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

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GRDC

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FEBRUARY 1998 *"Sustainable high production agriculture - now!"* Vol 6 No.1 pp 136-151

No-till versus erosion?

Last year I heard Canadian farmer Bob McNabb who is also a no-till leader, share some powerful examples of how no-till would have preserved the earth's soil. Bob said that his local town lake, used for recreational purposes, has silted severely in the last 20 years.

Farmer Bob McNabb from Manitoba, Canada

Bob said that in 1995 enough soil washed down the Mississippi to fill a train that is long enough to go around the world, not once, but 90 times! He also mentioned that the Tigris River takes soil and water from the river Euphrates because of silting and a town that was built on the ocean's edge, several thousand years ago, is now 30 km from the ocean. The soils that grew the magnificent cedars in Lebanon that went to build Solomon's temple are now almost non-existent, the erosion has been so severe.

My recent travels through Israel make me agree with Bob that an eleventh commandment would have been desirable; "thou shalt not over-cultivate". So many rocks are exposed throughout this land which used to be "a land of milk and honey". The soil has washed and blown away. Hopefully these thoughts help us put our erosion events and herbicide use in some long-term perspective.

Glean also washes into the furrows

Like diuron use post-emergent, any Glean use is more risky with no-till than with full soil cut out systems. Glean, with rainfall, can wash freely into furrows and, on some soil types and susceptible varieties, this can be bad news. It is worth noting that Glean pre-sowing would be safer, in this regard, than Glean post-sowing.

In fact, with oats, Glean use pre-sowing has been used by some farmers with more safety in no-till systems than it has been used post-sowing when weeds have 3 leaves before Glean is applied.

Fire risk greater with no-till

With more and better crops being grown throughout WA in recent years, there will be more and thicker stubbles that burn well. Less pastures mean more stubbles, and no-till means keeping this stubble for soil life. The recent fires in the Brookton-Pingelly area, and elsewhere, highlight how devastating fires can be in our hot summers. We all know how well cereal stubbles burn.

So, what to do? One tool could be when purchasing a new spray unit or truck give some thought to making it a dual purpose unit. Consider a spray truck that is fitted with high pressure pump and outlets. Also you could weld two safety rails for the fire fighters on the back – perhaps just behind the cab. Some farmers who have removed fences have found it an advantage when fighting fires.

Recent fire damage in the Brookton-Pingelly area

Mushrooms in no-tilled wheat

Can you believe this? Not since the early days of farming has Corrigin farmer and inaugural "National Golden Grower of the Year" winner Lawry Pitman, seen consistent mushrooms growing in his paddocks. Now after four years of no-till, Lawry was driving through his wheat crop in spring and noticed not one, but several patches of very healthy mushrooms. This suggests that something is obviously changing in his soil with no-till.

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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 un-intentional. Recommendations are current at the time of printing. Farmer experiences may not work for all. Views expressed are not necessarily those of the Editor or WANTFA committee.
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Bill Crabtree, WANTFA's Scientific Officer is funded by:

GRDC

Grains Research & Development Corporation

No-till gives drought resistance

Recently a Canadian journalist emailed me, saying he was surprised that we grew so much grain with only ordinary rainfall in 1997 and on not a huge area and he wanted to know why. He asked if it was due to no-till sowing systems. I replied that I thought that was one major factor and the other was less sheep and therefore better sowing dates. I suggested to him that while no-till might not drought proof us it does offer significant drought resistance to crops.

I have heard many farmers, particularly in dry areas, growing better crops than usual on less rainfall with less tillage. You may have noticed Derek Chisolm's photo on the cover of the Christmas edition of the Countryman, saying that since no-tilling their whole farm his wheat yields at Morawa have jumped by an average of 1.0 t/ha. Obviously good management must be given credit also.

Five years before stubble works

South Australian agronomist Tom Yateman from Clare agrees with others that perhaps it takes five years before stubble starts to work for you. Allen Postlethwaite from Victoria has thought this for some time, and Steve King from Lake Grace thinks he is starting to observe this on his farm in his fifth season of stubble retention. Obviously David Roget's CSIRO work in SA also confirms this principle.

