Newsletter of
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Western Australian No-Tillage Farmers Association (Inc)

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Make your break!

Spraying out weeds in April or earlier pays at seeding time! It saves moisture—often enough moisture to mean that the next light shower will be enough to allow successful crop establishment. The photo below, taken in May '98 at Narembeen, clearly shows the difference between holding that moisture by killing weeds, versus allowing the soil water to be lost through 3–4 weeks of weed growth (which may finally be drought).

Left: Weeds were allowed to grow unchecked before seeding in the moon-shaped headland.

See how much difference that little bit of extra moisture made for crop establishment. Also, no-till allows you to safely chase soil moisture with knife points or discs, if you have the weight to push them in. It is surprising people just how much better crops can establish with no-till compared to dried and cultivated soil. This trick can really work for the crop and against the weeds (which may have to wait for the next significant rain to emerge).

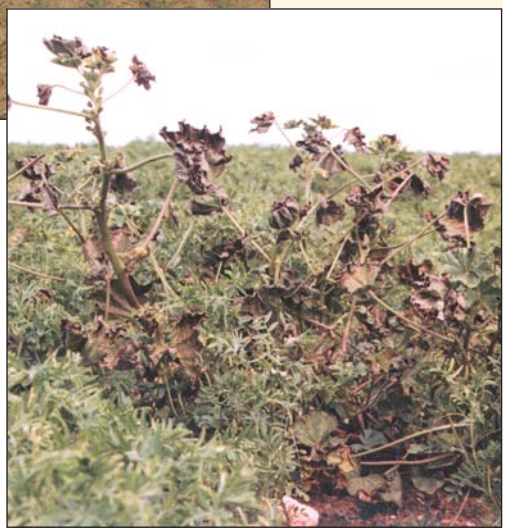
Don't drive to the sound of the motor!

These are the words of experienced no-tiller and inaugural WANTFA President Ray Harrington. Ray is sure that many farmers buy their new knife points and seeder and shove it in as far as the sound of the motor allows.

Ray thinks that more often than not—this is a mistake. Ray would encourage you to get out and see what's happening with seed placement, soil moisture and cultivation depth and only work as deep as the point and closer permits.

Big marshmallow can be killed!

The photo below shows that selective herbicides can have excellent activity on marshmallow. This weed is hard (perhaps impossible) to kill with glyphosate. The addition of Goal (Monsanto) or Spark (Crop Care) to glyphosate apparently works well if the mallows are 50 cent piece sized and fresh. Likewise, 2,4-D also has useful activity on small mallows, while Broadstrike, according to farmers, also can knock them—even large ones!



Below: 50 mL/ha of Brodal mixed with 100 mL/ha of Lexone stitched up these big marshmallows in lentils at Cummins, South Australia.

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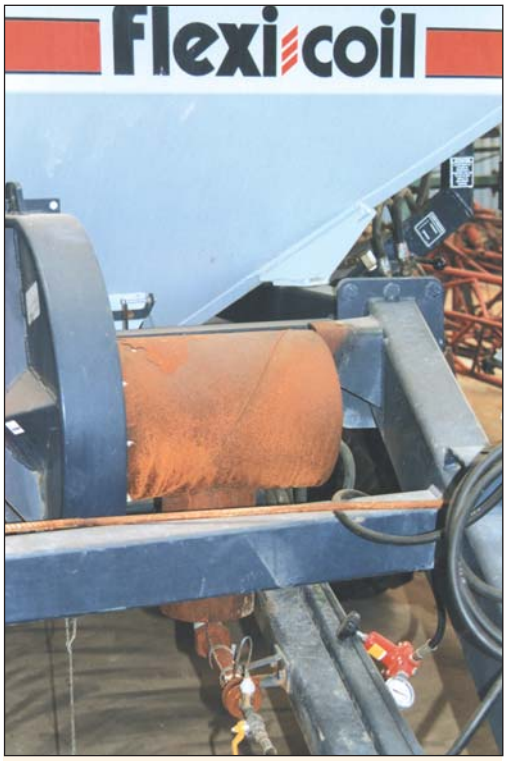
Bill Crabtree, WANTFA's Scientific Officer is funded by:

Many conventional farmers have also seen more marshmallows in some seasons. Another good reason for getting rid of mallows is that they are perfect feed for vegetable weevil which love to eat a subsequent canola crop.

Heat that air and avoid fertiliser blockages!

If you have ever been frustrated with fertiliser blocking your hoses, then consider heating the air that goes into the fan inlets. You will probably only need to use it for 2 hours in the morning and then again, as the air gets damp, at night. The Flexicoil machine below, has been fitted with a large gas bottle, which has done a whole season—now that's cheap and smart!



Rocks and thick chain are placed inside this 40 cm diameter drum and are heated from below with a propane flame

Other farmers have used their warm exhaust air from their air seeder motor or tractor motor. Farmers suggest starting the warm air up 4–5 minutes before seeding. DAP users will particularly benefit from the warm air.

Cultivation encourages continued ryegrass flushes!

The ryegrass plants below were photographed from Mike Collins' AgWA trial at Wongan Hills in late Spring '98. Mike is comparing different clever ways to kill ryegrass in lupins on wide rows. The ryegrass here is from a "cultivation-up-the-row" plot. Note the constant flushes of ryegrass germinations from this one, early cultivation.

"What do you do with sleeping dogs?—stir them up and shoot 'em or let them lie". From John Hicks, Pingrup, WA.

The ryegrass plants range from 2-leaf, tillering all the way up to setting seed. Clearly, this is telling us that ryegrass has developed resistance to cultivation. Am I wrong? This is, perhaps, a converse view to the autumn tickle approach. Although I will acknowledge that, if weeds have got out of control, then tillage can help pull the numbers back!

It would be nice to see some integrated weed systems trials—where Allen Postlethwaite's weed control systems is compared with a more tillage-based weed system, including the autumn tickle. But, it would require good management and changing more than one variable!

Keep the weeds off balance

This was the strong take-home message from friendly Canadian speaker, Doug Derksen. But what does it mean? It means lots of things—things we haven't even thought of. One thing it could be is what Bob Holloway is doing—see the next story, and those after it.

Doug says that one simple and important technique that farmers can use is to seed the same paddock at different times in different years. For example, don't always seed the house paddock first—this does not let the weed get set into a pattern. But conversely, the same is true—don't always seed one paddock last. This has implications for your two blocks—mix them up from year to year.

A classic "avoidance-resistance" example of this was found at Indian Head, Saskatchewan. Doug told me that, for 45 years, they had applied 2,4-D to the same patch of soil, every year, at the same biological time. A researcher was sure he would be the first to find weed resistance to 2,4-D, but he couldn't. But what he did find was just as interesting. The plants now regularly emerge 3 weeks later than the same weed types in nearby fields.

Topdress wheat on first rain

Bob Holloway at Minnipa Research Station in SA (08 8680 5104), has been successfully broadcasting wheat on the first rain in 320 mm rainfall area since 1983. The topdressed crop has always yielded higher than any other crop on the farm. However, few farmers (except Ken Gerschwitz, Cungena and Ben Hughes, Maltee (08) 8625 8017) have been game to follow his lead.

Bob's technique is to topdress wheat at 100 kg/ha (50% more than standard) onto a low weed pasture or stubble on an opening rain. He then prickle chains it in before the soil dries. The soil needs to be loose enough (Bob usually dry drills fertiliser beforehand), and wet enough, to ensure the seed is in the moist soil. Bob says, one year, a financially troubled farmer, did this on his whole farm, and it kept him out of jail.

From a weed point of view, it is clever! Since wheat is an extremely aggressive competitor with weeds, the few weeds present are overrun by the rapidly germinating wheat, which is evenly spread. Bob usually grows these crops without any selective herbicides. It is smart, from a resistance point of view.

The few weeds that do struggle through do not compete heavily with the crop. Doing this occasionally would surely confuse the weeds.

Unicorn kills weeds

Have you considered Unicorn barley? For paddocks that are nearly out of control, it is a profoundly powerful tool against weeds—well done Mike Lamond! See the photo below.

Unicorn is ready for swathing before Karoo canola—now that's clever!

Unicorn matures well before Karoo canola (in the background). It's almost impossible to believe that the heads could fill so quickly—in fact they fill 3 weeks earlier than most other barleys.

The good and bad thing about Unicorn is that it is first, barley, and second, it sheds. Therefore, it must be swathed, and the swathing gives you more power over the weeds. The ryegrass underneath is just flowering! You can be sure of this, because it is also a late sown variety. But it still yields well.

And there is more! Add to this a swather that is mounted with nozzles that spray under the whole cutter bar (see photo)—into an open canopy of green unsuspecting weeds. Then, you are well on the way to one year of weed seed set control.

This topdressed wheat paddock went 2.9 t/ha, the next best was 2.5 t/ha, the average was 1.8 t/ha over the farm. Inset: Bob Holloway from Minnipa, SA

Two years of using the swather and sprayer together, in cereal and canola pulled Paul Lush's ryegrass numbers down dramatically. Right: Paul Lush from the Mid-North in SA (08 8527 2452).

