and organic fertiliser application and the rates in which they are applied

Hypotheses

1. As there is little to no Industrial Hemp cropping history in the Murray River LGA, it is reasonable to assume that some varieties are better suited to this environment than others, they just haven't been identified yet. It is assumed that some varieties will perform better than others in this trial.
2. The Murray River LGA is a region that traditionally suffers from dry conditions and is reliant on irrigation water from predominantly flood irrigation; therefore moisture related issues cause plant stress (too dry or water logging) It is reasonable to expect that some level of moisture stress will be seen in the hemp plants, which can impact THC levels.
3. Synthetic chemical use is common practise in traditional farming/cropping in the Murray River LGA, as such the trial plots treated with traditional rates of synthetic fertiliser will most likely demonstrate higher productivity than those treated with organic alternatives.

What should farmers know and do when planning and growing an industrial hemp crop?

John Muir and John Wightman: Consulting Hemp Agronomists & Entomologists

Hemp is somewhat different to other broad acre crops:

- Hemp crops sequester more carbon than other crops (on a per month basis).
- Biomass crops can grow to 5 m in 5 months with as much as 15 MT/ha dry weight.
- The grain is processed into high value products. The stems have a layer of very strong fibres (the strongest) and a central core (the hurd). Both have their own value chains.
- Hemp requires an investment in a significant amount of irrigation water (perhaps 4-6 ML/ha, depending on rainfall) and more fertilizer compared to conventional cereal crops, to achieve this rate of growth.
- There are about 20 varieties grown in Australia – all with their own special features.
- Grain and dual purpose crops (grain and biomass) require 3- 4 months from sowing to harvest. Biomass crops could require 5 months.

What should farmers know and do when planning and growing an industrial hemp crop?

John Muir and John Wightman: Consulting Hemp Agronomists & Entomologists

Before starting:

- Contact State Officials about procuring a Hemp Growers License.
- Engage with a recommended seed supplier and organize product sale contracts.
- Check the field to make sure it has adequate access for trucks and heavy equipment: check for narrow bridges, gates, sharp corners, wet areas, etc.
- Ensure that there is cleaning and drying equipment for grain and for bales of straw
- Work out if the irrigation equipment can operate in tall crops and whether there is an adequate water supply available to get the crop through the season.
- Think about the soil when selecting a field. The best fields have sandy to clay loam – but sandy and 'light clay soils' can work. It's all about well drained fertile soil.
- Hemp plants die if they stand in ponded water for more than a few hours. This means that fields should be free of depressions and have an adequate slope of more than 1:1000. Pans should be broken up by deep ploughing.
- Raised beds can be used on flatter, lasered slopes.
- Never sow hemp after hemp – diseases will build up.
- Review the fertility of the field to make sure its nutrients have not been 'depleted'.
- Soil tests are needed perhaps two months before sowing so that ameliorants can be added well in advance of crop establishment.
- pH of 6-7 is the optimum range.
- Crops may require as much as 150 kg N, 50 kg P, 150 kg K, and micronutrients (mixed or selected) per ha. Hemp crops also need calcium and magnesium. No more than 20 units of N should be applied with the seed if leaf burn is to be avoided. Soil carbon may need to be boosted with manure etc., but that is long term operation.
- Weeds impede the establishment of hemp crops, so that weed management should start well before sowing.
- Check that no residual herbicides (e.g., Atrazine) have been applied to the field for at least a year before the anticipated sowing date.
- Ensure that all farm operations are possible with owned equipment or known contractors well before the need arises.



HEMP FARMING SYSTEMS

What should farmers know and do when planning and growing an industrial hemp crop?

