

Meckering attracted 550



ON the 18th September, WANTFA held perhaps the largest agronomic Field Day in WA's recent history. The feedback has been very positive and suggestions have been gratefully received for ways to improve the event even more.

Kind thanks to all speakers and sponsors, especially our Diamond Sponsors GRDC, CSBP futurefarm, Elders and BEELINE Technologies. Thanks also to the Meckering sub-committee—in particular

Chair Geoff Fosbery and Colin Pearse—and to the local Meckering community. We are now planning trials for next year. The Field Day event will be Tuesday 17th September 2002. Your trial suggestions are most welcome. Please send them to bill.crabtree@wantfa.com.au. Matt Beckett has compiled the feedback from the day—see pages 462 to 463—with photos kindly taken during the day by Angie Roe from Farm Focus Consultants.



CONTENTS

TOPICAL SECTION

President's Report	
Neil Young	p455
Letters to the Editor	p455
2001 WANTFA Study Tour	
Angie Roe	p457
Agronomic View—less ryegrass	
Wayne Smith	p460
Spectacular claying trial—imaged!	
Bill Crabtree	p461
2001 Meckering Field Day proves bigger and better	
Matt Beckett	p462
Northern South Africa—agriculture and more!	
Bill Crabtree	p464
Thing of growing a summer crop?	
Andrea Hills	p466

SCIENCE SECTION

Fertilising and farming to 2cm	
Grant Thompson	p467
Tramlines and no-till—a good match!	
Dr Paul Blackwell	p468
Timing of nitrogen for no-tilled wheat	
Bill Crabtree	p470

FARMER SECTION

Towards discs and residue managers	
Murray Gmeiner	p471
Weed wiping has role	
Trent Tyler	p472
Forage sorghum survived a dry spring	
Ashley Jones	p474

Website password
Please note that your username and password for the website are: **wantfa02** and **soilcare**

Disclaimer: Mention of trade names does not imply endorsement or preference of any company's product by WANTFA, and any omission of trade names is unintentional. Farmer experiences may not work for all.
WANTFA's Farming Systems Editorial Board is comprised of Ric Swarbrick, Neil Young, Richard McKenna and Kevin Bligh (Chair). Articles are also kindly reviewed by Angie Roe of Farm Focus Consultants, and Cally McKenna. Views expressed are not necessarily those of the Editor, the Editorial Board or the WANTFA Committee.

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WANTFA's Scientific Officers are funded by:



Blanket wipers—their time has come!

In the search for innovative ways to kill weeds and not destroy the soil, will blanket wipers have a role? I believe so—and so does Geoff Fosbery, Principal Farm Focus Consultant.

The time to use them is in the spring, when weeds grow above either crop or pasture. There is clearly a nice fit with in-crop blanket wipers and tramlines of some sort.



Radish thrive up north in short lupin crops. These weeds are a sitting target for a blanket wiper operation—at the right time.

During spring, when weeds grow 20cm above the crop canopy, these become a target for herbicides. A blanket wiper is like a piece of carpet that hangs down with herbicide slowly seeping down through the blanket. This blanket can brush the tops of weeds without touching the desirable crop or pasture species. This enables high rates of non-selective or selective herbicides to be absorbed by the weeds with minimal impact on the crop.

This approach seems to have most merit where resistance is a problem or where weeds grow well above the crop canopy—in particular with wild oats, radish and ryegrass in short crops. Newer crop varieties tend to be short, being designed to produce maximum grain yield. We have probably been selecting for weeds that grow tall through the canopy. Mike Collins and Dr Abul Hashem from the Department of Agriculture are currently researching this issue.

Ryegrass growing proud above short lupins—makes for a blanket target.



GRDC offers

TAFE Scholarships

GRDC is encouraging young people into a farming career in broadacre agriculture by providing 12 scholarships worth \$5,000 each.

These scholarships will support full-time study at a recognised vocational education and training (TAFE) institution.

Application details are available under 'Information for growers' on the GRDC website at www.grdc.com.au

Do you spray aphids in canola?

Three agronomic consultants I have asked all say "Yes—when the aphids are thick and still have a long way to go!"

In fact, paddocks that have heavy aphid infestations for a long time without being sprayed yield poorly. This is the overwhelming consensus. Yet, Department of Agriculture trials consistently show that there is no yield benefit of taking aphids out... Maybe it is all in the timing? Perhaps we should explore this issue from all perspectives in the next *Farming Systems*. Your feedback is welcome!

A heavily aphid-infested canola crop—it's a common site. Would you have sprayed this crop?



Another interactive field day

WANTFA held over a dozen field days during 2001. These days are a great opportunity to look at seeders, crops, soils, trials and each other's farms. These events contain lots of valuable farmer interaction.

There is no charge for these events and everyone is encouraged to come along—being a WANTFA member is encouraged though!

The winter and spring field days are often organised by WANTFA farmers in conjunction with local agronomists. As preparations can only take place a few weeks before the event, such timelines make it hard to do early advertising for these field days. We rely on faxes and the generous support of the ABC Radio. Next year we hope to be able to have these dates put on our website in early July.

If you would like to help organise one of these events, please phone a committee person or myself on 9622 3395.

Another reminder of erosion

While at the Esperance Department of Agriculture in the early 1990s, I photographed some graphic erosion scenes caused by tillage or stubble burning. Some of our soils are so shallow that a loss of 8 cm of sand can result in farming difficult sodic sub-soil.



Shallow duplex soils are much more productive when the sandy surface is retained—here soil is lost due to firebreak requirements. Note, many shires have now abandoned this firebreak law because of erosion!

Deeper sandy soils on the sandplain can erode very easily if stubble is burnt—in this case by an accidental harvester fire. Esperance sea breezes over a period of only 3 months caused this soil loss.



Wide rows improve lupin flowering

WANTFA President Neil Young from Kojonup has sown a whole paddock to lupins on 90 cm wide rows and he is pleased with their improved height and earlier flowering time.

The lupins seemed to have flowered about 2 weeks earlier than in previous years. Perhaps this year Neil may also get some reasonable grain yield. Research at Meckering this year will also tell us more.



Agronomist Wayne Smith (left) and Neil Young inspect Neil's vigorously growing lupins. Unfortunately, weed control has not been perfect, strengthening the argument for shielded spraying, but good lessons have been learnt.

Several farmers have asked me what about the implication of next year's nitrogen supply from these wide row lupins, assuming that all the nitrogen is in the narrow row of soil near the roots. Fortunately, more than 85% of the nitrogen left after harvest is not in the roots but is in the tops and leaves. This means that the nitrogen will be mostly where the leaves fall—which will probably be reasonably uniform.



Dale Baker, Chair of GRDC's Western Panel (left), observes the potential grain yield that farmer Mark Adam's sorghum shows here on his South Stirlings farm in February 2000. Prof Dwayne Beck is on his right!

Warm Season Crop Project begins

Congratulations to Andrea Hills from the Esperance Department of Agriculture who has been appointed to manage an exciting new GRDC-funded project on warm season crops for the south coast. See Andrea's comments on the project later in this issue.

Thanks to GRDC, the Department of Agriculture and WANTFA for helping to spark interest in the Project! WANTFA was allocated \$50,000 per year over three years for such a project and WANTFA passed these GRDC funds onto the Department to strengthen its proposal for a larger and more comprehensive GRDC project.

The three main aims of the project are to:

1. Develop a risk analysis of warm season cropping for the south coast region of Western Australia to arrive at 'best bet' options for maximising summer and winter crop productivity and minimising deep drainage.
2. Develop hard data on the performance of warm season crops on the south coast of Western Australia and on best practice agronomy to impact on production and on farming systems.
3. Develop a best management practice manual for warm season crops and a technical report on data collected and collated for the project.



Andrea Hills, Research Officer, Esperance Department of Agriculture.



Keeping warm helped us to concentrate. This was a first for me! At Lake Mears last year, conditions were so cold and windy that we made a shed fire—highly recommended.

Cultivated crops look best early!

Yet again some farmers have observed, if crops are given adequate moisture at seeding, that such crops grown on fully cultivated soils look better soon after seeding than no-tilled crops. And yes, this is true! However, payment is in the grain—not on what the crops look like early in the season!



Aerial photo of a large replicated trial showing 7 different seeders at Esperance in late July 1994 at Alan and Lorraine Jones's farm at Ridley. The darkest three plots are the full cultivation plots sown into lupin stubble—others are various forms of no-tillage.

The above photo shows how good cultivation is at releasing nitrogen and loosening the surface soil—resulting in dark green strips that grow vigorously initially. However, later in the season, after a fair bit of this mineralised nitrogen has been used or leached, the cultivated plots lost some of their green colour. Note the photo below, the fully cultivated plots are now partially yellow in late September and the no-tilled plots now look green and healthy.



Plots on either side are dark green while the cultivated plot goes yellow—for a time.

With dry winters, as has been the case for much of WA in 2000 and 2001, the no-till crops can recover better. This is because they have not 'over-used' the scarce water resources and they survive with less stress, as compared to the cultivated crops which grow more aggressively early in the season in ground that has no stubble cover to reduce evaporation.

Apology to BASF

At the exciting WANTFA Meckering Field Day, we incorrectly labelled two treatments in one trial as Cinch (cinnethylin). These were the initial intended treatments but they were not actually used. After the trial was sown we received advice that Cinch had been used and this information formed the template for the Field Day booklet. We apologise to BASF for this error.

Given recent discussions with others since the event this apology needs to be widened. Sorry also to Dr Terry Piper, who spoke to the wrong product, and agronomists and farmers who were enthused by the 'products' effect. The Cinch treatments were in fact trifluralin and diuron at 1.6 and 0.55L/ha or at double this. Pleasingly, Cinch performed well in our 2000 Meckering trials and it is likely to be a useful product in the future, but not in 2002 and perhaps with a different name.

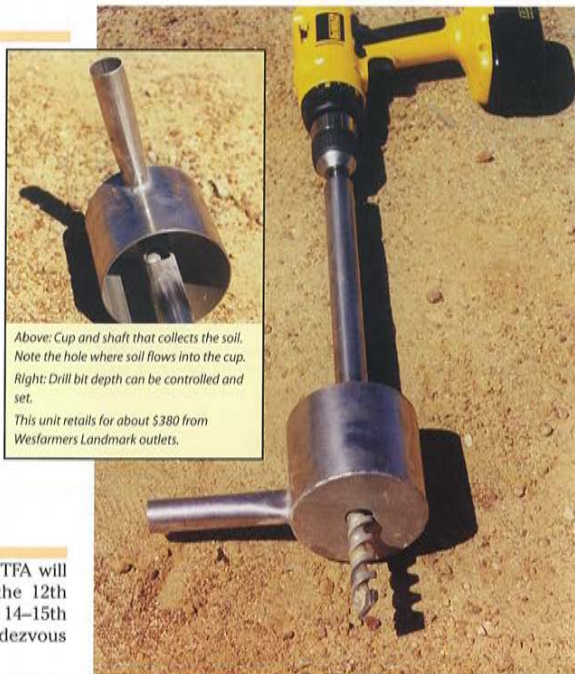
Soil testing made simple

A simple and effective soil collection system has been invented that can be connected to a hand-held drill.