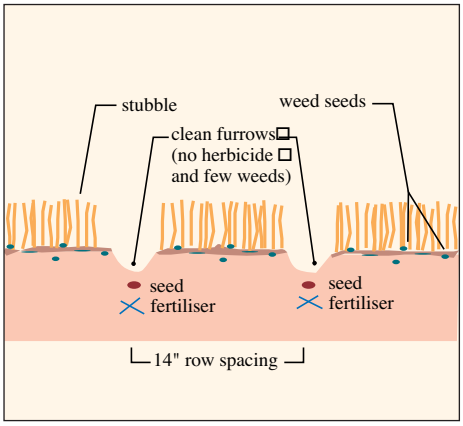
Spray header rows

Bill Roy has also been working on clever ways to kill weeds. The glyphosate sprayed strip in July in this photo, shows how header rows can be tidied up. An important ingredient in this package is ensuring that the weeds are channelled into a narrow slot. Bill used a rubber funnel mounted on the back of a header, as shown in the Nov '97 *WANTFA Newsletter*.

A 30 cm strip of weedy crop is sprayed with glyphosate from behind a 4-WD motor bike

Give the weeds 'hell' and your crops a taste of 'heaven'

This was the final line from Allen Postlethwaite's talk and it sums up his no-till weed approach. Allen is convinced that stubble retention and no-till, with 12 mm wide knife points on wide row spacings, creates a harsh inter-row environment for the weeds. At the same time, creating a clean opportunity for the crop (because it has the fertiliser all to itself, safely below the crop).



Leaving the weed seeds on the surface, in the stubble, without harrows, but with herbicide is 'hot' on the weeds. And, if it doesn't kill them, it gives them a real headache. Wide rows, with lots of weeds and no stubble, make no sense—get the package right and it's a powerful tool. Why force the herbicides to do all the work when stubble has its own 'natural' weed killing chemicals there, waiting to be used, in our favour?

Neil Postlethwaite shows Neil Young what they are achieving with full stubble retention

Ants–what about ants?

Like earthworms, they hate having their homes and pantries destroyed by tillage. They seem to work 24 hours a day at collecting weed seeds—see the adjacent photo to see what a good job they do. Ants love to have the seeds on the surface where they can easily find them. Remember though, that these are extra tools, not to be completely relied on—don't forget diverse rotations, crop topping, chaff collection, seed destruction etc.

A close inspection of the wild oats shows that the ants have severely damaged most of the seeds—and how many have they buried?

Cultivate so you get a gypsum response

Absolutely amazing! A drive through the Victorian Wimmera and Mallee in February '99 shows piles of gypsum everywhere. The gypsum is waiting to go on the soil to fix the damage that the cultivation has just done. Does this make sense?

Gypsum poised to fix the damage of cultivation in Victoria.

Canola header rows and Potassium

At the AgWA Crop Updates, Bill Bowden went a long way to explaining why we saw all those healthy green strips in cereals in '98, in the canola header rows from '97. Bill's work at Wongan Hills shows that there is 8 times more potassium in canola chaff and straw than there is in the grain. This means that the canola swaths are loaded with potassium.

Those strips are telling you something about Potassium—note header rows!

It suggests that where stripping occurred, the soil is probably low in potassium, and you would do well to soil test and maybe topdress some. Also, there have been situations where trace elements and nematodes have been complicated in this stripping result. The answer is: Monitor, as—"You Can Not Manage What You Do Not Monitor!"

Claying takes off

Every man and his dog with water repellent soil in WA, or even just gutless sandy soil, should be closely watching the claying that is currently happening, mostly along the south coast. It has the potential to really improve farm profitability. For an in-depth look at the issue, see the Jan '99 *WANTFA Newsletter*.

Not only are farmers improving soil wettability, but they can also often be doubling soil cation exchange capacity or the soil's ability to hold nutrients.

There is still uncertainty among all concerned as to what the most appropriate rate of clay is. Although, in general terms it is agreed that 100 t/ha is probably adequate on shallow soils, while 200 t/ha may be more appropriate on the deeper soils. This will also depend on the actual clay content of the clay subsoil—which often ranges from 25–40%.

There is also debate over how deep the clay should be incorporated. However, all agree that 3% clay in the topsoil is a useful target and the depth of incorporation should therefore correspond to the rate. Such that, crudely, 100 t/ha should be incorporated to 5 cm depth and 200 t/ha should be incorporated to 10 cm depth, and if someone was keen to try 300 t/ha, then they might need to incorporate it to 15 cm depth. High rates with shallow incorporation is likely to result in surface sealing and yield loss.

So how much should it cost? It is still early days yet, but in a perfect situation, it has been carted and spread, with large machines, for 90 cents/t/ha. It could also cost $1.50/t/ha—depending on distance from pit to dropping and how deep the pit is. The cost of opening the pit (bulldozers are best at this) and incorporation would cost extra, these may cost $40–$60/ha per treated area. Low rates of clay are difficult to achieve with the larger machines.

Below: Three modified Claymates and a Lehmann scraper working together.

Carry grader in full swing—they load very quickly.

Right: A low rate of clay significantly lifted the barley yield at Peter Eardley's at Condingup in 1998—but note the better weed control from the header rows from 1997 in the background."

This shows that 400 t/ha (on left), if properly worked in to 20 cm, as Paul Barber from Condingup did, can give dramatic growth improvements.

President's Report

Geoffrey Marshall, Hyden (08) 9880 0018, fax 38

We are fast approaching our critical 'break to the season' period, hopefully with a good degree of confidence and optimism. A crystal ball or even a reasonably accurate April–October rainfall forecast would be so valuable to all farmers. Rain is falling as I write (19th March) and extremely variable falls have been recorded with more forecast over the next few days. Some farmers have already had a break to the season—keep your knockdown rates up to ensure a total kill of all weeds with careful consideration to follow-up applications (SpraySeed adds diversity).

This Monday (22nd March) your committee meets in Perth with four new faces—Owen Brownley, Derek Chisolm, Matthew Jones and Colin Steddy. The balance of new and older committee members is good and I really am enjoying working with them all. We will miss three very capable people who could not continue for their own reasons—Ken DeGrussa (past President) who has given a huge amount of time and energy, also Paul Maisey and Colin Pither, we will miss your direct committee input but know you will be contributing strongly to No-Till—Thank you!

A very successful Annual Conference was held at Muresk, with our first attempt at incorporating similar seminars at both Dongara and Esperance, as a lead up to Muresk. Thank you all who so willingly filled out the feedback forms on these days, to provide us with some very valuable suggestions and criticism. The whole concept of "days for information to members", is to ensure as much as possible that they are very informative on subjects that are important to you.

One very successful aspect of these days (nights) was the interactive sessions. These were well attended and lively. Another benefit is the bringing together of researchers who interact with one another and farmers on a one-to-one basis.

If you are planning ahead, we will not be having our Annual Conference at the same time next year, as it conflicts with *Agcon 2000*. We will move it to the end of Feb or early March to coincide with a visit from Dwayne Beck who has accepted our invitation—more information later.

Warm season crops are gaining a deserved amount of increasing attention—well done to all involved! Feedback, to Bill or through any committee members, of how your summer attempt has unfolded and any detail of success or failure and your plans for this year, would be valued. As a system to manage deeper rooted crops (pastures also) evolves and confidence and experience grows, sharing information will be valuable to limit pitfalls and increase the successes. Weed control is shaping up to be an area of limited understanding?

PCU (Plastic Coated Urea)—The plant in the US which produces this product has taken longer to install than was hoped and, unfortunately, bulk quantities will arrive too late for this year's winter crop. We will have a limited quantity of 3% coating for trial work only and this should give a much more desirable release rate than the 5.2% of last year. A target coating of 2.5% in the production phase was declared too thin for safe release rates. Bill will be coordinating trial quantities.

Claying of sandy, non-wetting soils and this whole debate is much more out in the public arena and hopefully some good trials involving farmers and researchers can be put into place very soon (50 to 300 t/ha). A lot more work needs to be done to give farmers the information needed to make the correct decision on the whole package of clay application (such as how much, when, incorporation and likely economic responses). Some farmers are going ahead with the task armed only with limited local information, hoping to capture the potential rewards of an expensive operation. Another visit from Clem Obst is a possibility later in the year if members wish. Bill has been working very hard to try and have this newsletter out by early April.

Research Priorities—If you can find a few spare minutes to fax to Bill three of your personal priorities for research (farming) this could be of real value.

I hope you all have a very successful seeding and a productive and profitable year. ■

No-Till Conference—Fantastic!

Neil Young, Conference Coordinator, (08) 9821 0026, fax 01

That is the one word summary for the February Conference and pre-conferences held at Dongara, Esperance and Muresk. Over 700 people had the opportunity to hear and then talk to some of the world's leading agriculturalists over the 5 days, invariably going home with a new perspective on "how to do it well".

Canadian, Doug Derksen, a weed ecologist, caught the imagination of the crowd with his observations on the way weeds adapt to the environment and suggested that we need to "keep the weeds off balance". Professor Stephen Powles followed with some specific cases of weeds adapting to the repetition of management practices we have used, giving what we all know as resistance. Both these speakers emphasised the need for variety in management, particularly diverse rotations, to keep in front of the weed populations. Of course, we have all heard it before, but they put it so clearly.