John Muir and John Wightman: Consulting Hemp Agronomists & Entomologists

Operations:

- Sowing can start in mid-September in northern Victoria and southern NSW, depending on variety and planned end use.
- Test germination rate of seed before sowing to help determine sowing rate (aim for an emergence of 100 seeds/sq m for biomass and 60 for grain).
- Ensure seed is treated with a fungicide such as Thiram (dealers often do this before they sell the seed).
- Before sowing, check soil for unwanted insects, such as wireworm, cutworms, white grubs, etc. If sowing into stubble (e.g., after canola) check for Rutherglen bugs. Conventional insecticides may be needed. Always check if the product is permitted for hemp by the AVPMA.
- Sowing: close row spacing is best: 15- 20 cm is good.
- Sow into moisture with the seeds 15-25 mm deep and firm soil moisture contact.
- Weed control may be needed before or after sowing.
- Irrigation – an establishing crop pumps out water all the time: check soil moisture levels frequently at crop rooting depth.
- Grain (and dual purpose) crops can be attacked by insects: *Helicoverpa* species (Heliothis, bollworm, budworm) are the most likely and the most damaging. They are resistant to many insecticides so information about the most appropriate (within APVMA guidelines) should be sought from Government or professional advisers, including HFS. Green vegetable bugs, Rutherglen bugs and mirids could also be a problem.
- Foliar diseases are not common, except for isolated cases of Botrytis (grey mould) and mildew in cool, wet summers. Preventative fungicides can be applied as a prophylaxis and are effective if applied soon enough. Soil diseases are more of a problem, hence the suggestion to treat the seed with a fungicide and to rotate the following crop(s).
- Timing of grain harvest is critical, because the seeds mature sequentially. Best to cut when most of the lower seeds are ripe (70% brown and hard inside). Draper front headers are best. The grain has to be put dried down slowly in dryers from up to 20% - to less than 10% moisture within 12 h of harvest, cleaned and stored cool.
- The biomass/stubble can be left to rot for a couple of weeks: rotting helps the central core of the stem (hurd) separate from the outer fibres.



Trial Design:

20 different variety x soil treatment combinations planted within 4 'bays'. Bays are border check irrigation layout.

Fertiliser Types:

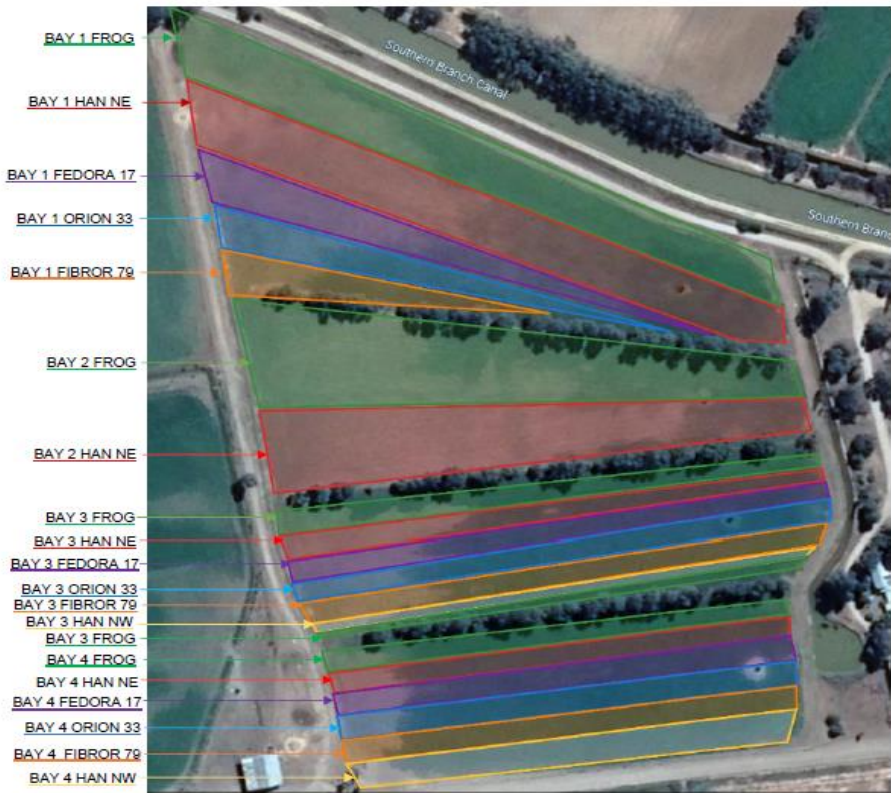
Natural Compost Balpool Gold, Standard Fertiliser DAP (Diammonium Phosphate), Standard Fertiliser, Standard Fertiliser MAP (Monoammonium Phosphate), Gypsum (applied to all) and Lime (applied to all)