This combination enables quick and easy soil testing to more than just one depth. As our soils mature and there is a greater history of no-till use, there is a need to re-examine how we conduct soil testing.

How deep do you need to test your soil to? It is likely that you will want to know how your soil's fertility changes with depth. Sometimes the sub-soils can be quite hard to penetrate in mid-summer. This tool, however, will make it a much less strenuous activity.

Incidentally, if you have been no-tilling and retaining stubble for more than 7 years, then I would love to have your soil's organic carbon levels from the same paddock (preferably by dGPS) through time—have they changed?



Above: Cup and shaft that collects the soil. Note the hole where soil flows into the cup. Right: Drill bit depth can be controlled and set. This unit retails for about \$380 from Wesfarmers Landmark outlets.

10th WANTFA Conference —Perth and Katanning

After reviewing the feedback from last year, WANTFA will hold one regional Conference at Katanning on the 12th February and a two-day Conference at Perth from 14–15th February. The Perth Conference will be at Rendezvous Observation City again.



Brazilian keynote speaker Dirceu Gassen.

Keynote Speaker will be Brazilian Dirceu Gassen. Dirceu is an entomologist with an excellent command of English. He is an insightful researcher with a healthy view of the pros and cons of insects in the no-till system. A broad-based systems-thinking person, Dirceu is strongly science-based and an energetic and clear communicator.



Other key interstate speakers will be Dr Warrick Felton from NSW Department of Agriculture in Tamworth, Dr John Williams from CSIRO Canberra, and Dr Nigel Wilhelm from SARDI, South Australia. There will also be many more local agronomists and farmer speakers. Please mark the dates in your diary—it will be a good event. The next *Farming Systems*, in early January 2002, will have all the details—as will our website in late December.



Keynote speakers Dr Warrick Felton (centre)—who spoke at and enjoyed our Meckering 2001 Field Day—and Dr Nigel Wilhelm (left)—WANTFA Study Tour member and speaker at our Conference two years ago with Dwayne Beck.

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EDA 102 2001

Sunn Hemp—might have potential!

Sunn Hemp (*Crotalaria Juncea*) is a popular cover crop in South America—and it may be what we need! It is a warm season legume that grows very quickly in warm soil and apparently does not need inoculation—let's hope that is the case in WA soils.

A nice feature of this crop is that it apparently actively fights many soil diseases such as root lesion nematodes, rhizoctonia, CCN and take all. It fixes N at the same time.

Will it have a niche in WA? Well, apparently it can handle a wide range of soil types, pHs and grows very quickly with a strong taproot and branching root system. We have sown some at Meckering on 2nd October on light soil at the cover crops trial. Albany-based Consultant Wayne Smith has organised 1 t/ha of seed that has been through quarantine. This will be sown in a wide range of WA conditions—and we'll keep you informed.

Topdressing urea in wet areas

Here is a modified email from Geoff McCallum, Farm Manager, Northparkes Mines NSW, phone (02) 6861 3051 or Geoff.McCallum@riotinto.com.

"Bill, here is a picture of a spreader that can hold up to 1 tonne of urea. It can spread urea 25 m wide—with an 11 hp Honda motor that runs the spinner. It runs on Land Cruiser wheels when the soil is dry and on low compaction tyres in the wet."



Perhaps this is a more cost effective option—there is certainly less compaction. Don't you just love these innovations—but check that it's legal in your area first!

"The 450 Honda 4WD can pull the spreader at 20 kph and spread 160–200 ha/day on very wet crops. If the bike can get over the ground—then so too will the spreader. The spreader was designed and built by Keith Bender of Lockhart NSW."



Study Tour Poem No-Till with Bill

(Editor: Excerpts from a poem kindly written by Vivienne.)

By Vivienne Lee Steere, leesteere@westnet.com.au.

We are the farmers from Aussie researching NO TILL
Setting out on our travels with Monique and Bill
South Africa is our first stop and jet lag we endure
To the Waterfront for shopping refreshes us for sure
Philadelphia for lunch then a seminar for some
The rest see a winery and taste the wine by gum
Then meet our South African hosts for the night
This will remain a tour highlight

Our Kit from Kellerberrin acts like the Mole
Records our sins daily and tells every soul
Harvey is all heart and makes a lot of sound
Has a talent for spotting any beauty around
It's off to Harrismith we must go today
To study NO TILL come what may

Free State, Natal, planters, fertilizers and lime
Control weed, plant crops, rotating all the time
Into Porto Alegre where they speak Portuguese
And soon we 'Oi', 'Cluo' and 'Obrigado' with ease
Carolina has joined us the language to master
Her knowledge of English will save many a disaster
We stay in hotels with rooms large and small
Showers with water hot, cold and warm

And sometimes when searching in the middle of the night
We cannot remember if the loo is to the left or right
Bill has connected with the Brazil Research Centre
To get permission their institute to enter
So we study and question their research on NO TILL
TILL NO brain cell is there left to fill

The Professor and Manuel fill us with knowledge
A clap of hands and we all had to follow
Palmero for lunch and we all paid the bill
That shop lady she have trouble with her till
An Aussie football got stowed on the coach
It came out for play when we stopped by the road
The locals look bemused, some kick if they dare
And we gave one local driver reason to swear
The Iguassu Falls gave a magnificent display
Lunch after on the decking sipping beer and chardonnay
To the bird park where the colours kept getting bolder
And a button pinching macaw to sit on your shoulder
While we ponder the field of agronomy

We know the bottom line is the farm economy
We can't yet practice what we see overseas
Because we just can't plant four crops in two years
It's drinks in the coach because we are running behind
And there's dancing in the aisle in a tango line
So often arrive late at our overnight hostelry
We think Bill must have Brazilian ancestry
Bill addressed the APPRESSID Congress by invitation
Proudly watched by his Australian delegation
An Aussie panel him joined for the question time
They hand-balled some questions right down the line
Up early and north to Buenos Aires we rush
We're booked to do a city tour on the guides bus
City sights, shopping alley and flea market in San Telmo
Dress up and the bus races us off to the tango show
Our sincere thanks must go to Bill and Monique,
To Angie and Nigel for their agronomic expertise,
And Ralph for his knowledge of pest and disease.

New website password

Time has come for a change! The new user name for members will be **wantfa02** and the password will be **soilcare**. Please remember to use lower case—no capitals!



From the President

Neil Young, Kojonup (08) 9821 0026, fax 01

Meckering Field Day

September 18 was a gala day at WANTFA's Field Day site.

It was a great day to look at agronomic issues and talk shop with good researchers and presenters whilst standing in the paddock. New ideas will spin off from this event over the coming year.

Congratulations to the organising committee, and thank you for your efforts in making this a delightful day.



World Conservation Agriculture Conference

Spain was host to farmers, scientists and bureaucrats representing 60 countries who came together for four very full days to swap ideas on conservation agriculture. An enormous wealth of information was presented, with 1200 pages of conference proceedings.

I presented Australia's activities with my allocated 25 minutes extending to nearly 40 as so many questions came out.

From what I could understand, given the amount of Spanish used, WANTFA is heading along the right track so far. Stubble was universally recognised as the driving force for productive soils with all its inherent benefits to soil health and life. Elsewhere they have been able to make really good use of residue as a useful tool in crop management—a challenge for us still.

The next such conference will be in Brazil in 2003.

WANTFA Research

We are well aware that no-till farming still has along way to go before it can be considered secure in WA. Therefore, we are in the process of drawing up a research strategy for our Association to take us into the next five years.

Following on from this, we will place a submission before GRDC for assistance in implementing the highest priority work. Other sources of assistance are being identified to expand this work where possible.

Committee

Nominations for positions on the Committee to manage WANTFA are called for at the Annual Conference. Fresh ideas and faces are always welcome, so give some thought to either volunteering yourself or proposing somebody who will be able to actively contribute to making this Association even more effective.

Letters to the Editor

TOPICAL

Dear Sir,

Why I am not afraid of Roundup GMO crops...

Can no-till exist without Roundup? Of course it can. I have been meaning to write my thoughts on this topic for a few years, and Kevin Bligh's letter to the WANTFA Editor (August 2001) finally prompted me to do it.

Unfortunately, I strongly disagree with Kevin Bligh's comments. I am not sure why Kevin does not see what I see, but WANTFA is clearly at the forefront of fighting herbicide resistance. Even at the excellent Meckering Field Day, held in September, WANTFA clearly showed this is a major focal point with trials on shielded sprayers in wide rows, cover crops, summer crops, and herbicide testing across many crops and pastures. It was mentioned by several of the speakers, though I could not get to hear all of them.

One amongst WANTFA's many activities is researching what others are finding in other parts of the world, and one clear example of this is the study tour Bill and Monique Crabtree and I co-organised to the USA and Canada in 1998, with 43 farmers. Dwayne Beck's research station clearly showed how it is indeed possible to farm without Roundup or any knockdown herbicides for that matter. My own clients are slowly but surely finding that this is possible, and are achieving this. Each year, ryegrass populations are falling in more and more paddocks, even though we are not fully adopting true no-till.

Cultivation is not an option

Just in case anyone is thinking cultivation is required to prevent herbicide resistance, I will argue strongly that cultivation and erosion are not an option. We are doing so well with no-till that going backwards (to cultivation) is an anathema. Cultivation is ensuring we have a recurring weed problem. No sheep and no-till plus other strategies are removing weed problems. Our aim is 100% weed control so that we can grow crops without herbicides (costs). 'No seed = No weed' as my clients keep hearing me say.

Roundup Ready—A powerful tool

There is much debate and hysteria over the introduction of GMO crops. Some seem to think that Roundup-resistant/Ready (RR) crops will only hasten the development of widespread resistance to Roundup. I do not think so and I would like to explain why, ignoring the marketing implications for now.

Saying that RR crops automatically means widespread Roundup resistance is an annoying statement to me. The reason is that it assumes farmers are idiots.

We are great farmers, adopting new techniques and technologies faster than most. Farmers are many years ahead of where the research is. Each year we find new ways to do something better, and tackle new problems well before funding is given to find a cure.

The Clearfield package failed

We rejected the Clearfield package and have won this battle. We know how to grow things efficiently and the demise of the Clearfield package is testimony to this. I am very proud that WA farmers were the most vocal against such intrusion to our efficiency (Best Management Practises).

Let's consider the RR package. There is no way that WA farmers, and I hope the other state's farmers, will accept any dogma that says we must use XX mL/ha of Roundup at such and such a time, and you are not allowed to use mixtures, etc... This is what the Clearfield package tried to do. We just will not do it because it is not Best Management Practise. It is a scheme to ensure profits for the companies. Therefore I have no fear or give any credence to comments that GMO crops will only benefit the multinationals and not the farmer. Twaddle, absolute twaddle. That assumes we are merely dumb robots for the multinationals.

Look at the demise of the Clearfield package. That occurred because we could see it was wrong, and very inefficient. We will not do something like the Clearfield restrictions if there is a better way of doing it. The multinationals will not be able to tell us what to do. We are not their puppets.

Before continuing, remember that herbicide resistance management is a numbers game. The more weeds you have, the more chance there is of finding a resistant weed. One of the many things I objected to with the Clearfield package was that the so-called "fit" for Clearfield canola was into weedy paddocks. This just shows why their Best Management Practise package was nothing of the sort. It is a numbers game and we do not use just one or two herbicides to clean all our weeds up.



continued over...