Allen Postlethwaite, our guest farmer from Victoria, fascinated the audience with his views on the practical aspect of fighting the weed problems that he faces—all without tillage. His realisation that the organic matter component in the soil is so important to the country's well-being and that he won't do anything that might cause its reduction. This has lead to the evolution of a very successful farm system that does not involve tillage nor grazing animals. He initially used winter crop rotations to his benefit, and has now built the soil up to such an extent that summer crops can be used to widen the rotations even further.

Clear thinking and excellent record-keeping allowed Dr Yvonne Postlethwaite to quantify just what was going on in the production of grain and of dollars on their farm. She made the point that land that might be considered "ordinary" with tillage farming can became as profitable as "top" country under no-till, and she left the audience in no doubt about the sustainability of their operation.

This is how Allen and Yvonne Postlethwaites' sorghum looked when they returned home from WA—a handy crop and with no winter weeds.

The evening wrap sessions were a big hit, and certainly should be included in any future conference. Wayne Smith was the final speaker for the Muresk event and he sent many people away with lots to think about. Wayne likes to challenge convention that is there for no reason—his talk is a great read. Distilled parts of the conference are presented in this newsletter.

Wayne Smith

Full proceedings are available from Carolyn Middleton {fax (08) 9075 9057} at WANTFA, Box 1731, Esperance 6450 for $15 posted.

Stuart McAlpine was presented with the Farm Weekly: 'No-tiller of the Year' award. Congratulations Stuart. Thanks to Ken Wilson for organising the Award.

Some things weren't perfect—just a handful thought that the one day at Dongara and the two half-days at Esperance were considered too high pressure for the amount of content. We will work on that one. Having to cut off enrolments at Muresk at 360 was sad, but neither the hall nor the caterers could cope with any more. Sorry to those who missed out.

A conference of this scale has a lot of expenses and there is a risk of WANTFA losing money. However, we are pleased that this didn't happen, and we look forward to future events with confidence. Our thanks go to our major sponsors BankWest, CSBP, *Farm Weekly* and Crop Care, without whom we would not be able to have an event of this scale. Full credit must also go to Bill Crabtree for organising most of the speakers, and to John Duff for the excellent organisation of the events. Thanks also to Cameron Weeks and the Mingenew/Irwin LandCare group for a great partnership. ■

Email From England (4th March)

Tony White, WANTFA Secretary

I visited *Precision Farming '99* at Nottingham yesterday. It was really good to see the future of farming. I can see that we are going to be forced into Precision Farming due to environmental pressure and consumer demand for a clean healthy product. I saw many eye-opening ideas. If only we had the money.

Some of the highlights were seeing a Smartlog remote sensing weather station. It is solar powered and has

cellular modems to enable remote download. It measures air temperature, soil temperature, rainfall, wind speed and direction, relative humidity, two leaf-wetness indicators and a precipitation impact sensor to help with leaf disease decisions.

I also saw Real Time Nitrogen Sensing. It's a sensor mounted on the tractor cab that enables real time variable rate application of nitrogen according to the crop's requirements. It has still only been tested on wheat, but it looks very promising. It doesn't need GPS—it is all done as you drive along. The field scale trials they have done over here have shown benefits in terms of gross margins, grain quality and an increase in the N efficiency of the crop. They also have a lot of information on crop fungicides.

The impact of the BSE and the GM foods has been huge over here. Most farmers are being forced into a quality assurance scheme from fear that they might not be able to sell their produce. It looks like they are going to introduce a pesticide tax to try and curb the use of farm chemicals.

Government regulation is huge. From March of this year, farmers are not allowed to rinse their sprayers out anywhere due to the ground water contamination. It is only allowed on fields that have crops in them. Not even set aside land can be used. They have to have their sprayers checked each year and pass a licence test to make sure that nothing is wrong. They accept all this because they are being paid £90/acre subsidy for just growing the wheat. They are worried though, because it looks like subsidies are going to be phased out—starting from 2000.

Above: Tony calls this seeding arm (copied from Graham Malcolm), a poor man's DBS. However, it is effective for Tony.
Right: The top end of the seeding arm—fertiliser is placed ahead, in the bar behind a leading tine.

That's a brief summary. I hope all's well in WA and that you are preparing for another big no-till season with bumper crops. Regards, Tony!

SANTFA Is Born!

Bill Crabtree, Scientific Officer 041 722 3395

Congratulations to the newly-formed South Australian No-Tillage Farmers Association (SANTFA). In February, Doug Derksen and I went to their inaugural Annual Conference in the Barossa Valley, along with 270 South Australian farmers and scientists. The meeting was alive with ideas and questions—just like WANTFA! They are off to a flying start—congratulations!

SANTFA also hopes to employ a "Scientific Officer" and they intend to produce their own newsletter soon. From their Conference, I stole an excellent talk by Trevor Polkinghorne—it's in this issue and is called *Farming Weeds*. Well done to the initial ground-breaking committee which was energetically lead by Interim Chair: Mr David Humphris from Jamestone—good on ya David! And congratulations to Max Young from YP for taking on the 1999 Presidency.

Left: David Humphris—Initial SANTFA Chair
Right: Max Young—New SANTFA Chair

Australian Sustainable Farmers (ASF)

Bill Crabtree, Scientific Officer 041 722 3395

For your information—last year WANTFA helped initiate ASF. This is an umbrella group for all Australia's no-till and conservation farming groups. Designed to improve the exchange of ideas from within Australia and from overseas. While it is unlikely to influence WANTFA members in any major visible way, it has been a great network for me.

During February, most of these groups have their Annual Seminars and I was able to visit SANTFA and the Central West Conservation Farmers Association (NSW) with Doug Derksen and later, on my own, Southern Farming Systems (Victoria). All these groups, like ours, are "alive" with anticipation that we can make sustainable and profitable farming work better. Our network allows us to better share information.

ASF first met in Dimboola. From left (standing):Bob Mackley (WCFA, Vic), Ray Platt (CWCFA, NSW). Seated: Andrew Harding (SANTFA), Peter Bufton (SFS), John Cutler (CFI, Qld) and Neil Young (WANTFA).

August Field Day Dates

Ric Swarbrick, Gairdner Committee Member, (08) 9836 1038, fax 01

Again we are planning field days for August '99. Mark these dates in your diary if you plan to join us—South Australians are most welcome—bring your own bus-load! The state is too big to do it all in one week, so it will be over two. We have a Southern (higher rainfall) and a Central-Northern circuit (drier) planned. The aim is to do some kilometres and bring a swag, so you can get into the serious evening discussions around a fire and drink.

Visiting trial sites will be limited to only the best, as it seems that farmers prefer to learn from other farmers.

The Central-Northern Circuit will start at 9.00 am, Tuesday 3rd August, at Peter Boyle's, just east of York and will finish at the Yuna Pub at 6.00 pm, Friday 6th August. The rough route will be: York, Bruce Rock, Merredin, Koorda, Wongan Hills, Buntine, Morawa, Mingenew, Mullewa and then the "Yuna Pub". We will look at all the serious seeders—and the dodgy wire and pipe ones. We'll debate row spacings, herbicides, stubble retention, press wheels and lots of other hot topics.

The Southern Circuit will start at 8.30 am, Tuesday 17th August, at Alan & Matthew Jone's Neridup block, Dempster Road and will finish at the Jerramungup Roadhouse at 6.00 pm, Friday 20th August. The rough route will be: Esperance, Munglinup, West River, Lake Varley, Lake Grace, Borden, Kendenup, Wellstead, Jerramungup and then home. It will include a look at: claying water repellent soils, raised bed cropping, new developments with no-till seeders, soil testing, soil agronomy, rotations, stubble retention, disease and insect control. ■

Weed Seed Collection and Control Techniques

Michael Walsh, WAHRI, UWA (08) 9380 7872, fax 34

Annual ryegrass and wild radish pose the greatest herbicide resistance problems in WA agriculture. Seeds of these species mature at around the same time as the crop and, as such, a high proportion pass through the header at harvest. This creates a great opportunity for collecting and killing seeds, effectively reducing the replenishment of their seedbanks.

Weed seeds pass through the header with the chaff fraction and seed collection systems have been developed which collect this fraction. Collected material is stored in a separate bin on the header and either transported off the paddock in trailing chaff carts or placed on top of the straw which is then baled and removed.

Despite their effectiveness, these systems have some drawbacks and can substantially reduce the effectiveness of the harvest operation. Farmers and researchers are now experimenting with techniques which kill the seeds as they pass through the header, or in the concentrated bands in the header row. These practices include the use of herbicides, fumigants, burning, microwaves, heat, exhaust gases, rollers and hammermills.

As a weed agronomist for the WA Herbicide Resistance Initiative (WAHRI), I plan to evaluate many of these systems. This will involve in-paddock testing of the systems that farmers are currently using, laboratory evaluations and desktop studies of conceptual systems. I am seeking your suggestions as to what weed seed kill and collection systems should be studied. All ideas will be considered! I am also looking to conduct field evaluations on seed collection systems during the 1999 harvest. So, if you would like to know how effective your system is, I will be only too happy to do some evaluations. ■

SCIENCE SECTION

Dear readers,

It was my intention to publish large portions of the WANTFA annual conference in this *Newsletter*. However, due to space limitations, this *Newsletter* contains only selected parts, particularly those that have important immediate implications for you this year. I intend to include most of the other stories in subsequent newsletters. However, you can obtain a full copy (50 pages) of all the other talks given at the conference by sending a $15 cheque to WANTFA, Box 1731, Esperance, 6450, WA.