Harvest:

Conducted with 1.8m wide plot header

*^^ For more in-depth descriptions of the trial plot, see Field Journal document, where more details are recorded.

FERTILISER APPLICATION



Trial Site Fertiliser

All Bays 2t/ha Gypsum + 1t/ha Lime

Bay 1 – Natural Compost Balpool Gold (20t/ha) + DAP 100kg/ha & MAP 100kg/ha

Bay 2 – Standard Fertiliser DAP 100kg/ha & MAP 100kg/ha + Natural Compost Balpool Gold 13t/ha

Bay 3 - Natural Compost Balpool Gold (20t/ha) Only

Bay 4 – Standard Fertiliser DAP 100kg/ha & MAP 100kg/ha

Germination Rates:

-Data at 5 days post germ.

Seed Variety	Plants/m2 (Average)
Frog	36.375
Han NE	86.5
Fedora	82
Orion	65.66666667
Fibror	61
Han NW	1

Location	Plants/m2 (Average)
Bay 1	60.8
Bay	55.5
Bay 3	84.8
Bay 4	48

NOTES

It's all a learning process and this further highlights that.

Germination issue – tops of bays

Data collected from 20 days – summary germination % from top of bay 4

Plant deaths from 3rd Irrigation

Weed control (Bromicide 6m) –Laneway of Bay 4

Weed trial was undertaken in Bay 4 using Bromicide at 0.7l/ha in a 6m wide strip in the bottom section.

Weed control Grass (Verdict & Clethodim)

Both Verdict and Clethodim were applied to the whole crop with varied degrees of success.

Water logging

After the 3rd Irrigation in early January there was some dramatic plant wilting, followed by death. We have done tissue tests from both sick and healthy plants. The plants that died in the water logged areas were shown to have the fungus Pythium present in the roots. This indicates that it was an accumulated effect of the water logging and fungus interactions that led to the plant death.

Split germination due to uneven irrigation bottom bay 1.

Despite being lasered prior to the trial commencing it has become obvious that the water has not travelled over Bay 1 evenly during irrigation events. This has led to three germination events in the Hemp in Bay 1. One that occurred after the first watering, a second germination event after the second watering, and a third germination event after the third watering. This was due to the water travelling to different parts of the Bay in the differing irrigation events.

Discuss Fertiliser application – Bay 3

From the very beginning of this trial, Bay 3, the bay with only “natural fertiliser” application (Belpool Gold), has been a standout in terms of plant performance. The germination rates were higher from day 5, plants were more advanced at day 20 data collection and the plants proved to be more resilient to water logging that occurred after the third watering.

Difference between Fiber and Dual Purpose

Out of the varieties we have trialled here, there are two with known purpose. Han NE is a dual-purpose plant; created for biomass and fibre. Whereas Frog, is a biomass variety, created purely for the amount of biomass. The other four varieties in the trial are still unknown.

Lack of growth along tree line – bay 4 compare to bay 2 and 3

In Bay 4 it is evident in the Frog variety that the 1 m strip closest to the tree line hasn't grown as well as the rest of the crop. Initially it was thought to be due to water/moisture competition between the hemp and the trees. However, this isn't visible along the edge of the other bays where Frog is also next to the tree line. A hypothesis for this observation has not yet been created... it is a mystery.

NOTES



E: admin@hempgro.com.au

M: +61(0)449 686 928

W: www.hempgro.com.