TOPICAL

Rotate chemicals!

"Give the crop a taste of Heaven, and give the weeds hell" (Allen Postlethwaite). We must do all we can to make it difficult for a weed, like use no-till and keep weed seeds on the surface where they do not like to be. Therefore do not use harrows and do not bury the seeds with sheep or machines. Use chemicals like Dual, Avadex, and Treflan that work so well in this scenario, and work towards 100% weed control using all possible means. The most important control methods are not chemical.

Ryegrass is disappearing from most of my client's paddocks, for various reasons I will not go into here. We will not increase our chances of selecting Roundup resistant ryegrass by using RR crops because the numbers are low (non-existent in an increasing number of paddocks). In fact, I believe RR crops will reduce the chances of us getting Roundup-resistant weeds.

If we farm correctly, we will not be using Roundup any more frequently in a RR crop than in a traditional crop. Anyone who farms like many Americans do (sorry, USA readers) will get Roundup-resistant weeds very quickly—ie RR corn followed, by RR soybean, followed by RR corn, etc...

Let's assume our first RR crop will be canola. We would usually sow the canola dry, and remember that we would not be starting from a weed blowout scenario. If there happen to be weeds present before sowing, good farmers will use SpraySeed as much as possible, or a Roundup brew followed a SpraySeed brew (double-knock).

If sown dry, we would spray Roundup at about the 1-4 leaf stage but always in a mixture with other herbicides, like Verdict (to control geranium (erodium)), Lontrel (to control legumes and capeweed), and perhaps a stronger grass selective, like Select (Roundup is synergistic with most (all?) grass selectives). Where is the extra Roundup use in this scenario? Some mixtures would also be with chemicals like Dual and Treflan—yes, even in post-emergent canola.

Farmers are only likely to use Roundup twice in one year if a RR crop is sown in a weed blowout scenario. Better farmers are not likely to do this. They are aware of the dangers in relying solely on Roundup to control a mass of weeds. They are not idiots.

We are about to start using the following techniques in our farming, and I will use RR canola as an example, but any canola or legume crop will be using this principle. Growing RR canola in wide rows with shielded sprayers and self-steer tractors means we do not have to spray Roundup on all of it. We could and would use other chemicals, like Affinity, Kerb, SpraySeed, Gramoxone, Basta, etc... between the rows inside a shield. We would only spray 25% or less of the area with Roundup—25cm on the crop row and 75 cm between the row with shields to spray whatever other chemical brew is required.

So if Monsanto think that the best Management Practice for RR canola is using a set rate of Roundup at a set time or multiple times, they are dreaming. We are better farmers than that. We will not put RR crops onto the weediest paddocks, as the promoters of the Clearfield package so erroneously suggested.

Good no-till farmers are starting to spend less on herbicides, and with RR crops, as with any crop, it will end up being to purely to keep weeds out, rather than to fix up a problem. We are good at rotating chemicals, but increasingly also at rotating crops that include more diversity—like summer crops, cover crops, and hay crops. Keeping sheep out of paddocks is also one excellent tool for weed control. My experience clearly shows that 'no sheep' makes weed control even easier.

No-till is a system!

Change one thing and many other things change. If all you change when you start using no-till is the seeder, than you will get herbicide resistance, and suffer many other problems. Good farmers use all tools and techniques available, such as most WA no-till farmers are doing.

WANTFA and Bill Crabtree have done so much to help Australian farmers into a more sustainable and efficient farming method that will last for generations. May you continue to help us improve and prosper!

Wayne Smith

Agronomic Acumen
www.agronomy.com.au

WANTFA's activities with glyphosate resistance

A response to Kevin Bligh's letter to the WANTFA Newsletter's Editor (p432 August 2001)

Bill Crabtree, Editor and Scientific Officer

Kevin Bligh rightly points out that glyphosate resistance is here and it is a threat to no-till sowing. I have received another letter from Kevin on this same subject—intended for this issue—which suggests WANTFA should do more 'work' on glyphosate resistance. Kevin's concerns have been discussed at length at many WANTFA committee meetings. However, as WANTFA's Senior Scientific Officer, I would now like to outline how WANTFA has addressed these concerns.

In perspective

Glyphosate-resistant ryegrass probably first occurred in Australia in June 1976—the year it was first released! This assumes an innovative farmer applied glyphosate to a ryegrass-based paddock, then no-tilled and did not follow up with another herbicide and the plant survived. Richard McKenna's article in the last WANTFA Newsletter (August 2001, p432) shows that the gene frequency of glyphosate resistance to be 1 in 10,000,000 plants (this is early data and the frequency may be somewhat lower).

I have measured ryegrass at 5,000/m² in a south coast pasture paddock going into crop in the mid-1980's. Therefore, if nothing else killed these plants in every one-fifth of a hectare, there would be one glyphosate-resistant plant, or in 100 ha there might be 500 resistant plants. To suggest this might only amplify Kevin's concerns and encourage others to become complacent. I hope not! But it does demonstrate that we have obviously been killing ryegrass with other methods and this is what we need to keep doing.

Practical tools

In most WANTFA Newsletters we have tried to present innovative and varied ways of killing ryegrass and other weeds. These include less tillage; the double knock with SpraySeed; getting weed numbers down; rotating crops and herbicides; adopting Unicorn barley; swathing crops; spraying under swathers; chaff collectors; Rotomill; delaying sowing; ants; trifluralin in thick stubble; burning windrows; using a chaff top; cut hay; growing lucerne; including summer crops; growing a healthy crop (raised beds and claying); safe fertiliser placement; increased seeding rates; cover crops; shielded spraying; crop topping; spray topping; weed wiping; as well as new ways of using old herbicides. This list is not exhaustive. Perhaps readers know of even more ways of killing weeds—please suggest them! Whenever we meet a farmer or researcher who has a new slant on how to kill weeds or grow crops more aggressively we try to include it in the Newsletter.

Speakers

Weed management and herbicide resistance has been a WANTFA focus with many of our speakers at conferences, field days, seminars and trials, and in Newsletter articles. Some of these include Prof Jonny Gressel, Dr Doug Derksen, David Minkey, Prof Steve Powles, Prof Dwayne Beck, Scott McCalman, Rolf Derpsch, Dr Michael Walsh, Dr Warrick Felton and Mike Collins.

The biggest problem

Perhaps our biggest problem is those who are not WANTFA readers and don't read other material on herbicide resistance either. We need everyone to help in whatever way you can to spread the word and share ideas with others, because herbicide resistance is of concern to us all.

soil loss through wind and water erosion. Corn, soybean, grain sorghum and wheat are grown under both dry land and irrigation conditions.

Surprisingly, with high rates of water (irrigation) and N being applied to their winter crop, their wheat yields are not much better than ours. We felt that something must be limiting their yield potential—could it be inefficient use of water or N, soil acidity, disease or inappropriate rotations?

The South American experience begins

We then flew to Sao Paulo in Brazil and then down to Porto Alegre, where we boarded our bus for the journey through Brazil, Paraguay and into Argentina for the next 14 days. We travelled through Passo Fundo, Uniao da Vitoria, Ponta Grossa and Londrina in Brazil; Naranjal, Bella Vista and Encarnacion in Paraguay; and Buenos Aires, Mar del Plata and Balcarce in Argentina. Along the way we visited farms, research centres, machinery factories and universities.

We also managed to spare some time to visit the magnificent Iguacu National Park at Foz du Iguacu on the border of Brazil and Argentina, where we saw the Iguacu Falls, and took a jet boat ride up the river. The less adventurous went for a walk through the bird park, and the insane flew over the park in a helicopter.

Jet boat ride at Iguacu Falls.



The South American countryside is a colourful patchwork of hills and fields, dotted with tiny houses and tall trees.

Farms range from 10–3,000 ha and are as varied in what they produce as they are in size. Wheat, barley, canola, corn and soybean are grown in rotation with both cover crops and forage crops (in Brazil and Paraguay only). Black oats, vetch, lathyrus, peas, ryegrass, radish,

Sunn Hemp and lupins are all used as cover crops, while black oats, alfalfa, ryegrass and clovers are grown for forage—more than one species may be grown at any time.

Stock numbers are dwindling and feedlots are becoming increasingly popular as farmers realise the benefits of removing stock from their no-till fields. They sow 2 crops a year (20 crops in 10 years!) with wheat, barley, canola and occasionally corn grown in winter, and soybean and corn grown in summer. In Brazil and Paraguay, 5 of these 20 crops will be cover crops, sown in winter, and followed by soybean or corn. In other words, approximately every 4 years they sow a cover crop in the winter phase of the rotation.

Cover cropping began as a means of further reducing water erosion on steep slopes. No-till methods of farming, which began in the late 1960s, had already greatly reduced soil losses resulting from an annual rainfall of 1,000–1,500 mm falling on hilly country. Sub-tropical agriculture is not sustainable without cover crops.

Their cover crop experience

These crops take no-till one step further, providing a thick, protective residue layer over the soil. Since then, other benefits have come to light, such as an increase in organic matter and soil fertility, increased biological activity in the soil and a reduced need for herbicides (due to the suppression effect of the residue layer on weed germination). A cover crop is now included in the rotation as often as is deemed necessary to maintain and promote these benefits for both the cash crops that are grown, and the wider environment that they are grown in. Often one crop in five is a cover crop.

Knife roller in action in Paraguay.



Typical Brazilian countryside.



Winter cover crops are sown April–May while summer cover crops are sown in September. These crops are then rolled, slashed or sprayed down between late flowering and early milky dough stage. Knife rolling kills the plant by crimping the stem a number of times as the roller rolls over the crop.

A knife roller has blunt blades welded 18–20 cm apart, all the way around the cylinder. The blades are not sharp enough to cut the stem; otherwise the plants can re-shoot, causing problems in the cash crop phase of the rotation. The aim is simply to crimp, pinch or bruise the stem to prevent the flow of nutrients to the plant. Some farmers follow up with a chemical desiccation after rolling, to ensure that nothing re-shoots.

Right: Every 20 cm the oats are crimped—this stops them re-growing. Below right: This knife rollers edges are too sharp and it cuts.



If the contact edges are too sharp they will cut the oats—allowing them to regrow.

The cash crop is then sown directly into the residue with a disc machine within 2 weeks of rolling, and can be sown either with, or across the direction of the roll. We believe this is possible for two reasons. Firstly, because the crop is rolled at flowering—when



2001 WANTFA Study Tour

Angie Roe, Farm Focus Consultants, (08) 96 225 095 or angie.roe@wn.com.au. Photos also by Angie Roe.



The Study Tour Group in front of the Iguacu Falls, Brazil.

The 2001 WANTFA Study Tour to South Africa and South America was a huge success. We have all returned full of enthusiasm and armed with some new ideas to trial within our own farming systems.

Thirty-five of us travelled through South Africa, Brazil, Paraguay and Argentina for a total of three and a half weeks, looking at no-till farming systems and, in particular, cover cropping and warm season cropping within no-till farming systems.

By the end of the trip, we all agreed that both cover crops and warm season crops might need to be given a place on our own farms if we are to achieve long-term sustainability in the agricultural industry. Now we just need to figure out what and where that place is!