Trifluralin, Stubble and Harrows

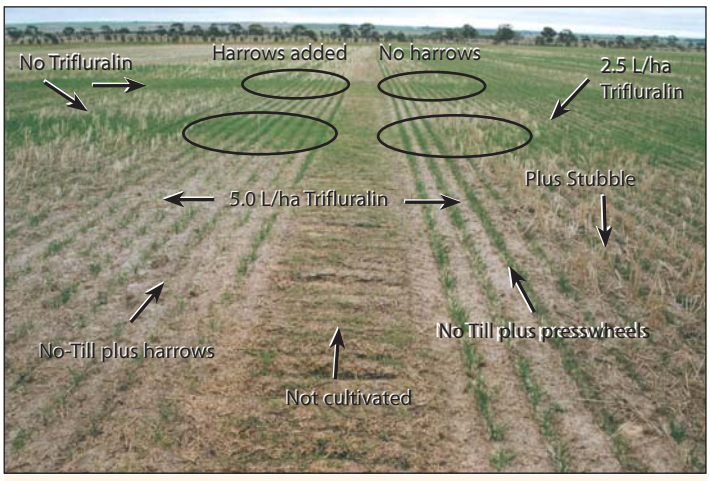
Bill Crabtree, Scientific Officer 0417 22 3395

Many farmers are subjecting trifluralin to very high ryegrass densities (>300 plants/m^2) which will limit the effective life of trifluralin. This work was designed to subject these trifluralin and mixtures containing trifluralin to high ryegrass populations to show the limitation of this approach. The trial measured the effect of stubble burning and herbicide incorporation on the efficacy and safety of pre-emergence residual herbicides in no-till crop establishment.

Thanks to GRDC, WANTFA had funds to look more closely at what happens when we throw trifluralin and other soil residual herbicides into a no-till system. The trial was conducted at Brookton on Graham Sudholz's farm and with his help - thanks Graham! The trial was conducted by Ric Madin under the supervision of Lamond Burgess and Associates.

It was a sandy-surfaced site, which grew a 2.7 t/ha wheat crop in 1997 despite a Hoegrass failure. The site also has some Logran resistance. The site has been ungrazed for several years. Stiletto wheat was sown at 55 kg/ha in 1998, the second wheat crop—which, with retained stubble situation, has negative implications for wheat leaf disease and nitrogen tie-up. The site did express leaf disease early and was sprayed with Folicur once in late July, and only 37 units of nitrogen (as CAN) was applied during the growing season.

Due to the size of the trial, it was not possible to split the trial into blocks, therefore, grain yield comparisons between burning (the day before seeding) and non-burning are statistically invalid. So, do not try and compare grain yields across columns in the table on the next page.



LBA trial funded by GRDC at Brookton. At rear is the WANTFA trial.

Comparisons of weed numbers may be more valid.

On the 11th June, herbicides were sprayed at 50 L/ha of water across the plots before sowing with a 15 m DBS seeder on 25 cm row spacings. Heavy leaf harrows were dragged in the direction of the seeder immediately after seeding. Ryegrass density scores were taken after harvest using the following scale and converted to percent ryegrass control.

The results

There was lots of ryegrass and the treatments showed clear herbicide effects. Burning the stubble increased ryegrass control by 18% with all the herbicides (73–91%). Excellent ryegrass control was possible with herbicide mixtures where full stubble was retained without adding harrows.

All herbicides appeared more effective at controlling ryegrass in thick stubbles when harrows were not used. Trifluralin at 1.5 L/ha gave 73% ryegrass control in standing stubble without harrows and was reduced to 50% control with the addition of harrows. Even more dramatic was the effectiveness of the soluble herbicide which fell from 57% to 33% ryegrass control when harrows were added. Such a result could be due to factors such as higher weed germination due to harrowing, or the retention of herbicide on stubble so that it is less uniformly distributed when the stubble is incorporated. The combination of soluble and insoluble herbicide gave 90% ryegrass control in the no-till and full stubble retained plots, with some treatments giving 97% control.

When weed numbers are this large, burning and harrowing may need to be considered as well as other more sustainable integrated weed management tools. Reducing stubble and allowing the herbicide to be shallowly incorporated may have enabled more effective herbicide activity making increased yields more likely.

Isoproturon was used because it can be more effective against ryegrass and is safer than diuron. However, diuron was as effective in the combinations as isoproturon, with no apparent loss of crop safety and with marginally better efficacy.

High rates of trifluralin, Logran and diuron were effective against high ryegrass numbers but this approach is asking for resistance. Trifluralin can work effectively in high stubble levels. Soluble herbicides added to trifluralin aid in more complete weed control. The soluble herbicides dissolve from the inter-row area and move into the furrow. Caution with this system is recommended and it is not advisable to use diuron on very sandy soils or post-planting with no-till sowing.

Treatment Grain yield (t/ha)				Ryegrass control (%)				Herbicide
Burnt		Standing			Burnt		Standing	
+Har	–Har	+Har	–Har		+Har	–Har	+Har	–Har
4.3	5.0	5.0	4.6	Ryegrass scores, untreated				
0	0	0	0	Untreated control	1.80	1.57	1.11	1.64
85	72	38	53	Log 35g	2.60	2.26	1.80	2.14
90	79	50	73	Trifl 1.5L	2.62	2.33	2.26	2.21
96	93	79	88	Trif+Log 1.5+35	2.80	2.58	2.36	2.42
98	99	90	97	Trif+Log 2.5+35	2.86	2.70	2.48	2.59
94	93	64	83	Trif+Diu 1.5+1.0	2.77	2.40	2.27	2.22
96	90	79	83	Trif+Diu 2.5+1.0	2.76	2.35	2.27	2.28
78	72	23	64	Log+Diu 35+1.0	2.63	2.45	1.84	2.17
94	93	64	73	Trif+IPU 1.5+1.5	2.63	2.37	2.00	2.06
96	90	64	83	Trif+IPU 2.5+1.5	2.80	2.43	2.12	2.35
78	79	38	53	Log+IPU 35+1.5	2.53	2.38	1.89	2.10
98	96	87	95	Trif+Log+Diu 1.5+35+1	2.79	2.69	2.33	2.45
98	97	79	83	Trif+Log+Diu 2.5+35+1	2.78	2.73	2.57	2.39
98	98	93	97	Trif+Log+IPU 1.5+35+1.5	2.77	2.73	2.41	2.59
98	98	87	83	Trif+Log+IPU 2.5+35+1.5	2.81	2.55	2.60	2.36
				LSD at 20% level of significance	0.11	0.12	0.18	0.31

+Har = harrowing after seeding, –Har = no harrowing after seeding
Log = triasulfuron (714g a.i./kg), Trif = trifluralin (400 g a.i./L), Diu = diuron (500g a.i./L),
IPU = isoproturon (500g a.i./L)

Trifluralin combinations achieved significant ryegrass control under no-till seeding in both standing stubble and stubble removed situations. While no-till is a powerful tool for improving the efficacy of soil residual herbicides, these two tools alone may be insufficient to control large ryegrass numbers. It is also putting a lot of selection pressure on the herbicides.

Bare Fallow and Lose Fertility

Chris McDonough, Lameroo SA
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Cultivating and grazing bare paddocks in the Mallee has negative long-term fertility consequences *(Editor: this is an understatement, you should see the Victorian Mallee—it is almost wicked!)*. While these practices are perceived as being beneficial—they must be weighed up against long-term losses to soil erosion and the soil's potential productive capacity.

Cultivation reduces soil cover, breaks the soil into fine particles and exposes the clay and organic matter fines on the surface, to erosion. Wind erosion studies across various land types in the South Australian Murray Mallee have shown how serious the loss can be.

Dust collected from wind erosion, which is generally lost to your farming system, was found to contain:

- A high concentration of clay particles. At some sites the loss of soil fines was about 300 kg/ha/minute at the start of a 75 km/h (gale force) winds. This may happen three times a year.
- A concentration of organic matter. The organic carbon levels were 5–10 times the concentration of the soil from which it had blown.
- A concentration of nutrients. Available phosphorus was 2–6 times, nitrogen 2–4 times, and the soil cations (Ca++, Mg++, K+ and Na+) averaged around 4 times the concentrations of the soil from which they had blown.

These losses occurred at the greatest rates from soils which could least afford to lose them—the sandier less fertile soils.

So what's really being eroded away is not just a bit of soil, but actually the

A severely eroded mallee paddock in February 1999.

soil's productive capacity. The fine clay and organic matter are that portion of the soil which can hold a charge and increase the soil's cation exchange capacity (CEC).

A higher cation exchange capacity generally means that the soil is more fertile—and has more sites to hold, maintain and release nutrients. Organic matter and soil's fines are also vital for moisture retention and promoting biological activity.