ABN: 9621316456

Certified French Seed.

We chose these seeds because they have Red tag certification out of Europe which means they are guaranteed to test THC below 0.3. They have always tested below 0.1% in WA.

The varieties are lower Mediterranean climate seeds (E.G. Spain, Italy, Greece which have less summer rainfall like Southern Australia), aiming to match the growing region in Europe with our climate. They do not need a great deal of water as they grow dryland in Europe and we aim to emulate that in WA with dryland growing.

The Agronomy for these plants is similar for all French seeds. All inputs need to be considered e.g. good carbon in soil and high nutrients.

There needs to be good moisture in soil but not water logging – as it will not grow in a water-logged environment. Good seed-soil contact is essential for good germination in the first three to seven days. The next irrigation would be best when the plant is at knee height to boost growth, but is not always required for a seed orientated outcome. The next water event would be good around flowering to allow some extra moisture for seed set. They have proven they do not need a great deal of water to grow well.

Fedora 17 – Hemp-It French Seed Certified seed.

Germination rate: 91%

There are a few harvest numbers but nothing consistent as it has only been grown in WA for two seasons. 650kg h/a is the rough number for first time sown.

We use it as a dual purpose seed only because we are still working on how it grows and where it grows best.

There have been some good results with this variety, esp. this year where it has grown 'true to type' for the first time across a whole paddock.

It will grow to 2 metre in height dryland but tends to even out at about 1.6m which makes it a reasonable plant for which to use a combine harvester.

The stem can be left in paddock for forage and allow animals which are not destined for immediate market to clean up the area.



E: admin@hempgro.com.au

M: +61(0)449 686 928

W: www.hempgro.com.

ABN: 9621316456

Fibror 79 - Hemp-It French Seed Certified seed.

Germination rate: 89%

We use it as a dual purpose seed only because we are still working on how it grows and where it grows best but the seed harvest last year was good and the size of seed quite large. However, the variety is sold for soft fibre – clothing and fibreglass manufacturing and has a lovely smell and softness to the stem.

There have been some good results with this variety, esp. this year where it has grown 'true to type' for the first time across a whole paddock. It has a natural yellow colouring to the leaves, esp. when seed is setting.

It will grow to 1.6metre in height dryland and tends to even out across the paddock which makes it a reasonable plant for which to use a combine harvester.

The stem can be left in paddock for forage and allow animals which are not destined for immediate market to clean up the area.

Orion 33 - Hemp-It French Seed Certified seed.

Germination rate: 87%

This is the first season we have grown this variety.

We use it as a dual purpose seed only because we are still working on how it grows and where it grows best. The variety is sold as a seed variety which has a high oil content.

There have been some good results with this variety this year where it has grown similar to the other three but emerged quicker in some areas and has lead the way with stem production. It appears to be a week later than Fedora 17 to be harvested.

It will grow to 2 metre in height dryland and tends to even out across the paddock at about 1.6m which makes it a reasonable plant for which to use a combine harvester.

All seeds are import by HempGro into WA. Stored in a cool, dry environment and shipped across Australia. There are still at least 2 more varieties which we will endeavour to import and try. They appear to grow well in dryland, water reduced areas.

HAN NW

HAN NW was sourced locally from produces that had imported the seed 5 years ago with intentions to grow, that never happened. The seed was pre-treated with an anti-fungal before being imported to Australia. The

science now indicates that the seed should be treated immediately prior to sewing, and that the seed shouldn't be left in a treated state.

As such the HAN NW that was sowed had little to no germination in some areas. Further supporting the idea that the seed needs to be treated immediately before sowing.

HAN NG

Han NG is a mid-season “public” dual-purpose variety that grows across Southern Australia and is now being tested north of the Queensland Border.