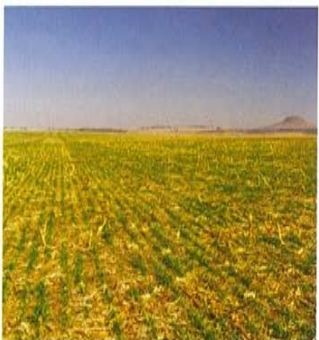
Western Cape—winter wet

First stop was Cape Town in South Africa, where we met and were billeted out with a group of farmers in Philadelphia, a little town about one hour north of the city.

South Africa is very similar to WA in terms of age, climate, landscape and soil type. Farms range from 1,000–3,000 ha in size and the farmers grow wheat, canola, faba bean, sunflower, corn and medics.

No-till is a relatively recent event—most crops are still being broadcast onto cultivated soil, then buried with another pass over the paddock. Beef, milk, lamb, wine and fruit are also produced and one farmer we met even operates a 4,000 ha game park!

Pre-emergent herbicides (trifluralin, Glean, triazines, etc) are not common and, consequently, farmers have come to rely heavily on knockdowns and post-emergent weed control. Grass weeds require high rates of grass selective herbicides and broadleaves such as capeweed, double gee, wire weed, marshmallow and fern leaf geraniums are becoming increasingly difficult to control. Sound familiar? Ever wondered where some of our weeds come from?



Young wheat plants in a no-tilled field at John Jackson's property, near Bergville, South Africa.

Around Johannesburg—summer wet

We then flew into Johannesburg and headed SSE for 4 hours to the Kwa Zulu Natal area, where we met with a number of farmers and industry-related people. This region is relatively flat and dry with sandy, acidic soils. No-till was adopted in the mid-1980s, as people became increasingly concerned about

the plant is still green and the stems are soft and pliable, it makes the cover crop easier to cut through. And secondly, the farmers are sowing into a firm soil type—not sand! In some places they only seed in the direction of the rolling.

The disc needs something firm to cut against. Soils which have been loosened by a knife-point, or those which are naturally soft, tend to allow the disc to push (hair-pin) the straw into the furrow. Hence we believe there is a strong need for residue managers in WA conditions.

Can we grow cover crops?

Our group regularly discussed whether cover crops should be sown in the winter or summer phase of the rotation in WA. Establishing something over summer means that the paddock is still available for the cash crop in winter—although it would use any moisture delivered in a summer thunderstorm. (Ed: Note Owen Brownley's experience of this in the February 2001 WANTFA Newsletter.)

Additional benefits of cover crops include reduced wind erosion on paddocks which are usually bare in summer and an opportunity to graze or cut fodder if feed reserves run short (for those of you with stock! (Ed: See Ashley Jones' forage sorghum article in this issue.) A suitable plant would be anything that is summer active and reasonably drought tolerant, which grows vigorously, covers well and produces good biomass. Examples include forage sorghum, Sunn Hemp and millet.

Growing a cover crop in winter means no income from the paddock for a year, unless you grow your cash crop in summer. The advantages are that there are a greater number of suitable plants (including legumes) available to use in winter, the risk of producing inadequate biomass is reduced, and it can be a very effective way of controlling resistant weeds. Plants such as Cadiz seradella and black oats might be good options. (Ed: See Trent Tyler's experience later in this issue.)

Black oats are very popular in South America because they have a long growing season and are tolerant of both frost and acidic soils. As well as these features, they produce an incredible amount of biomass, decompose very slowly (which means more ground cover for longer) and they are disease tolerant—which means less disease carry over to the following cash crop.



Black oats mixed with vetch as a mixed cover crop.



Garry Helliwell (from Butine) shows the size of the Brassica Juncea roots—that are used to break the hard pan of the soil.

Argentina Conference and rain

From Paraguay, we headed south to Mar del Plata on the east coast of Argentina, where we attended the three day AAPRESID No-Till Conference, as well as enjoying some free time in the many shops and restaurants. At the conference we heard many references to no-till and its potential for reducing CO₂ levels in the atmosphere, as well as the importance of maintaining balanced Ca:Mg ratios in the soil. Speakers like Carlos Crovetto (Farmer—Chile) and Dr Sara Wright (Researcher—Dept of Agriculture USA) reinforced the importance of creating and maintaining healthy soil ecosystems by practicing no-till, developing suitable cropping rotations, and maintaining the stubble on the surface of the soil.

The problems associated with no-till were discussed at length, and we soon realised that farmers everywhere face many similar issues. These included the best way to managing weeds, diseases and insect pests; issues of lime movement and herbicides like trifluralin; and managing stubble residues. All these are issues no-tillers need to work with everywhere. We are constantly seeking ways around new no-till challenges. The lesson from South America is that incorporating both cover crops and warm season crops into the farming system

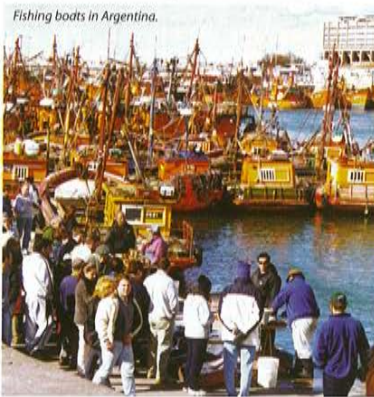
will go a long way towards solving many no-till problems.

Cover crops need reasoning

We need to think about why we will grow these crops, before we can decide what and how we will grow them. If they are to be worthwhile they will need to provide a flow on benefit to the winter cash crop and, ultimately, the wider environment. For example, you might like to reduce the grass weed burden in the year prior to a crop or reduce a resistant ryegrass population. You may want to increase nitrogen levels and improve soil fertility, or increase organic matter, suppress weed germination, and reduce evaporation by building a residue layer.

Your choice of crop species, variety, time of sowing (winter or summer) and seeding rate, amongst other things, will depend on what you are trying to achieve. For example, a legume should be planted where you would like to increase soil N levels, but a biomass producing plant such as a cereal should be used if you would like to create a thick residue layer to suppress weed germination. And we need to ask ourselves how we can incorporate these things into our farming systems without exposing ourselves to high levels of financial risk.

Perhaps it would be easier to buy an Argentinean fishing boat, and head off fishing each morning...



Fishing boats in Argentina.

In summary, the trip was well worth the long flights and never-ending buffet meals, since we all came home with a better understanding of the complexities of no-till farming systems. This has given us the knowledge and confidence to further develop these systems on our own farms.

Agronomic View—less ryegrass!

Wayne Smith, www.agronomy.com.au, phone (08) 9842 1267



Wayne Smith, Agronomic Acumen Consultant from Albany.

Farmers often ask me 'why is ryegrass disappearing? Yet, it is difficult for other farmers to understand how this is possible when they have been having problems with ryegrass for years and years. It is more common for ryegrass to be disappearing in the south areas of the state than in the north.

Sheep contribute to ryegrass persistence

I do not have all the answers to the question of why this has happened but, for those still having ryegrass problems, perhaps something I suggest below may be different to what you have been doing and consequently may help you get rid of your ryegrass. I have seen paddocks that were once full of resistant ryegrass now so clean that you hardly find any ryegrass in the whole paddock. It seems to me that the biggest factor of this success has been the removal of sheep in a no-till system.

Ants are active

Ants seem to eat large amounts of the seed when left on the surface, and this observation is supported by some research that has been done over the past few years. Seed buried even just 1 mm deep is rarely eaten by ants. The seeds need to be on the surface—not be pushed in by sheep. Sheep also destroy many surface ant tunnels and probably reduce the effectiveness of the ants in gathering seeds.

Avoid using harrows

In my view, harrows in no-till systems are an absolute no-no. I know that many no-tillers still persist with harrows, which is probably one reason why they are still having a ryegrass, and other weed, problems.

Aim for total weed control early on—and then keep it clean! Sounds easy, but of course it isn't always like that. Neighbours' paddocks blowing onto your clean paddock is one example of how your good work can be undone.

Using whatever rotation is needed to remove weeds is a must. This may include hay, summer crops, cover crops,

A fence line has just been removed from here! These weeds enjoyed the safe place created by the shelter in the fence line.



lupin then TT canola, etc. Keep fence lines and all sown seed free of weeds—part of farm hygiene.

Soil applied mixes love no-till

Treflan + Dual, and Treflan + Avadex mixtures in no-till have been giving excellent weed control in most situations, and now post-emergent sprays for ryegrass are quite rare. These brews generally do not work as well for first time no-tillers as they still have many weed seeds buried. Long time no-tillers have all their seeds on the surface.

My aim is to be able to sow wheat without a knockdown and only use a small dose of a herbicide to clean up the previous self-sown crop. This is not possible until all problem weeds are removed. 100% weed control is the aim, not economic weed control.

Rotate, rotate!

Just relying on chemicals to get 100% weed control is not possible. It must be in conjunction with diverse rotations, and whatever means are necessary to make it as hard as possible for the weed to set seed. No Seed = No Weed.

It takes determination to do this because I know when the first crop is really clean (like crop-topped peas for example), many farmers cannot help themselves and sow the paddock back to wheat, which then let some weeds build up again. (I can see some readers smiling now, saying "He's talking about me again").

If the clean peas were the first crop, the second clean crop needs to be hay or a summer crop to make sure there is no weed seed set for another year. If you have carried out the rotation correctly, and there are no root disease and weed restrictions, the following wheat crop will be very clean and cheap to grow.

North versus the south?

Why is it different in the south to the north of the state? I am not sure. I know we seem to have different ant species that may eat more ryegrass and silver-grass seeds than the species up north. Also, more no-tillers down here do not use harrows, which is crucial to not giving weeds a seedbed.

Remember that the number of seeds is not important, it's the seedbed. Do not give the weeds what they want. They hate being on the surface where they suffer wet/dry cycles, heat, ants, birds, toxins from stubbles, and get the full dose of chemicals like Dual and Treflan. This is the way it should be.

Tickling is foolhardy

Doing a tickle to encourage weeds to germinate is crazy to me. It gives weeds a chance of survival, as the herbicides will not kill all of them, removes them from the ants who eat them, dilutes the Treflan and Dual type chemicals, and encourages some weeds to be dormant. Don't give the weed a seedbed!

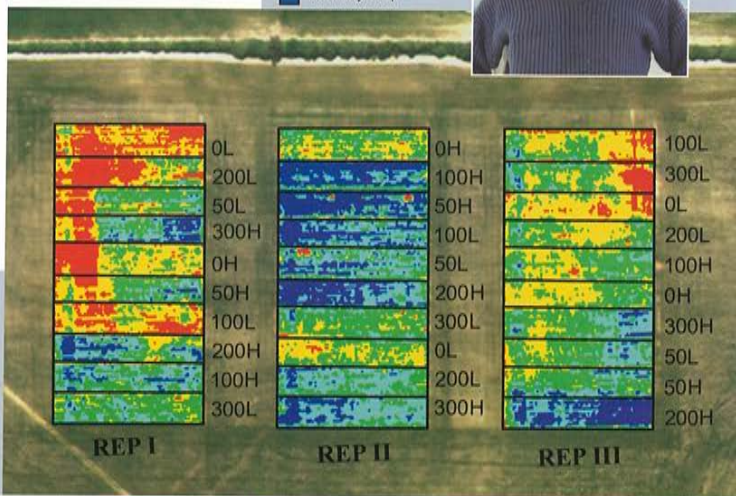
Spectacular claying trial—imaged!