Sandy soils already have very low cation exchange capacity and organic matter content in the Mallee. So, what they have left is vital! *(Editor: Some farmers are even adding clay to these sandy soils in SA just to increase the soil's cation exchange capacity—even in the absence of water repellence. So it is surprising that those who have some clay in these soils do not see how valuable it is.)* These sands will not naturally increase in clay content, unless we go down the path of clay spreading.

The organic matter lost from one severe wind erosion event may take 10 years of excellent agronomic practices (growing and retaining large amounts of residue), to replace.

A soil surface will protect itself against soil losses over the duration of a wind event. As the fines are removed from the surface, they leave the coarse sand grains on top. Each time this soil is cultivated, however, more fines are brought to the surface, only to be winnowed away again by the next strong wind.

The short-term benefits of mechanical fallows, or various improvements to farming systems, may well be masking the long-term degradation caused by wind erosion, particularly on our lighter soil types.

No-one likes to see paddocks moving. The most effective way of controlling wind erosion is to maintain soil cover. It is therefore vital that we are moving towards farming systems and machinery that maximise residue retention if we are to maintain and increase the productive capacity of our erosion-prone soils.

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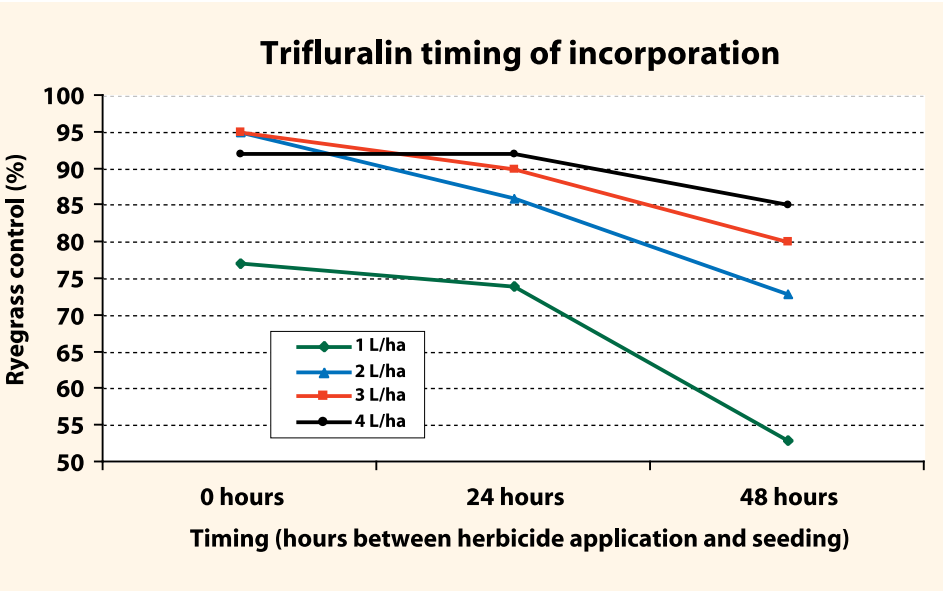

Trifluralin Incorporation Timing

Peter Burgess for LBA.

By WANTFA's request, and with GRDC funding through WANTFA, a trial was conducted at Cunderdin to investigate the timing of trifluralin incorporation. The site had a moderate ryegrass density of around 200 plants/m^2 and was a yellow sand soil type. The trial was sown with Harrington knife-points and press wheels on a 9" row spacings with Stiletto wheat at 70 kg/ha with 120 kg/ha of Agras deep banded at seeding.

Glyphosate was sprayed at 1.5 L/ha on 5th June, and trifluralin at 400 gai/L was sprayed 12th June at 1, 2, 3, 4 L/ha. In the 48 hours following applying trifluralin, the surface soil was moist and the days were sunny. These conditions would favour the volatilisation and photodegradation of trifluralin laying on the soil's surface.

No differences in crop phytotoxicity were visible at the site, even the 4 L/ha rate showed no sign of crop thinning or reduction in vigour. The second germination of ryegrass, although only regarded as moderate density, was uniform throughout the trial site. Counts taken on 10th September confirmed this and showed consistent rate responses across the 3 times of incorporation. These counts also showed that, at the 3–4 L/ha rate, the efficacy of trifluralin was maintained at commercially acceptable levels when left on the soil surface for 24 hours after application. When left for 48 hours the reduction in efficacy was more significant, however, still less than expected and a very real option for farmers. This was not the case at the 1–2 L/ha rates where efficacy fell sharply due to delayed incorporation.

Background is no trifluralin. Foreground is 1 L/ha of trifluralin immediately before seeding.

4 L/ha of trifluralin and immediate seeding (Claytons incorporation).

4 L/ha of trifluralin and 48-hour delayed seeding (Claytons incorporation).

Footrot Created Opportunity

Peter Boyle, York (08) 9641 1186 p/f

My brother and I farm 3,200 ha and lease and share-farm about 1,000 ha which is spread over 45 km lots, just east of York. The crop consists of about 1,700 ha of wheat, 1,400 ha of canola, 400 ha of lupins, 220 ha of beans, 500 ha of oats for hay and 40 ha of barley. In 1994, we found Footrot in our 6,000 ewe flock so we decided to sell our sheep and go total crop.

In 1994–95 we cropped 1,800 ha using a one pass, full-cut, direct drill system. In order to manageably crop the whole farm, we needed more machinery, and the preferred choice was to go no-till, but what machines should we get?

We wanted a seeding system that could achieve several things:

(i) a seeder that could seed into hard soil with limited moisture,

(ii) allow effective trifluralin use without harrows to incorporate,

(iii) retain some stubble and seed through stubble,

(iv) break up the hard pan, and,

(v) water-harvesting ability to improve germination.

If we could achieve these things it would allow us to improve our yields and our long-term soil structure in a continuous cropping program. After much reading, talking and looking we decided to purchase a Nichols No-till tine system on a Snales bar because we needed a robust system to handle our rocky country, the heavy clays, deep white sands and everything else in between. To pull the bar which had 49 tines (and each tine requiring 8–10 hp) we purchased a Cat Challenger 85D.

Being new and naive at no-till, we went out and tried the new toys (this was April 97). Straight away we found out that we hadn't:

- cut the straw short enough,
- the header trails posed considerable problems and
- we hadn't sprayed the Easter germinated weeds because the new boom had not arrived.

The results were big lumps of straw and dirt. So we could see immediately that we wouldn't be able to sow canola into the stubbles due to the seed placement problems. (Note: we wanted to leave the straw to help burn the canola stubble in the following year, thus lessening the blackleg risk and lupin harvesting would be difficult because of the lumps.) We also seem to have a high stubble index compared to other areas.

We rang Terry Nichols to see if we could do anything to improve the situation and, on closer examination, we could see a couple of areas where improvements could be made (such as press wheel arms) but not until too late into the season.

So, hoping to "get out of jail", we purchased a 20-foot Great Plains with coulters and a fertiliser box. There were no problems getting through the straw now. However, severe hair-pinning occurred where the wheel marks from the headers were and we had very poor germination. We also had some structural and mechanical problems—which, after some debate, were mostly overcome. With cereal crops, we found some problems with the incorporation of trifluralin with way coulters not giving enough dirt throw.

During seeding, we found that the 17 mm points gave too much dirt throw and some rows were sown too deep. We also had some chemical mixing when moisture conditions were marginal, even at 8 kph. Having seen these problems, Terry came up with a 12 mm point and, even though we only had a couple to fit, the results were encouraging. Once the soil got wetter the problem seemed to disappear.

We also had some problems with the tungsten tips. They were knocked off in the stony ground. These problems were overcome with the newly-designed 12 mm point and this year both problems disappeared. We still can't go faster than 8–10 km though.

This year with the Great Plains we put on Turbo Coulters and we were very impressed with their ability to incorporate trifluralin. There still was, however, some hairpinning.

As a result of the above problems, we put Kirby spreaders on the headers and these went a long way to removing the header trail problems. We didn't cut the straw short because we were going to have the straw swathed and bailed. However, there was plenty of straw elsewhere and the swathing didn't eventuate—leaving us with the straw problem again. Also, having used the Kirby Spreaders when harvesting the canola (and with the previous year's wheat stubble still on the surface) we were able to burn the canola stubble very easily. This is because the canola stubble was spread. We didn't seem to have the green strips around the paddocks which was so common in burnt header rows this year, due to potassium harvesting.

By May 1998, we had swathed much of the stubble. We still wanted to sow a large area of canola into stubble, and with no sign of an early break, we contracted Michael Swain to seed for us with his K-Hart Bar. We hoped that its coulters, operating at a 12 degree offset, would push the straw out of the way.

They were effective against pinning. However, they left a big V and, to my mind, in the drying conditions at time (26 mm for May in 6 rainfall events), they allowed too much evaporation, and this delayed germination. Another observation was that there was no under-seed cultivation. The paddocks were a bit rougher than when sown with the Great Plains, but the water harvesting was very good. If some under-seed cultivation could be arranged, it would go a long way to being the ultimate machine. The machine did have problems in our stony country.

In 1998, we used an anti-feedant on all the wheat and oats and a fungicide on the wheat. We would do both again if conditions warrant. We also used the new Monsanto chemical Monza, in the trials on our farm this year. It was very impressive on brome, barley and silvergrass. However, it is only a SU and therefore won't have a long lifespan.