FROG

Frog is mainly grown as a late season Bio-mass variety. It was bred in Australia and is of Chinese origin. It is highly photoperiod responsive with it's “trigger” in February and March

NOTES

Hemp budgets and gross margins

	Hemp Dual Purpose		Hemp Bio-mass		Hemp Grain	
Gross Income (\$/ha)						
Grain yield (MT/ha):	1.00	(0.75 to 1.25)			1.25	(0.75 to 2)
PRICE(\$/t):	3500				3500	
Grain income \$	3500				4375	
Biomass yield (t dry/ha):	4.00		10	(8 to 14)		
Biomass price \$/MT (lowest)	300		300			
Biomass income \$	1200		3000			
Estimated duration (days)	120		150		≤120	
Total	4700		3000		4375	

NOTES

Hemp budgets and gross margins (Cont'd)

Hemp Dual Purpose	Hemp Biomass	Hemp Grain
-------------------	--------------	------------

Variable Costs (\$/ha)	Rate	\$	Total	Rate	\$	Total	Rate	\$	Total
Field preparation									
Ploughing, discing etc,	1	600		1	0		1	0	
Weed management (herbicide)	1	100		1	0		1	0	
Sub-Total		700			0			0	
Seed and sowing									
Seed cost /kg (treated)	15			15			15		
Seed weight kg/ha	30			35			30		
Seed cost (treated)		450			52			45	
Sowing	1	60		1	60		1	60	
Sub-Total		510			58			51	
Fertilizer (max amount)									
Lime, gypsum and/or dolomite	Ac-			10				10	
Organic carbon (mulch, manure)	cord			0				0	
N P K trace elements	ing	100		10				10	
Si	to			0				0	
	soil			50				50	
	anal	500		0				0	
Spreading	ysis	50		50				50	
Sub-Total		650			75			75	
					0			0	

Hemp budgets

	Hemp Dual Purpose			Hemp Biomass			Hemp Grain		
Variable Costs (\$/ha)	Rate	\$	Total	Rate	\$	Total	Rate	\$	Total
Pest management									
In crop herbicide		50						50	
Insect control		100						100	
Sub-Total		150						150	
Harvesting (options)									
Combined header		150						150	
Mowing, windrowing, baling		200			400				
Grain cleaning and drying		150						150	
Freight									
Sub-Total		500			400			300	
Total Variable Costs excluding irrigation			2510			2435			2410
Gross Margin \$/ha			2190			565			1965

NOTES

INDUSTRIAL HEMP PRODUCTION & PROCESSING



Western Murray
Land Improvement Group

Opportunity

The aim of the Western Murray Land Improvement Group (WMLIG) Industrial Hemp Processing Project is to scope and investigate the viability of an integrated value chain for production and processing of industrial hemp in the Western Murray region.

Wakool farmers are interested in producing hemp however, they also see the importance of adding value to the primary product to ensure they can generate a higher return on investment.

Objectives of the PFS

The PFS being developed by The Wedge Group, aims to provide farmers and potential value chain partners with information to assist them to understand the requirements, desirability, feasibility and viability of

1. Growing hemp in the Murray region in the range of seasonal conditions (low to high water cost variables)
2. The current and potential future demand for the raw and processed product including seed and fibre.
3. Processing the primary product into usable fibre as inputs into manufacturing of other products (e.g., building materials)
4. The potential of developing a high value manufacturing precinct converting fibre to building sector products.

Preliminary consultation with project stakeholders will confirm the scope of the PFS to ensure that it is focussed on critical needs.

- Production thresholds
- Core products – fibre, seed, other
- Value adds – processing, waste reuse
- Locations/Logistics – processing plant, transport constraints
- Resources – irrigation, machinery and equipment, labour
- Establishment model – Cooperative approach
- Regulatory Environment – Growing; Processing; Marketing
- Overall business model and planning horizon.
- Project Control Group (PCG) establishment – agreements and legal instruments

The PFS will collate the information necessary to assess support for progressing the project to a business case for investment.

What Information will the PFS examine?