Bill Crabtree, WANTFA Scientific Officer, (08) 9622 3395

Thanks to Jim Baily of AirAgronomics and Specterra Services, the Meckering R&D site claying trial was photographed and imaged from a plane in early September 2001.

The image (right) gives an excellent overview of how each of the plots performed. This site was given the highest trial rating by visitors to our Field Day. Notice the higher the clay rate and the greater the level of incorporation the higher the plant cell density index. See the grain yield results in the next WANTFA Farming Systems edition (early January).

Note the better 'plant cell density index' with the higher rates of clay in plots that are 15 m wide by 85 m long. Thanks to Colin Pearse and Walter den Engelsen for assisting with the trial.



2001 Meckering Field Day proves bigger and better

Matt Beckett, WANTFA Scientific Officer, (08) 9690 2157 matt.beckett@wantfa.com.au

The second WANTFA Meckering R&D Field Day was held on 18th September with about 550 people attending—making it possibly the state's biggest agronomy field day in recent years.

On display were more than 20 innovative and mostly visual trials. The majority of the trials were located on the main R&D site, with three others in close proximity. The day's program involved 18 different speakers with nine concurrent sessions running every half-hour.

Ninety-three people completed the tear-out survey forms, which were included in the Field Day booklet. We asked attendees to rate aspects of the day, including the trials they visited and the presentations at those trials. People obviously chose how they interpreted the questions. Their interpretation may have been based on relevance, design, treatment differences, take-home messages or more.

The Field Day overall was given an average rating of 4.8 out of 6 (1 = poor, 6 = excellent). The average rating of all of the trials and presentations was 4.4 with the following graph demonstrating the individual ratings for both the trials and presentations.

Claying rated most spectacular

The highest rated trial was 'Wheat on clayed soils' with a score of 5.5. This is a long-term trial, with five different rates of clay by two different levels of incorporation applied in early 2000. The clayed treatments produced much better wheat emergence which should give strong grain yield increases. See the claying trial image on page 461.

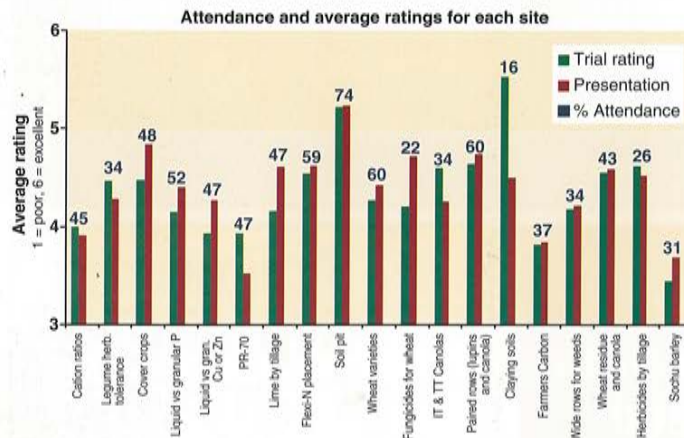
Other trials that rated well were wide and paired rows for lupins and canola, herbicides by tillage, IT & TT canolas, wheat residue and canola, and Flexi-N placement.

Trials and presentations that rated relatively low include 'Sochu barley', 'Farmers Carbon' and 'PR-70'. Reasons for their lower rating may be an issue of relevance or expectation and is not a reflection of the validity or importance of the work done.

How did people find out about the day?

The WANTFA Newsletter was shown to be the most common medium for alerting people to the event (see the table below), closely followed by word of mouth.

Advertising medium	%
WANTFA Newsletter	48
Website	10
Farm Weekly	25
Other printed media	8
Radio	15
Signs at site	8
Word of mouth	43
Other	14



There were a wide range of other constructive comments submitted which will be given due consideration. We are keen to have more input from farmers on trial ideas and trial designs. There will be the opportunity at the upcoming 2002 WANTFA Annual Conference to assist in trial planning for the 2002 trials—come and have your say.

Below: Angie Roe (left) and Matt Beckett (right) relax with friends near the bonfire after the event... and some of the key helpers who made the day work (from left) Merve and Ashley Burges, Colin Pearse, Carl Perella and Geoffrey Marshall.



Bob wins again!

Professor Bob Gilkes' soil pit was the winner for the second year running, achieving the highest attendance, highest presentation rating and second highest trial rating. A pit was dug across a lupin and barley crop to a depth of 1.8 m with Bob standing in a foot of water explaining many soil and plant root characteristics.

The presentation by Fran Hoyle for the cover crops trial was rated second best, with speakers Geoff Fosbery (paired rows for lupins and canola) and David Williams (fungicides for wheat) almost equal for third.

Meckering R&D Site Sponsors

WANTFA would like to thank all the speakers, our Diamond Sponsors and all our other sponsors and contributors.

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BUILDING BETTER SOILS

Northern South Africa —agriculture and more!

Bill Crabtree, WANTFA Scientific Officer, (08) 9622 3395

At the end of the South American Study Tour I spent three days investigating crop production issues in northern South Africa. I travelled 3-4 hours south-west of Johannesburg to towns called Muresberg and Wesselsbron then 50 minutes east of Johannesburg to a town called Delmas. On other recent visits I have travelled 2.5 hours south of Johannesburg to Bethlehem and 3.5 hours south-east Johannesburg to Bergville and Winterton and then taken a bus to the irrigated farms in KwaZulu Natal. This article includes thoughts from all three visits.

Social and natural background

South Africa was known as the 'jewel of Africa', it has extensive mineral wealth, particularly gold and diamonds, and the mine deposits are very visible as you fly over the land. This wealth has brought much prosperity to the country and this is evidenced by good roads, electricity, rail, water systems, nice homes and a strong public service. All of these, especially the roads, are deteriorating. There are now 5 million whites and perhaps 40 million blacks in South Africa. Before the dismantling of apartheid in 1996 there were 7 million whites.

Immigration into South Africa is not controlled and there is a constant flow of Africans through the border from northern countries. There is a law in place to prevent illegal immigration but the government does not have the resources or willpower to enforce this. These people are encouraged, by government policies, to share in the wealth of South Africa. Squatter camps of 5,000 people can emerge overnight. Such camps usually consist of thousands of small tin, wood and plastic huts. Power is quickly tapped, by hand, off the main electricity wires overhead illegally and no electricity or water bills contribute to the economy as a result. It is now governmental policy that if these camps are not 'moved on' within 24 hours then they can claim the land as their own.

Such situations are difficult to write about but they are important when explaining some of what we learnt on our agricultural study tour. Farmers can find labourers standing on the side of the road 'looking for work and a lift'. This labour can be purchased for about \$US4 per day.

I was struck by the soil pits that were dug for me everywhere I went—some of the holes were large, being 2 x 2 x 4 m. It made me feel uncomfortably 'special'. One lady who served my wife Monique and me at a fast food counter said she was happy to work for little, as it gave her something productive to do each day.

Smoke fills the winter air around Johannesburg until the August winds blow it away. The dry and cold winters make prairie grass fires and fires in huts common in northern South Africa. The whole Johannesburg region is covered by an extensive mushroom of smoke.



Skilled craftspeople spend time carving items by the side of popular tourist roads. This market was on the way to the Pilansberg National Park.

The recent governmental policy of 'affirmative action' requires that a large number of native Africans must be elevated to prominent positions in the workforce. This, apparently, has made it more difficult for well-qualified white people to obtain suitable employment and has hastened their immigration to countries like Australia. The wide economic gap between the few whites and the many blacks has, however, meant that stealing and violence are commonplace. Wealthy farmers, with increased isolation, are at greater risk.

In southern South Africa the social atmosphere among the whites seems to be more positive now than it was when I visited 14 months earlier. However, in the northern areas, where the influx of people is more obvious there is still significant pessimism. The main governmental focus is on getting people into modest \$US5,000 homes. This has meant more employment, improved morale for Africans, continued immigration from other African countries and less money being spent on other essential services. It is a complicated issue that the rest of the world is facing too.

The sandy soils

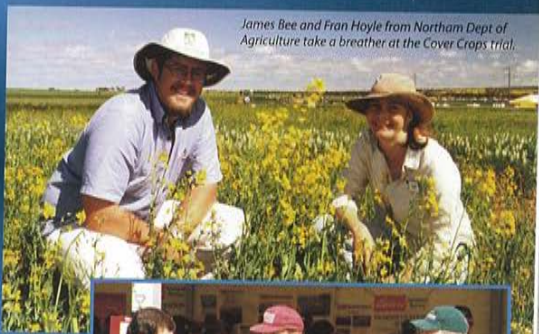
The soils south and west of Johannesburg are generally light textured. Some seem very similar to the yellow loamy sands



Above: Bill Crabtree surveys the site.
Below: Farmers check which 10 of the 20 sites to visit.



Aerial view taken three weeks after the Field Day.



James Bee and Fran Hoyle from Northern Dept of Agriculture take a breather at the Cover Crops trial.



Above: P.J. Singh from BEELINE (right) talks with one of many farmers on the benefits of 2 cm accuracy. Left: Dr Warrick Felton (left) from NSW and Mike Collins reflect on the success of the day!
Below: Groups gather to listen to the concurrent half-hour sessions.
Below left: Prof Bob Gilkes gave an entertaining and instructional talk about problems with WA soil.



Geoff Fosbery, Farm Focus Consultant and Chair of the Meckering R&D site discusses how to get the most out of the day. Bill Crabtree (middle) and Neil Young (WANTFA President) listen on.



of the Wongan Hills area while others are more like the Esperance or West Midlands sandplains. Water repellence is not a problem there and their often deep, sandy soils usually contained at least 4% clay.



Everywhere I went labourers had dug soil pits for our inspection. Here an Omnia fertiliser agronomist shows the compacted soil layer.

The rainfall in these agricultural areas varies mostly from 500–800 mm and is mostly in the warm months (October–March). Such sandy soils do not hold much water. These soils are often duplex and have a clay base (of similar type to ours) from 0.7–3.0 m depth. Perhaps not surprisingly, deep ripping to 70 cm depth gives 25–40% corn grain yield responses and is done every year in winter with increasing depth—a scary thought!



Ripping is done with a twin ripper—the second one rips deeper than the first.



The wheat roots struggle to penetrate compacted sandy soils. See how the roots on the top plant have thickened as they attempt to push through the firmed soil. There was also a suggestion that low Ca levels may have added to the root thickening.

Corn is the main cash crop grown, along with some sunflowers and sorghum. On the deeper soils, with a fresh water table within 1.5m, spring wheat can be grown on stored summer moisture during the winter but it is sown on 50cm row spacings with a wide gap every three rows, and at only 8kg/ha into soils that are 'well' tilled.



Wheat grows during winter (photo taken 22nd August 2001) on stored moisture on wide rows. It was sown at 8 kg/ha into cultivated soil.