With the harvest just gone, we did not want to be caught out again with trash flow problems, so we cut our stubble under 12" in length. We didn't cut the crop shorter because we were scared of rocks. Our Nichols bar does pull out quite a few. This certainly did slow harvest down. We also took off the spreaders and replaced them with a Danish-designed Chafftop. These windrows—weed seeds and all—were bailed and carted away (which removes NPK, etc).

Chafftop viewed from below.

Chafftop in action, putting chaff on top of the header row.

Issues for 1999 and on!

There are several issues that keep us thinking. These include: the lack of mixing of trace elements with the no-till system, the continued threat of resistance (brome grass is a major problem), how financially sustainable are our rotations with the current prices of lupins and barley, ironstone gravel is not yielding well in the no-till systems, will continuous stubble retention on the light sands increase non-wetting? And, do we need to be concerned about blackleg in this area and should we burn all the stubble?

We still use the 753 and MF 80 on about 25% of our program because we need to get over the ground quickly. We have still kept the ploughs and scarifiers in case we have to vary our current practice. We have seen yields improve on the sandplain with both no-till systems—with the added bonus of being able to continuous crop. The deep-rip effect of the bar is noticeable and runs into the following year giving us improved crops with both the Great Plains and the 753.

We still have some reservations about continuous stubble retention. It seems okay for lupins, wheat and canola, but do we go further and do wheat, barley and take it right through the rotation? We have a lot to learn about no-till systems, but we are confident that we are going in the right direction.

Peter Boyle shows how the seeds are left on the surface of the header row. They can then be bailed or burnt.

No-Till Gives Crop Assurance

James Yewers, Mingenew (08) 9971 6055, fax 77

We operate a family farm between Mingenew and Morawa. The farm is totally cropping, with no livestock now for 4 years. Over the past 3 years, for ease of management, I have slowly organised all the paddocks into blocks of about 800 ha separated by natural landforms. This has enabled more timely operations of everything and improves the safety of spraying. It reduces the risk of drift and makes spray rate decisions much easier. I think it is important to view things wholistically and I like to use the "keep it simple stupid" approach as it allows a fast and efficient way of getting more done in a day.

The cropping is done with a Flexicoil bar at 9 inch spacings using DBS blade points and ARP presswheels. The phosphate is deep-banded and the urea, when used, is just ahead of the bar. The majority of our soil is heavy country. On the light country, urea top-ups are post seeding. Our rotation is lupins-wheat-canola-wheat with *Angustifolius* lupins now used on all soil types.

When I think of weeds I just think—kill! We now spray to kill and not just maim the weeds. This means our rates are actually what the agronomist recommends. We also don't spot spray or hope the pre-emergent will miraculously work—and last year was the first year we didn't suffer damaging yield losses through poor weed control.

The only downside to this heavy-handed approach is the high chemical bill of $60/ha/year. Elders aren't complaining, and now, with the service loyalty scheme, we get one agronomically sound chaser bin driver for a couple of days. However, this year that bill has to come down. We have had sole reliance on glyphosate as a knockdown for six years with knife-points. We are going to have to go back to SpraySeed and sweeps to put a portion of the wheat in. *(Editor: The double-knock using glyphosate, then SpraySeed instead of the sweeps would not stir up as many weeds).* This will be the last paddock in and will be wheat after canola. This will also enable the canola stubble to be incorporated (to speed its breakdown for blackleg control).

Chaff cart torture

Even though we still have our herbicides working well for us, we decided to deal a pre-emptive strike on our weeds. In 1997, we invested in a chaff cart—I now hope to make a return on that investment after we listed it in the Elders Weekly. The chaff cart does work. There is no doubt about it! You only have to take a sample home and use it as garden mulch to find out the mat of weeds that will soon germinate. And as for radish control, there could not be a better system of removing it from the paddocks.

However, the problem I had with the chaff cart is that it is another thing to go wrong at harvest! Also, it is not pleasurable having to get out of an air conditioned cab to play in a pile of chaff. In addition, weed-seed shedding occurs prior to harvest—although it's amazing how many wild oats will still turn up in late December. *(Editor: Swathing is needed to make chaff carts most effective.)*

In their first year of use, we estimate that the chaff carts slowed our harvest by two-thirds. We usually aim to harvest 4,000 ha with the one harvester by harvesting around the clock. The chaff carts are a bit like treflan at seeding—someone doesn't sleep and that mug is me. The other compounding fact is we are increasing our acreage and are buying another header. The poor commodity prices make a second chaff cart an item easily put off. However, the chaff cart would be more suited to 2,400 ha per machine—rather than the 4,000 ha and a single chaff cart.

Using a chaff cart does lessen the risk of crop failures due to poor weed control and also tightens the window of weed germinations. For us, the chaff cart, on a one-year basis, cost $7.50/ha to purchase and in herbicide terms—that's not a big expense! However, there is also the risk of finishing after a storm. One never knows—by September I may have gone soft again and forgotten much of the harvest hassles and order another one.

Agronomists are well worth having

Fortunately we have the expertise of Richard Quinlan—and he's not a weed-friendly person either. During the year, we came up with some awesome spray mixes together that had a two-sided effect. Richard knew that my time was limited and he was well on the way to the theory of "a little bit of everything is better than a lot of one thing". This enabled us to get excellent control of most things in the paddock in one pass. So long as you didn't look at the crop for at least 3 weeks—it works well!

Some examples of these brews are:

- For Pre-Em lupins we used Simazine at 1.5, Diuron at 1.0, Atrazine at 0.5, Roundup CT and Sulphate.
- For Pre-Em wheat we used Logran at 35, Diuron at 1.0, Roundup and Sulphate.
- For Post-Em for canola we used Atrazine, oil, Lontrel, Select, Lemat, Hasten, wetter and some Logran.
- For Post-Em for wheat we used Hoegrass, Achieve, MCFA lve and Eclipse.

Silver grass used to be our most damaging grass weed on heavy country because we didn't use the triazines in high enough rates to control it. Now with lupins, and the top-up simazine and canola with 4 L/ha of atrazine and the ability to use 700–1000 mL/ha of diuron in wheat, the silver grass has been reduced to lower levels.

We tend to favour high seeding rates but recently Carnamah wheat doesn't appear to like high sowing rates. So, we reduced that to 70 kg/ha. Canola doesn't like high sowing rates either so we'll keep them around the 5 kg/ha mark. Lupins we seed at 100 kg/ha (down from 120 kg/ha), but I don't know if I'll ever work them out.

Planning to include some tillage

Integrated weed control is not new and is the emphasis of our weed control approach. For this year, it means going back to mechanical weed control in a portion of the wheat, controlled burning in another portion of wheat and treflan-avadex mixes in wheat. Also, since we are putting in 4,800 ha with the one bar, we will use a late weed control with minimal chemical and seed Westonia. We will also stir up some weeds with the trackrake to clean a quarter of the program, and then rake those paddocks going into lupins.

No-till gives reliable establishment

After starting in April for the past few years with no-till, (no matter what the conditions and not stopping for anything until finished), I am now confident that this system is far more reliable than previous soil mixing and drying techniques of crop establishment. However, this may be the year when 'Huey' teaches us another lessen *(Editor: You can count on it)*. But our experience of the last five years suggests that the no-till system is far more reliable—considering all the advantages!

We now have reasonable acreages to finish dry seeding canola then lupins. We will then push on dry with wheat into paddocks I know can be kept cleaner with selectives (post emergent and cheaper—if dry seeded). The selection pressure is greater, but the money is still in timeliness. Last year, we actually did this and, had it not been for the 75 mm of heavy rain at the start which washed diuron into the wheat furrow, the dry sown wheat would have been well ahead. It did this on both the light and heavy country, but as it turned out, those paddocks still yielded the average—so it wasn't too bad.

Resistance and spraying ideas

Often farmers jump on the resistance bandwagon too early. We like to blame resistance for herbicide failures before having adequately assessed the spraying operation and environmental conditions. This year we will attempt to address this by using a GPS guidance system on the boomspray that is interfaced with the controller and a weather recording station at home. This will tell us the weather conditions for: before, during and after spraying—a real time record of what went on. And, if there are herbicide failures, we will be able to see if weather had anything to do with it. Last year we had 750 mL/ha of Amine plus 5 g/ha of glean on radish fail dismally. We were told that it was a frost that night which deactivated the chemical.

Another way to reduce the risk of developing resistance is to change boom widths occasionally. This avoids having the same areas being over or under-sprayed every year. Our boom has been 90 foot for 5 years and we now are changing a 110 foot boom which, on the run in-cab, can be folded to 70 foot to spray smaller pieces more accurately. We have a GPS guidance system which is interfaced to the boom controller which makes is possible to spray as per normal—well that's what the salesman told me!

Water quality is another important aspect of effective weed control. This year we will use spray water from a reverse osmosis unit which gives clean, neutral water for maximum efficacy. The unit costs around $13,000 for l0,000 L/day output. This won't keep up at peak times but we also have rainwater. Spraying Roundup at the start of the season is difficult enough with high evaporational rates and plant stress, not to mention our hard water. The unit has largely been bought because of the high cost of replacing Mum's rose bushes, but I'm sure it will quickly pay for itself.