Supply Chain

A supply chain is a system that moves a product from the raw material to the end-user and is an interconnected process that starts

Pre-feasibility Study (PFS)

Overview



INDUSTRIAL HEMP PRODUCTION & PROCESSING

with the farming of the hemp, goes through processing and ends with the sales.

Market Demand Assessment

Examine demand for hemp products at a local, national and global scale to identify market opportunities for Western Murray producers.

Industrial Hemp Production

Presentation of critical environmental conditions, improvement inputs and integration with traditional farming practices.

- Soil and soil improvements
- Irrigation demand
- Incorporation into rotational cropping systems
- Pest control
- Machinery and equipment
- Risk Assessment

Hemp Processing

Processing systems will be investigated to develop the base case Facilities, Plant & Equipment and Resourcing plan including;

- Base case costs /option
- Augmentation options /costs

Ownership, Governance and Investment Framework

- Explore the range of ownership and corporate governance models.
- RGA/Sunrice Co-op model as a starting point.

Sales and Marketing

Core Products - High level sales and marketing plan to identify opportunities, resource requirements and costs for model inputs.

Value-Added Products / Relationships - Explore Carbon Sequestration markets and returns

Financial Analysis

- Development/refinement of the overall financial model.
- Establish key timeframes for planning and development through to upscale to profitable operations
- Explore the range of financing options and costs.

Project SWOT Analysis

Strengths, Weakness, Opportunity, Threat



For further information contact

Karl Mathers

The Wedge Group

karl.mathers@thewedgegroup.com.au

Mob. 0423 378 803

Upcoming Events



Western Murray
Land Improvement Group

www.westernmurraylig.org

Ph (03) 5453 1577

Email admin@wmlig.org

Joining Ewe Lambs

A joint initiative of BestWool
BestLamb and WMLIG



**Monday 14th
February 2022**

To be held at "Fairview"
3334 Noorong Rd,
Noorong NSW 2732

Henry Hickson, Livestock Breeding Consultant, neXtGen Agri presents key management targets for joining ewe lambs: Covering accelerating the genetic gain, greater selection at classing, greater surplus sheep for sale, greater overall enterprise profitability



For more information and registration, please scan the QR code or contact us.

Sheep Handling Workshop

An AgTrends Event

**Thursday 17th
February 2022**

To be held at
Yambinya, Feedlot
Burraboi, NSW

Manufacturers and suppliers will be giving demonstrations on the latest manual and automatic sheep handlers.



For more information and registration, please scan the QR code or contact us.



Industry Tour

With Grant Sims

An AgTrends Event

**Tuesday 22nd
February 2022**

Assemble at Murray
Connect for 12:30pm bus
departure to Lockington

Grant Sims will lead a tour of his multi-enterprise farm covering topics including ground cover, multi-species, forage cropping, bio-fert production and livestock integration.



For more information and registration, please scan the QR code or contact us.



Drone Workshop

An AgTrends Event

**Tuesday 1st
March 2022**

To be held at
Wakool (Location TBA)

Learn more about drone technology and how this can be used to improve your farming operation. This practical workshop is led by award-winning photographer and drone specialist Fiona Lake..



For more information and registration, please scan the QR code or contact us.



Dung Beetle Benefits

**Wednesday 16th
March 2022**

To be held at
"Willow Wood" Lilliford Lane
Barham NSW 2732

Russ Barrow will be presenting information on the benefits of using Dung Beetles in farming.



For more information and registration, please scan the QR code or contact us.



Reboot My Soil

with David Hardwick

**Thursday 7th
April 2022**

For more information and registration, please scan the QR code or contact us.



SAVE
THE
DATE!



Download PDF:
NSW Department of Primary Industries



Growing low-THC hemp in NSW
Frequently asked questions

Trial Map, 'Uamby'



	FROG Variety
	Han NE Variety
	Fedora 17 Variety
	Orion 33 Variety
	Fibror 79 Variety
	Han NW Variety



**Western Murray
Land Improvement Group**