I was frustrated that I could not give the farmers and agronomists confident answers as to how to adopt no-till without short-term economic loss. The farmers I met realise that they need to find a more sustainable way of farming their fragile soils. Some are adopting stubble retention, but their soils re-compact each year without traffic. I was privileged to travel with a knowledgeable soil physics scientist called Professor Allan Bennie, much respected by farmers. I suggested that legumes are desperately needed in order to inject some biological life into their soils.

Heavy soils—no-till's the go!

Generally, east of Johannesburg, the soils are heavier and many look similar to the Avon Valley loams. In these soils they were doing significant tillage. The tillage destroyed their stubble cover and greatly damaged their soil's structure. They had lots of run-off and lost valuable crop water in heavy rainfall events. On these soils I was able to confidently exhort them to embrace no-till, after some research.

On these better soils we met several farmers who had been no-tilling for 8–12 years and they were getting some great results. I encouraged them to think about crop diversity, which is possible in these better soils, and I talked of the 'intensity principle' that goes clearly with no-till (which Dwayne Beck has stamped in my mind).



A salt sensing machine that can give electrical conductivity readings to 70cm depth—this could be useful to WA farmers. It is linked to a computer and can create a map of a paddock—knowledge is power! For more information see www.veristech.com.

Thinking of growing a summer crop?

Andrea Hills, Research Officer, Esperance Department of Agriculture, (08) 9083 1111



Esperance farmers Marg Agnew (left) and Ken DeGrussa with Don Gadon (CSIRO modeller from Toowoomba) and Andrea Hills who met to talk about the project.

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A sustained interest in summer cropping along the south coast and beyond has resulted in a partnership of groups, including WANTFA, Dept of Agriculture, the Neridup Soil Conservation Group and the Oldfield Group, putting up a project proposal to GRDC. The GRDC has agreed to sponsor a three year project titled 'Warm season cropping systems on the south coast of WA'.

I will be working as the Development Officer in the project with David Hall to research, develop and extend agronomic information for a range of summer grain and forage crops based on local trials and experience rather than eastern states knowledge. I will be based at the Department of Agriculture in Esperance (where I have been working as a Development Officer since 1995).

Project aim

Our aim is to determine what role summer crops can play in our farming systems and whether summer crops can alleviate waterlogging, summer/ autumn feed shortages, herbicide resistance or have any other benefits. Soil water use over summer is an important focus of the project. Another interesting aspect is to search for other crops, especially summer legumes, which may be suitable for WA.

The end product of this project will be a best practice manual for various summer crops available to all WA farmers.

Trials planned

This season, two traditional small plot trials will be conducted in the Esperance area. In addition, selected farmer paddocks right across the south coast will also be important monitoring sites. A few other small plot trials in the central and northern regions are being monitored by Development Officers and there are also many farmer 'trials' from which I am keen to collect information.

Issues in summer crop agronomy include row spacings, fertilizer placement and the suitability of species and varieties for different soil types and depths. If you are interested in testing one of these or anything else on your farm, and would like to discuss how to set up a fair comparison, please call me.

A large part of this project relies on information gathered from farmers growing summer crops so getting feedback from farmers is vital! A faxback sheet is available to anyone interested in doing some basic monitoring this season. It asks simple questions (like crop variety and moisture at seeding), with the most detailed question being the number of grazing days (if you have livestock). Even if the crop fails, it will be important to try and discover why. These sheets will be available—please give me a call!

WANTFA wishes to acknowledge the generous assistance of:



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Fertilising and farming to 2cm

Grant Thompson, Agronomist,
Alluvium/Wesfarmers Landmark, Geraldton

Some personal background

My family manages a 29,000 ha cropping and livestock property in the Mullewa shire. We have been using Auseeder DBS machines for a few years and we have taken a pretty keen interest in the no-till system. Amongst stints of farming, I spent a couple of years working for CSBP in their Field Research Group. I also spent another couple of years as an agronomist for IAMA in Mingenew.

In 1998-99, I co-ordinated an agronomic management group with about 20 farmers in the North Midlands. In 2000, I started a small Agronomic advisory company, where I now contract out to Wesfarmers Landmark in Geraldton and also work with several other private clients in the Northern wheatbelt—two of those farmers being my dad Ken and Miles Obst from Mingenew.

Soil tests begin

In early 2001, Dad and I collected soil from the DBS furrows, and also from the inter-row, in an attempt to get a better understanding of fertiliser requirements in the no-till system. The fertiliser recommendations based on soil analysis conducted on these initial samples suggested we needed to use less fertiliser when sampling from the furrow. Our suspicions were confirmed—most of the nutrients from the previous year were still in the furrow—no rocket science there!

Following on from this, CSBP Dongara area manager Luigi Moreschi and I decided to investigate whether the conventional method of soil testing was adequately measuring the residual nutrient distribution of a no-tilled paddock. After many discussions with other farmers and colleagues, I decided that there were too many conflicting theories and arguments and that I needed to get some more concrete answers.

Luigi and I sampled a red loamy sand and an Eradu-type yellow sand from one of our paddocks. Both soil types had the same fertiliser treatment for as long as we can remember. In all the previous years we had sown the paddock round and round. Last year we seeded up and back. Therefore, by sampling in the inter-row, we thought we would have a pretty good chance of intercepting nutrient from many previous years' furrows.

We went through about 36 CSBP sample bags—taking about 20 samples from each part of the no-till profile and then replicated it 3 times. For both soil types we sampled from 0-10 cm depth in the furrow, 0-20 cm in the furrow, 0-10 cm in the inter-row and 0-20 cm in the inter-row. A brief history of the paddock is in the table following.



Year	2000	1999	1998	1997
Crop & yield	Canola—0.5 t/ha	Lupins—2 t/ha	Wheat—2 t/ha	Deep Rip Fallow
Fertiliser applied (rate and type)	100 kg/ha Agstar and 150 kg/ha NS41 topdressed at 4 leaf	80 kg/ha Double Phos deep banded	100 kg/ha Super C2M topdressed, 65 kg/ha Agflow C2M, 60 kg/ha Urea topdressed.	Nil
Seeder	DBS S Series	DBS S Series	DBS	Ausplow Deep Ripper

More nutrients are in the furrows

The results of the soil analysis showed that there were much higher nutrient levels in the furrows in both soil types. In the red loam soil, the differences between the nutrient level in the furrow compared to the inter-row were 42-215% (see the table following). The deeper profiles from 0-20 cm were much less dramatic, due to sampling twice the volume of soil at twice the depth (data not shown). However, similar trends were apparent—most of the nutrients measured were predominantly in the furrow.

Nutrient	Between furrows			Avg	In furrows			Avg
Nitrate	11	11	11	11.0	18	17	15	16.7
Ammonium	9	6	7	7.3	24	26	29	23.0
Phosphorus	24	23	23	23.3	37	44	53	45.0
Potassium	242	242	215	233	354	317	324	332
Sulphur	13	12	14	13.0	34	49	36	40.0
Org. Carbon	0.56	0.59	0.53	0.56	0.66	0.77	0.72	0.72
Reactive Iron	442	500	512	485	524	527	544	532
pH	6.2	6.1	6.2	6.2	6.2	6.1	6.4	6.2

In the yellow loam soil the differences in nutrient level between the furrow and the inter-row were 48-143% (see the table following). In the yellow sandy part of the paddock, the differences in phosphate at depth (0-20 cm) were not significant between the furrows and inter-row (data not shown). Previous studies have found P to move downward over time in these yellow sands.

Nutrient	Between furrows			Avg	In furrows			Avg
Nitrate	5	4	5	4.7	6	8	8	7.3
Ammonium	6	6	6	6.0	12	13	12	12.3
Phosphorus	14	16	17	15.7	22	27	21	23.3
Potassium	78	84	83	82	114	140	142	132
Sulphur	9	10	12	10.3	28	26	21	25.0
Org. Carbon	0.49	0.48	0.45	0.47	0.54	0.59	0.55	0.56
Reactive Iron	437	450	427	438	466	471	415	451
pH	5.3	5	5.4	5.2	5.4	5.8	5.6	5.6

The large sulphur differences between the samples from the inter-row and the furrow also occurred at the 0-20 cm sampling depths. Top-dressing mobile nutrients, such as nitrogen and sulphur, onto furrow sown soils seems very efficient as most granules bounce and roll into the furrows—right where your early plant root development is.

The paddock has never had potash before. The higher levels of potassium in the furrows suggests to me that plants are extracting potassium from the inter-row or from depth and depositing it back into the furrow as leachates from stubble and broken-down root and shoot material.

There are a lot of other people out there with more knowledge on plant nutrition and soil science than I, but I think that these large differences in nutrient levels are pretty significant. We all knew that we have some very thin strips of fertile soil every 25 cm throughout our paddocks but now we can start to understand just how large the differences are between furrows and inter-row. I am no longer sure how representative a random soil test is in no-tilled paddocks but I intend to try and find a positive side to this scenario.

Precision Guidance and accurate nutrient placement

The Obst family use a Nichols seeder and, this season (2001), they used a Beeline to drive their seeder; the Beeline being accurate to 2 cm. The Beeline has helped Miles to be very precise with his controlled traffic work, ensuring less overlap and less operator fatigue—just two of the benefits. After discussing the soil test results from my parents' place, Miles and I decided we would soil test his paddocks in a similar way and perhaps trial some very accurate seeding with the Beeline to capture the residual nutrient from the previous season's furrows.

Miles' farm is predominantly deep pale grey non-wetting sand with very low potassium levels. In 2002, with some technical assistance from Beeline, we intend to carry out a trial in which crop is sown 2, 4, 6 and 8 cm away from last year's furrows and do some tissue testing and yield measurements. In these soil types, we aren't sure what to expect but we hope the plants will pick up the residual fertiliser much more quickly if the wetting zone of the furrow is—as close as possible to last year's residual fertiliser. We have also noticed that last year's furrows are the first parts of the profile to 'wet up' after the opening rains. Seeding close to this zone may also improve dry sown crop germination and establishment.

With further investigation, we hope that this precision alignment of furrows may improve nutrient availability early in the crop's life and possibly lead to a slight reduction in fertiliser use.

The Obsts also intend to try and seed on top of the same furrow year after year to minimise weed seed disturbance. This will be interesting! Alternatively, if the crop is planted in the previous year's inter-row other advantages may be apparent. These include:

- Having all standing stubble for seedling protection.
- Reducing bulldozing from crop residues wrapping around tines and points and improving safety with trifluralin in light soils. (*Ed: Sheep grazing is an issue here.*)
- Separating allelopathic cereal stubble leachates from crop seedlings and hopefully improving early crop vigour.

This technology opens up a whole new can of worms in the no-till farming system!

Editor: Congratulations Grant for opening up discussion on what promises to be an exciting new era in farming—precise fertiliser placement. We look forward to the next set of results.

Tramlines and no-till —a good match!

Dr Paul Blackwell, Geraldton Department of Agriculture,
(08) 9956 8555 or 0429 098 126

Permanent tramlines are pathways in paddocks that carry the load from cropping machinery and preserve the structure of the soil between them for what soil does best—growing plants.

These tramlines offer an internal road system to improve vehicle traction and flotation. This system also ensures less fuel use, more accurate input costs (about 5-10% less) reduces crop damage and provides paddock access in wet conditions (which maximises traction). Tramlines do not have to be bare; they can be planted to crop.