Night spraying is another tool that will be used more with GPS guidance systems. Night spraying is far more chemical-effective because of the low evaporation levels, less plant stress, reduced likelihood of high winds and the general ability to spray more and be more timely about it. In addition, we are applying volatile herbicides at the right time. We have night sprayed before using blue foam and lots of lights, but with stubble, dust and a temperamental foam marker, it is less than perfect and we tend to over1ap too much. The GPS only has to save 4% of the chemical bill to pay for itself and currently we run at 8% and, in some cases, we use 12% more chemical just due to the constant cornering and overlapping in our tight paddocks.

We often hear about seed quality, but I don't think enough is said about weed sanitation for crops. It doesn't take many years of using even lightly weed-infested seed to replant those, and other seeds that are more herbicide tolerant, back into the paddock. This is the worst case scenario for quickly developing weed resistance. The best way to clean seeds is with a gravity table. Grading off, firstly, clean paddocks—because it is still a numbers game. These seeds must be destroyed and not recycled. Recycling weed seeds off a paddock (seeds which have survived a full year's spray) is asking for problems.

Using Walker Discs at Kellerberrin

Kit Leake, Kellerberrin (08) 9045 9031 p/f

I have been asked to relate some of my experiences with discs and I hope it is useful to someone. However, I am sure that I will ask more questions than I answer. We farm 3,200 ha north of Kellerberrin and our soil type is mainly a duplex of sand over clay with some paddocks being all clay. We also have some jam and york gum with granite outcrops and some tammar and heavy grey clay.

We have been seeding all of our crops for the last four years with a Walker triple disc that places the fertiliser down a leading disc. Prior to that, we started direct drilling in 1981. The last eight years of this were with a Chamberlain 753 doing a full cut-out with a phoenix harrow. I felt that it was time to go another step.

I chose the Walker discs for several reasons:

1. I knew they could handle stubble and other residues—I hadn't enjoyed raking and burning,
2. Hopefully, with time, my weeds would be surface germinating and two knock-downs would be all the weed control I needed,
3. I knew I would get perfect seed depth control,
4. The machine would have a low horsepower requirement,
5. We could seed in less than ideal conditions,
6. The discs would give good pasture regeneration,
7. We knew we could separate the seed and fertiliser,
8. It is a robust machine, requiring little maintenance, and
9. It is locally made.

Our rotations are either two pasture and one wheat, with the first year pasture being spray-topped and the second manipulated and spray-topped. We also continuously crop wheat:lup ins:wheat:canola:wheat.

My observations and experiences in the two pasture, one wheat are positive. We have been able to seed very early with one knock-down and an SU with satisfactory results—similar to our previous seeding method. The regeneration of the subclover has been excellent—we now plan to try just one year of pasture.

A Walker triple disc opener.

Our continuous crop rotation has, at times, been very challenging, but at the end of harvest I have always been satisfied enough to continue with the system. The problems include:

1. Hair-pinning, which is worse when establishing canola in wheat stubble. In good moisture conditions, it is not as noticeable. Sometimes our increased seeding rate to compensate for this has backfired. Hair-pinning with seeding lupins into wheat stubble is not a problem—perhaps because of the larger lupin seed.
2. The fact that we have no soil incorporation chemicals like trifluralin. You can hardly expect them to work. *(Editor: Kit, perhaps the Turbo disc, which Tony Boyle has successfully used and talks about in this newsletter, is the answer although changing the discs back and forth would be a hassle!)* Although, for the last two years we have been using trifluralin with some effect—perhaps from chemical seed contact—and it appears reasonably effective if sprayed out during a rain.
3. We are still getting later germinating weeds which are using spare shots of chemical that we have left over. We are down to Sertin and Achieve in wheat and Select, plus a Fop in lupins and canola.
4. The cocktail of chemicals we use pre- in some wheat crops includes: diuron, trifluralin and an SU. Then, sometimes, a couple of posts including: Sertin, Achieve, Tigrex and MCPA. For all of these, timing and rates do not allow for simple management.

We are not unlike many that have chemical resistance—except that, perhaps we have a bigger challenge than other systems, because of the trifluralin issue. To tackle this, we are swathing the canola and, in theory, burning the windrows. Also, we are delaying seeding, and using SpraySeed just on emergence. The precise emergence gained from the good seeding depth control is invaluable for the timing of the second knockdown—which we use regularly. We attempted to use a chaff cart this year and I believe that it should be reasonably helpful as another string to the bow.

Last season, we cross-seeded one paddock of wheat with a total of 140 kg/ha of seed. It also had double fertiliser. In a harvest trial, we gained 500 kg/ha in grain yield—but the best thing was that we didn't need to use a post-spray. So, we will continue to do a paddock or two of cross sowing. This year, we will burn some stubble and use a harrow to incorporate trifluralin to cover us in the inevitable event of the post-chemicals not working. I am concerned and disappointed that we are doing this as we will perhaps lose some of the gains we have made through time. *(Editor: Kit, in some interesting long-term tillage trials at Wagga Wagga, Damien Heenan has shown that you will do much less soil damage by burning than you will by cultivating—more to come on this soon).*

Benefits and highlights?

As long as conditions are reasonable, we have always been able to seed into even heavy grey clays after two years pasture (even with sheep compacting the surface). In fact, the ground has to be rock-hard not to be able to at least cover the seed. We have certainly had less waterlogging and better trafficability with our zero-till system.

There is also far less risk of wind erosion and better moisture conservation. Although, one year seeding on marginal moisture, (and in hindsight, not sowing deep enough) the only bit of soil that dried was where we put the seed. I'm sure if we'd seeded slightly deeper, this poor germination would not have been an issue.

We have observed, in some pasture regeneration, that the only weeds to emerge have been in the old furrows. Is this water harvesting or is it the only soil that was disturbed enough to allow the weeds to germinate in? I think we can give the system credit for increased earthworms and even white ants.

On rough calculations, the disc wear is similar to point running costs. We haven't had any bearing trouble, but no doubt there will be a maintenance cost there.

My big lesson from 1998 is that we need to wait for a germination before seeding our lupins and canola, because, in spite of having our triazines out on the stubble prior to a good opening rain, we just didn't get good enough weed control!

I do find it difficult to accept the amount of pesticides that I am applying to control weeds and pests. There is no doubt that there isn't any system that is simple and I still believe that, over time, our weed control will become less complicated, our soil structure will improve and our yields will increase. We are seeing evidence of this already.

Farming Weeds!

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Often I wonder—am I just farming weeds? I farm 460 ha at Petersville, Eastern Central Yorke Peninsular with 375 mm rainfall, on soils ranging from grey malice with its underlying limestone to red cracking clay. Most of my weeds include; ryegrass and barley grass (both resistant to most Group A's), brome grass and wild oats, bedstraw, bifora, wireweed, mouse cared chickweed and medic.

For me the three most important farming words are ROTATION, ROTATION and ROTATION. I need to rotate my chemicals, rotate my crops and rotate my farm activities. These rotations have been the most powerful tools in the fight against the weeds that I seem to be farming.

A history of weed control

By the early 80's we had been using trifluralin on much of the farm for about ten years. The crop rotations closed up, as pulses became available, and trifluralin had made it agronomically possible. At this time we had noticed that trifluralin wasn't working as well as it used to, and headlands were not

growing as well as they should. We concluded, that trifluralin was building up in the soil, and maybe ryegrass was getting "used to" the trifluralin. We were also putting a lot more trash back into the soil and perhaps this was not helping.

Medic harvesting then was a profitable enterprise, and we found Carbadamax could spray grasses out on legumes and Hoegrass was available for cereals. This meant that we didn't have to use trifluralin, and we wanted to incorporate more trash anyway. We then heard that ICI (Crop Care) had a chemical to kill grasses in onions, and it should work in medics, so we switched to Fusilade. Fusilade worked so well that we could halve the recommended rate, and I also found I could halve the rate again when using it to spraytop my pastures without losing medic seed as we had with Gramoxone. The lower rates meant that we could also use Fusilade on Pulses.

By the late 80's, we were well into grass-free farming, and were feeling quite pleased with ourselves. Then there was talk about ryegrass resistance to Hoegrass—and they were right, we found some! We grew oat hay for a few years on those paddocks and fixed that one. At this stage our rotation was cereal-legume, and the ryegrass numbers were so low that it wasn't a problem. Our main grass weeds had become brome and barley grass, so we continued to use "group A" selectives on our legumes, and had reintroduced trifluralin where it best suited.

As part of our grass-free farming we were spraying the pastures in late winter with "group A's" but some grasses would always get through, I would also spraytop to stop any carry over of seed. As this worked quite well, I thought I could use the same principal on our Pulses. There always seemed to be some late germinating plants that were getting through, so in the late 80's I started spray topping the pulse crops.

As we entered the 90's I thought we had the grasses fairly under control, but there always seemed to be a background population of, particularly brome grass, but also barley grass and ryegrass. These years were late breaks to the season, and generally low rainfall. Often rains were small and just in time to keep the crops going. I was unaware of the explosion that was about to happen. Pea stubbles that were perfectly clean of grass weeds were sown to wheat and were over-run with brome grass or barley grass (this fits with Doug Derksen's comments and experience). A paddock of barley stubble that was sown to contracted medic, was blowing out with resistant ryegrass, and I could see the possibility of this happening over the whole farm.