Paul explains the issues of compaction with Bodallin farmers at a joint WANTFA-Ag Dept and local Catchment group field day on 8th October.

The tramline approach creates other innovative farming opportunities. These include row cropping, raised beds, relay cropping and whatever we still have not yet thought of. Row cropping allows us to use wide rows and treat the in-row or inter-row zone with either selective and expensive pesticides or cheaper non-selective pesticides. Raised beds can minimise waterlogging and assist in desalination, and relay planting can be done for early and the easier establishment of either a summer crop or pasture in a winter crop.

The name "tramline farming" was suggested in 1992 by Graeme Malcolm of Morawa and in 1999 by Tim Pannell of Yuna.

A good team!

No-till makes tramlines easier to follow. Paddock scale trials at Mullewa allowed permanent tramlines to be followed for at least four years, with only the assistance of marker arms. This has been the experience of many Eastern States farmers, including Scott McCalman. (*Ed: See Scott's story in WANTFA's Newsletter, December 2000.*) Electronic (dGPS) guidance can provide better and more accurate long-term effects.

Tramlines confine the deep compaction in no-till to 10-15% of the paddock. No-till soils are stronger than cultivated soils because they have not been recently loosened between the rows, but all soils can suffer from deep compaction from the 'road trains' we are now seeding with (eg. a 400 hp tractor,

12 t air cart and 10 t Flexi N cart!). Maximum compaction occurs at a depth of about half the width of a wheel or track. Low surface pressures only protect the topsoil, while dual or triple wheels can only spread out deeper compaction. Deep compaction is mainly from the load on a wheel or track.



Paul stands on a tramline where several vehicles pass over in the one year. Thanks to Peter and Ken for digging the soil pit.

Matching machines

Matching the harvester is not so critical as the soil is usually dry during harvest and will compact less than other operations that are done when the soil is wet. It is important to match seeders and sprayers though. This matching encourages a track width of about 3 m and seeders of about 9.2 or 18.4 m width. Each farm is different and gradual progress is easier as each machine needs replacing. We are developing computer models to estimate benefits and costs.

Farmer experience would suggest that a 3:1 matching of boom to seeder is less complicated than a 2:1. The first run on a 2:1 means that the

Bodallin farmer Peter Bartlett's wheat crop is nearing maturing—the tramlines can still be clearly seen.

seeder or spray boom needs to overlap itself on the second run or the outer wing of the boom can fold in to miss the fence. (Editor: Come to the 10th Annual WANTFA Conference to hear how Peter Bartlett from Bodallin does a 2:1.)

Seeing is believing!

Those who went on this year's GRDC-funded tramline tour to the Eastern States came back enthused. Feel free to contact them—Nigel Moffat of Moonyoonooka; Lindsay Chappel of Perenjori; Miles Obst of Mingenew; Neil and Kim Diamond of Buntine; Colin Pither of Ongerup; Darren Baum of Borden; Paddy Barber of Esperance, and Todd Quinlivan of Esperance.

Up and back or round and round?

Round and round is essentially four sections of straight or curved working between four headlands in an approximately rectangular paddock. The soil or plants care little if the seeder travels in the same direction for each lap or if it changes direction! Bob Porter of Ajana and Jamie Grieves of Mingenew are using round and round methods. Round and round can be messy in the middle, but up and back is messy at the ends!

Compaction lines can be clearly seen at Tony Critch's farm at Tenindewa.



Gross margin benefits

There appears to be a financial benefit of up to \$50/ha for compaction control with Controlled Traffic methods. Crops give better and more uniform growth from less compacted soils. Compaction is one of the most invisible and insidious soil physical problem we face in growing crops. Most crop yields can be reduced by 30–40% in the area of the wheel-marks of heavy tractors and air seeder carts made in previous seasons.

Likewise, there might be a \$50/ha benefit for weed and drought control with 'row cropping' methods with inter-row shields. Mike Collins is working with this at the Northam Department of Agriculture with the 'Row Crop Rocket', which has some self-steering ability. Paddocks that are 'out-of-control' with weeds can be bought back into line with row cropping technology—without the need for going back into pasture.

Relay planting can dry wet areas

Tramlining enables summer crop sowing between rows of lupins near leaf drop when the soil temperature and moisture is suitable (if this occurs before harvest). The lupin harvest should occur before the summer plant is too tall. Tramlines assist good operations that minimise crop damage. A research grant has been awarded to Kim and Neil Diamond of Buntine for this work.

Other issues

Tramline controllers are a good way of minimising bare tramlines. They make bare tramlines for only the spray runs, by using solenoids to shut off rows. They are available from Europe or North America for use in up and back operations. Try contacting Neil Harris on 0427 090 431.

Single 'fuzzy' tramlines, or a central wide row, offer a low cost method of getting into the system in round and round operations for the cost of one marker arm. This is being done by Bob Porter of Ajana, Glen Fretwell of Lake Varley and Pat Barber of Esperance. Not seeding corners also saves time—ask Mick Desmond of Tenindewa. How about seeding the outside lap and the corners first, then carrying on round and round, but lifting up and switching off as you run over the seeded corners? That will minimise double sowing.

i For more information about the new GRDC-funded Tramline Farming Development project contact myself or Bindi Webb at the Geraldton office or (08) 9956 8555, Glen Riethmuller at the Merredin office or Jeremy Lemon at the Esperance office.

Timing of nitrogen for no-tilled wheat

Bill Crabtree, WANTFA Scientific Officer

From many no-till field days and talking to lots of farmers I have suspected that the timing of N for no-tilled crops might be different for the timing with cultivated plots. The photos on page 452 of this issue also suggest a difference. So at Meckering last year we compared zero-tilled wheat (using the Great Plains opener) against direct drilled (fully cultivated soil) wheat. We did find some differences. Note the spring and the finish was very dry.

Feel free to see this and other trials on our website (wantfa.com.au).

Method

The trial was a randomised complete block factorial design with three replicates and was split for seeding into lupin or wheat stubble. The main treatments were two levels of tillage (Great Plains-triple disc opener and a full-cut or direct drill opener) by six different timings or placements of 100 kgN/ha as urea (at sowing -20 units drilled); immediately before sowing; immediately after sowing; 4, 8 and 12 WAS).

Westonia wheat was sown on 16th June at 80 kg/ha at a depth of 2 cm in good soil moisture with Maxi TE at 100 kg/ha. Tigrex and Lontrol were sprayed over the whole site at 500 and 300 mL/ha on 26th July. On 7th August, Achieve was applied at 380 g/ha plus 0.75% S-charge and, on 25th August, Tilt was applied at 250 mL/ha. More details about treatments and soil tests are on the website.



Urea applied at 100 kgN/ha to direct drilled plots (on left) or zero-tilled plots.

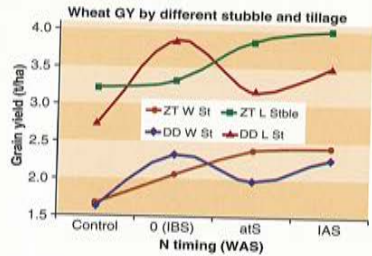
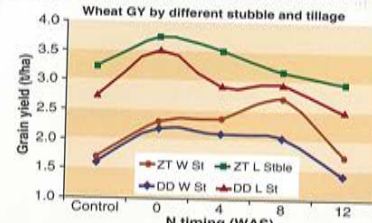
Results and discussion

There was a 12% response to zero tillage on the wheat stubble over the full cultivation (at P<0.06) while tillage had no effect on wheat grain yield in the wheat stubble.

The wheat following lupins was higher yielding and had lower screenings than the wheat following wheat. The wheat on the wheat stubble went 2.1 t/ha, the grain protein was 10.9% and screenings were 11.2%; while the wheat on the lupin stubble yielded 3.3 t/ha with the grain having 10.7% protein and screenings being 8.9%. Given the dry finish it was surprising that the delayed application of N on the wheat stubble did not give significant yield penalties, except for the 12 WAS application (the lsd at 5% was 0.6t/ha for the timing of application).

With the lupin stubble there was a benefit to early N application where the finish was harsh. There appears to be a benefit to applying N after sowing with zero-till and before sowing with direct drill. The furrows from the zero-till may help the urea granules bounce into the furrows, ending up in closer proximity to the plant roots and less at risk of being converted to gas.

For more information on this trial please go to the WANTFA website.



Towards discs and residue managers

Murray Gmeiner, Wagin, gmeiner@wn.com.au (08) 9862 6096, fax 89

I began no-tilling in 1993 when, halfway through the seeding program, my father and I replaced the cultivating tines on a BlueLine bar with Super Seeder points. It was a very simple and easy way to 'slip' into no-till with very little startup costs.

We continued with 18 cm row spacings and a set of rotary (phoenix) harrows following. At harvest of that year we compared the grain yields with the different seeding methods and found no difference. Since then we have tried to leave as much stubble behind as possible, even if it meant raking but having the rake as wide as possible.

I continued with this method for several years, although it wasn't long before the rotary harrows were taken off. The harrows left the paddock almost as cultivated as a direct drilled paddock, so I replaced the harrows with a chain dragging behind the combine and this left a much better seedbed.

We continued with the Super Seeders as they seemed to work well with lower tine breakout pressure—although I think they still cultivated a little too much. We then bought press wheels and tried to keep the retained stubble out of the seed furrow—and, although the press wheels were in gangs, it was an improvement.

Going wider

Out of a desire to retain stubble, in 1999 I purchased an International 2-11 scarifier and a Shearer 3T airseeder box. I took this out to 30 cm spacings and since then I haven't had to burn any stubble. I bought some Agmaster points and moved the press wheels onto this machine. I also ran a length of chain behind the press wheels to keep the residue out and to cover the seed slightly better. I then ran into problems—the bars on to which the tines were clamped were too close. Whenever the openers hit a rock or stump the tyne would then hit the rank behind it. This was damaging the boot and bent some of the points.

Discs in 2001

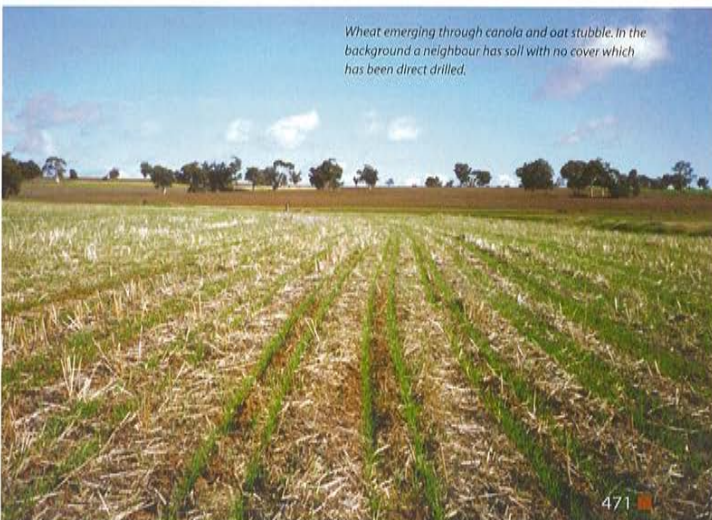
At the beginning of this year more changes were needed. So, in conjunction with Darryl Hine from Direct Seeding and Harvest Parts and Dwayne Beck from Dakota Lakes Research Farm, I began designing a disc seeder



Grazed stubble can be sown without hair-pinning with the paired rows and residue manager.

to suit what I wanted. I had got a fair way down this path when a disc seeder came up at a clearing sale.

This seeder belonged to the Burrell's at Green Range and they had designed it well. It was a 28 run Chamberlain box with an Inter gearbox with Walker triple disc openers underneath. The leading fertiliser coulters had been replaced with a Great Plains wavy coulters, useful for soil loosening. This gave some under-seed cultivation and still allowed me to handle the stubble.



Wheat emerging through canola and oat stubble. In the background a neighbour has sown with no cover which has been direct drilled.

Paired row adaptation

I modified this slightly by removing every third seeding module so that my row spacings were 18 cm, 36 cm, 18 cm, 36 cm. In front of every 18 cm pair I placed a Yetter residue manager that moved the stubble into the 36 cm row space on either side. I was only going to use this on my canola crop going into wheat stubble but it was so successful that I left them on for the whole of seeding. I was able to seed at around 13 km/h. I found the faster I went, the better the residue seemed to flow.

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Canola emerging through wheat stubble.

I found the ground was more trafficable with the disc zero till system. For all my pre-emergent spraying, seeding and early post-emergent spraying (the second atrazine on canola and bug sprays), I used only 3.7 L/ha of diesel. This is at least a 50% fuel saving!

Rotations

On my farm, generally either the paddock is in crop and stays in crop, or it is in pasture and stays in pasture. I will seed pastures but generally I have one paddock per year that is brought into crop for a year—to renovate the pasture. I do use strip grazing in my pastures and this has greatly increased my stocking rate.

With my cropping rotations, every paddock has a similar rotation of cereal: broadleaf: cereal: broadleaf. Generally the rotation will be canola: barley: wheat: field pea/lupin, although this can vary to fit in oats (and I have grown chickpeas). This diverse rotation helps with weed control. No weeds seem to get too far out of control as it is always cheaper and easier to get a grass weed out of a broadleaf crop and a broadleaf weed out of a cereal crop.

My farm is in 'the wool belt' and I did not get into 'intensive' cropping until the mid-90s so I have been able to rotate chemicals and, so far, keep resistance at bay. We have only once used Hoegrass on one paddock on this farm. I am fearful of glyphosate resistance—as this would end my farming methods. Because of this I use a 'double knock' on one-third of my cropping program every year.

Warm season crops

When Dwayne Beck first came to WA in 1996 to explain the benefits of diversifying our rotations into warm season crops, I was quite interested and have grown summer crops ever since.

I first grew forage crops for stock but it is difficult to do an economic analysis on these—as the costs were known but the benefits were hard to quantify. Subsequently we have grown sunflower but the parrots made these very uneconomic and themselves very content and fat. I have also grown safflower and these show some promise, while sorghum and millet appear to be the best bets.

I am trying to find crops that fit well with our current machinery which is why I have not grown corn and many sunflowers. The disc seeder should have an advantage here as I found all the weeds grew in the cultivated rows where the summer crops have been sown.

Desk research

I try to do as much homework on my farming methods as possible before I do or change anything. This includes no-till methods and machinery. So far I can see it is working very well but this does not mean that it is the "be all to end all". I still keep a scarifier in case of something not going to plan but so far no-till has worked very well.

Weed wiping has role

Trent Tyler, Wyalkatchem (08) 9681 4060, fax 64

This year we have sown 1,600 ha of Cadiz serradella to take the place of lupins in our cropping program. Having not used any pre- or post-emergent herbicide or fertiliser while seeding a weed problem was guaranteed. We therefore decided to pull the weeds up with either a slasher, a weed wiper or Raptor. The aim of the weed wiper is to wipe a 5% chemical mix (glyphosate and ester with water) onto the leaves of weeds like radish, wild oats and ryegrass—without touching the Cadiz.



Trent Tyler



Parts of the Cadiz are nearly weed-free and they have grown superbly.

We built a 25-m rig

We built our own large blanket wiper from a 25 m Flexicoil broadacre Sprayer as this has hydraulic control for the boom height. We replaced the spraylines with 25 mm galvanised pipe to attach the weed wiping mats to. We purchased the mats from GW & KM Davies at York. There are two sections to each arm, which are joined by a pivot and a break-away coupling. The hydraulic lifting arms allow the height of the wiper to be changed on the run.



The 25 m homemade boom did the job. It cost \$20,000—but had some weaknesses.

We towed the wiper with an International 4586—300 hp tractor. The outside dual wheels were taken off and the inside set were adjusted

to have the same wheel tracks as the Flexicoil sprayer tyres. This set-up gives good clearance of huge radish and reduces compaction of the Cadiz.

We used 3.5 m and 2.5 m mats that have trickle-on garden hose inserted longways in a sewn compartment. They extend the length of the mat with pin holes every 2.5 cm to release the chemical evenly. We have high pressure needle-valve taps (see photo on right) that are on the inline to every mat—this enables adjustment to the flow rate.



The needle valves can be clearly seen and likewise the mat with a few barley grass heads caught in it.

Learning challenges

We have learnt that you need to get the right amount of chemical into the mat before weed-wiping starts. Over-flooding of the mats will make the chemical drip excessively which will damage the Cadiz. The mats have to be able to replenish the chemical as it wipes off on the weeds. A problem with this is that, in the areas of the paddock that aren't heavily infested with weeds, the chemical will drip off and damage the Cadiz. Some dripping, however, isn't a big problem. A fully rubber choked draw-bar was the solution to a wavy pattern caused by the rough terrain where the mats were touching the ground.

Just another useful tool

The wiper is another tool that gives useful weed control but it is not a perfect solution to weeds in this situation. The weeds need to be about a 25 cm taller than the desirable plants for the best result. Even then, not all weeds (particularly radish) will bolt and grow tall at the same time. These 'clever' weeds will escape the wiping process.

The best results we have had are where we have sprayed Raptor and then weed-wiped over the top. We are also slashing the tops off radish, ryegrass and wild oats over the top of the Cadiz without stripping all the flowers off. The most effective chemical mix used was 60 L of glyphosate with 20 L of 2,4-D ester (80%) and 8 L of wetter in 1,500 L of water. We are still experimenting with the rate. This mix would cost about \$500 and would do between 150–300 ha (or \$1.70–\$3.40/ha).

Weed wiping is exactly what it is called. If you wipe the weed, then you will get an excellent result—but every weed that is missed gets a much better growth environment due to the reduced competition. Radish control has been from 40–60% each pass. Radish requires at least two passes, if not three, over the growing season. With grazing, where the sheep eat the Cadiz, the radish is easier to target.



The older radish that were tall at the time of wiping have died but the younger or smaller ones have now grown through. It is not like using a perfect selective, which takes out all the weeds.

Above right: Heavily grazed Cadiz made the radish a taller target and two wipes did the job in this case.

Right: The wiper has taken these out well—the radish in the hand have had a lower but useful dose of chemical.

Forage sorghum survived a dry spring

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After a very wet 1999, we could see there was going to be a need to quickly absorb some sub-surface moisture before salinity took hold on previously high-producing country. Trees would not be enough on their own so we tried forage sorghum—which would also hopefully provide some valuable summer food for sheep.

With 2000 being so dry during winter (115 mm for growing season), we had reservations about this project. We still decided, however, to go ahead. On the 14th August the 40 ha paddock was sprayed with 2 L/ha Roundup and 150 mL/ha cypermethrin to kill weeds and preserve any further moisture. The paddock is on a gradient and runs down towards salt country along fenceline. The soil is a shallow sand over clay with a pH of 5.0.

On the 19th September I sprayed 1 L/ha of SpraySeed to finish off any late germinating weeds and then sowed 3 kg/ha of Jumbo sorghum. No fertiliser or pre-emergent chemicals were used. The sorghum was sown on 92 cm row spacings with knife-points and press wheels into dry soil at 7 cm to chase moisture. It germinated very well and was probably too thick. It was sown into a grazed wheat stubble, where the crop yielded 3.8 t/ha in 1999. The sheep knocking the stubble to the ground probably helped with moisture retention.

Spring 2000 was very dry!

We had no rainfall from planting until 7th January when 7.5 mm fell and 21st January when 30 mm of rain fell. Surprisingly, the sorghum not only survived but, in places, it grew quite well. On advice, sheep were introduced on the 8th January and they had a choice of 70 ha of canola stubble alongside with a sulphur stock lick (which was never touched).



From top down:

Forage sorghum (photo taken 3rd January this year) after 4 months with no in-crop rainfall. The crop had received no rain since it was sown, yet the sorghum was still growing well.

A 35ha piece of land which was grazed for 3 weeks with 280 dry sheep (8 DSE/ha). During this period there was 30mm rain. (Photo taken 13th February this year.)

February field day group inspect Ashley's forage sorghum.



Good grazing value

The sheep stayed here until the season break on 8th May with no other supplementary feeding, though they did, however, have another pasture paddock towards the end. Sheep grazed down the sorghum to ground level. In places the sorghum was 1.5–1.8 m high and the sheep didn't mind eating either older, woody stems or fresh shoots. In all, we grazed the sorghum at 10.5 sheep/ha for 124 days with no poisoning problems and the sheep came through in excellent condition.

This season the paddock was sown to lupins on 45cm row spacings with the normal chemical treatments. We are hoping that the sorghum will regenerate after harvest if rain occurs and, as of early October, there are signs that some will re-shoot. (Ed: This is known as ratooning and it is a common occurrence. Also, thanks Ashley and Tracy for providing us with a trial site in 2000 and for kindly fencing the area off for us.)

I have no way of telling if we helped lower the water table but, for the amount of growth and rainfall received, moisture must have come from somewhere. We have oil mallees above this paddock on contour and river gums along the valley floor with lucerne the next paddock downstream. Hopefully, an integrated approach will halt salinity as well as provide a profitable outcome in the process.

More forage—plans for grain

We have sown some more forage sorghum this year which has germinated. Next year we plan to sow 60 ha of grain sorghum on similar country for similar reasons. Summer cropping is only in its infancy in the wheatbelt and needs some strategic planning and trial work. I believe it could be another valuable tool in making future farming sustainable and profitable.

From top down:

This 15ha area of land was grazed for 3 weeks with 350 dry sheep (23 DSE/ha). During this time there was 30mm of rain. Note the difference (to photo on opposite page) that the stocking rate has made to feed availability. (Photo taken 13th February this year.)

Ashley's lucerne, sown June 1999. The paddock is 30ha and the plants were grazed at 3 weekly intervals over summer with 450 dry sheep (15 DSE/ha). This photo shows 3 weeks of growth since the last grazing. (Photo taken 13th February this year.)

The area in background shows the sorghum recovering after grazing.

Key points we learnt were:

- Prepare the site early for good weed control and moisture conservation.
- Use press wheels. It is possible to sow fairly deep.
- Use phosphorus. The adjacent WANTFA trial showed good sorghum response to applied P.
- Give sheep a grazing alternative—they will let you know if they're not happy.
- Sow into moisture but ground temperature needs to be 18°C (or at least 16°C at 9.00 am).
- Sorghum will tolerate mild salinity.



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