Time for a change! After picking myself off the floor of depression, I had to set about planning a future strategy for the farm. I was using a conventional trash farming system—aiming for high yields with high fertiliser rates. We had raised our urea rates at seeding and found that the Department's recommended mix of urea with seed were about right—urea damages seedlings! We had also pre-drilled urea and often found that, if we cross worked the urea, we could see the urea rows just as well as the seed rows. There was also enough research to show that urea, placed 25 mm below the seed, gave the best yield response, so deep banding was the go.

Should I be direct drilling?

There seemed to be enough evidence from around Australia, particularly South Australia, that seeds, left on the surface, suffered more damage than those that were buried. Seeds that were buried under cultivation also seemed to emerge in a longer time frame than those with zero tillage. A multitude of other advantages from using zero tillage convinced me to go that way.

Is zero tillage the whole answer? No! It seems to me that zero tillage may help, and it offers more flexibility, but still the most important part of farming is rotation, rotation and rotation.

A two year rotation has some extreme limitations. The seed bank dynamics of most weeds, in the best conditions, will have some hard seed to carry over to the second year—with some of that carried over to the following years.

I have found that two years of perfect control of grasses has reduced the populations of all grasses to a bare minimum, and three years of perfect control looks like total control. I will only know in later years if this is possible. The catch is to gain perfect control. Hay that is spray topped early enough to catch all the regrowth, for two years is very good and a third year of hay seems to be excellent. Perfect pulse years, followed with canola have also been good, and combinations of pulse and hay have also worked well. Of course, the operative word here is perfect control, and this is so easy to mess up in one paddock, or just a portion of a paddock for one year.

It was interesting when, one day, I asked members of the CRC for Weeds Management Team, "At what stage do you spray ryegrass in the resistance tests?" The answer was 'At the three leaf stage. Don't you?" "No, I'd have to spray at least twice.", "Well don't go past the five leaf", was the reply. I have been able to do this most times now, and sometimes I have had to come back a second time. The main difference is seen at crop topping time. Any missed strips are at seed fill at the same time as the crop, but the bulk of the grasses I am chasing are well behind and the timing is much easier.

Changing rotations can fix one weed and be a boom for another. Vetch then canola, can be very effective on grasses, but the underlying bifora population, which I was unaware of, just boomed! I didn't think I had much bifora. Just a few isolated plants I had been hand picking for a few years, in a particular paddock. There are many chemicals to suppress it, but it seems that Glean and hay are the only control methods.

Rotation of chemicals is obvious to everybody now. But it can be easier said than done. For example, brome grass has resistance to selective herbicides in cereal crops, bifora has tolerance in almost every crop and Glean can carry over for three years (in high pH soils).

Paraquat after glyphosate use

I use glyphosate as a base knockdown, but I also make myself aware of the weeds in the paddock, and add other chemicals to cover the limitations of glyphosate. Adding Dicamber, 2,4-D Amine and Brodal has helped control difficult, broad leaf weeds. Monsanto have also suggested that the only chemical worth adding to glyphosate, is more glyphosate. However, the addition of other chemicals helps me kill marshmallow, horehound and wire weed. These weeds appear in conventional and direct drill systems.

Rotate the activities

The endless pit of suggestions. To burn, or not to burn, that is the question. The problem is, there is only one good burn—the Old Fellows are right—the burn that takes everything is the only worthwhile burn. Anything else is just burning the good stuff and leaves the weed seeds behind. Also, if there are weed seeds left in the header tracks—then it's a failure.

The real question is, when am I game to burn? Of course, the answer is 'the day before the opening rain'. I am more confident about burning now that I have been zero tilling for five years—the soil hangs together better and the paddocks don't seem to be as prone to drift. A suggestion for discussion sometime is, can continuous burnt wheat be sustainable under a zero tillage system? Burning just the header rows in canola stubble works well, if it's done before the rain.

Seeding rates, how high should I go? The current Department recommendations are a good start, and are higher than most farmers are currently using. I think it is the old numbers game—populate or perish! I have done some accidental trial strips of 300–400 kg/ha and yield estimates, protein and screenings were similar to the 100 kg/ha sown correctly alongside. With the high seed rate, the ryegrass plants were out-competed and very few set seed. A thick, healthy crop is one of the best weapons against weeds.

Now what?

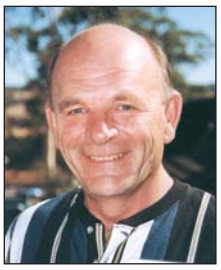
Several years ago, I was planning a two year grass control rotation which I altered a bit to allow for the herbicide carryover, etcetera, etcetera. I then realised that I was heading for almost the whole farm in peas. Not much profit in that! So I started my most important weed control. A serious plan allowing for as much of the above as I can, for at least five years. To do this I use a computer program called PAM (Paddock Action Manager) published by Fairport Technologies International Pty Ltd.

They had to add a budget section for me to do this, and that is how I use it. It is a budget that explores at least five years of planning. I revisit the plan each year, because, funny enough, things change from year to year—prices change, chemicals change, markets change, and I did get that perfect control I was after. Is the rotation pattern I am using working? Has it allowed other weeds to multiply? I can also plan to make sure that I also rotate crops like canola and pulses so that they are not just through the fence for disease control. I also try to plan for a profit.

It has been a major time for reflection. So I am left with the fact I am farming weeds. ■

Production Efficiency With Zero-Till

Ron St. Croix, North Dakota, USA



We farm at Kenmare, North Dakota which is 75 miles northwest of Minot. We are in the transition area between the wetter east and the drier west. We have been 100% no-till for eight years.

My ideas on production efficiency are not always the cheapest. Many beginning no-tillers end up with severe quack grass, Canada thistle, or other weed and disease problems. A strong management program is needed. I find it cheaper and more efficient to control seedling Canada thistle or quack grass before the snow falls in October (in the fall). Spring (June) in crop treatment is expensive and generally results in suppression instead of control. Clean fields allow flexible rotations.

We try to minimise fall harrowing with a good straw chopper. Good chopping with new hammers each year will generally eliminate the need to harrow.

I like a flexible rotation. With clean fields, I can change rotations depending on price and disease problems. My normal rotation is durum, barley, durum, and broadleaf in a four year cycle.

North Dakota conditions are different to those in Australia. December through March is cold and snow. We seed in May and harvest in September. The cold and snow is a real benefit in agriculture by destroying insects and accumulating moisture by catching snow.

A close-up of the 5" opener.

We have used a 48 foot Concord air seeder for eight years. I like the flexibility of the Concord including sweeps, narrow openers, or no-till openers.

The Concord air seeder has a lot of disturbance. We need in-row soil disturbance to warm the soil. We need narrower spacing because the crop only has a short time to tiller. The Concord's 12-inch row spacing and 6-inch wide seed spread gives 50% seeded area. This wide spread gives the plants room to tiller without other plant competition. I use a 6-inch opener on wheat and a 4-inch opener on canola.

The Concord has the frame and shank strength for tough conditions or deep banding. There is a no-till point that will place the fertiliser 3 inches below the seed. I do not use it because I don't want to penetrate that deep in the row in wet conditions.

Our nitrogen source is anhydrous ammonia because it is cheaper than urea. In 1994, my son wanted to try anhydrous coulters. We were using D-J Tubes to apply anhydrous. We tried two Yetter coulters with anhydrous knives for three years. They needed frequent adjustment and worked poorly in damp conditions. In 1997, we designed our own knife on a Yetter coulter. It is a back swept farmland knife mounted behind the coulter. The knife works great. It seals good, with very little wear, and no adjustment is needed.

The coulters are between every other row—24 inches apart—mounted on the front two ranks of the Concord. They are set three inches deeper than the seed and six inches from the centre of the seed row.

Since we switched to coulters for anhydrous, we can use any opener as needed. Early season, we use sweeps with no burn-down chemical. Now we can quickly change openers with no effect on the anhydrous equipment. ■

WANTFA

Western Australian No-Tillage Farmers Association (Inc)

About WANTFA

WANTFA aims to reduce tillage by facilitating the exchange of ideas, encouraging no-till research and disseminating no-till information.

WANTFA defines no-till as sowing without complete surface soil disturbance, using the narrow points or a disced no-till seeder. No-till sowing can reduce costs and minimise wind and water erosion, while improving soil structure. It is our desire to push for sustainable and productive cropping systems.

WANTFA publishes topical, farmer and scientific articles in this Newsletter, usually quarterly. It sponsors visits by overseas and interstate no-till specialists, and arranges no-till study tours. WANTFA employs a Scientific Officer whose role is to meet the rapidly growing demand for more and better information about no-till systems.

How to encourage a neighbour to join WANTFA

You may have a neighbour who wishes to join WANTFA. If so, all they need to do is send their name, address and contact numbers (phone, fax and e-mail) by fax to (08) 9075 9057 along with their Visa number, expiry date and the full name on the card. Alternatively, they could post a cheque to WANTFA, PO Box 1731, Esperance, WA 6450.

Please indicate your choice of option listed below.

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