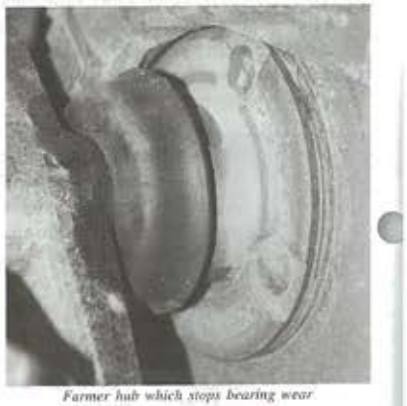
Long-term stubble retention must be balanced with reasons for stubble destruction. Most reasons for stubble destruction can be overcome with diverse crop and herbicide rotations. Obviously chaff retention also benefits the soil and its removal by catching is not contributing to soil life. However, some farmers who have hit the herbicide resistance wall successfully do this. Weighing up fors and againsts is a constant, and long-term, farm systems juggling act. The "Soil Life" snippet in this newsletter gives more insights.

Weeds in furrow harder to kill

Peter Burgess, from Lamond Burgess and Associates, made the useful comment that last years furrows catch water and allow autumn germinated weeds to persist more than after levelled soil. Weeds in these furrows not only suffer less drought, but are somewhat protected from knockdown herbicides. These two factors may mean that higher knockdown rates are needed.

Biomax® or Forward Germinator® owners

Have you had to replace more bearings than you hoped too and it doesn't thrill you? Then try this simple idea. One farmer has welded a simple cup over the bearing which has stopped sand getting into the bearing. Since applying this cup thousands of acres ago, he has only had to replace one bearing on his whole machine.



Farmer hub which stops bearing wear

Urea additives look promising

Four field trials with Agrotain® and two field trials with plastic coated urea show they both have the potential to greatly reduce emergence toxicity. This was also confirmed in glass house tests at Muresk. Elders and Summit will also sell you the Agrotain® to treat your own urea. Several containers of plastic coated urea will be imported into WA from the US this year to test it on a broad scale. To hear more of these results come to WANTFA's Annual Conference at Muresk from 10 am on February 24-25th.

Canola grain drying in '97 – not so good!

In the November '97 newsletter, you may recall an article on the McDougall's at Tincurrin, who had good success with air-drying canola in '96. Well in this '97 season it did not go so well. The damper conditions at harvest made it a frustrating experience. So modifications to this system will need to be considered to ensure it works reliably.

WANTFA sincerely thanks the following:

- Colin Booth of Booth Technology in Cottesloe for a good computor deal,
- South Australian researchers for their K-Komplex trial data put in this edition,
- Agriculture and Agri-Food Canada for allowing Dr Cynthia Grant to travel to WA,
- BankWest and Wesfarmers CSBP Ltd, and other sponsors of WANTFA's 6th Annual Conference at Muresk 24-25th Feb,
- Those farmers who freely share their ideas in these newsletters for others and;
- Wesfarmers for contributing an article.

BankWest & CSBP SPONSOR ANNUAL CONFERENCE

WANTFA is very pleased to announce that BankWest is the major sponsor of the Annual 1998 Conference at MURESK Institute.

Wesfarmers CSBP Limited has agreed to sponsor the marquee and outside display area

The support of these organisations allows us to keep the cost of events to members to a minimum, and provides the opportunity to share knowledge. We are privileged to have the managing director of BankWest, Mr Terry Budge to speak to us at the conference on financial management and benchmark farmers.

ANNUAL CONFERENCE: 24-25 Feb 1998

Kevin Bligh, Vice-President (08) 9755 7589, fax 90

WANTFA's sixth Annual Conference on the theme "No-Till Crop Rotations", launching WANTFA's partnership with Muresk Institute of Agriculture, Curtin University of Technology, Northam will be held at the Muresk Hall, starting at 10.00 am on Tuesday 24th February, and finishing at about 4.30 pm on Wednesday 25 February 1998.

The Keynote Speaker will be researcher Dr. Cynthia Grant, of Agriculture Canada, Brandon, Manitoba, talking on Fertiliser Placement and No-Till in North America. Geoff Fosbery (agricultural consultant) will follow, discussing common no-till rotations and challenging issues in Western Australia. Bill Crabtree (WANTFA's Scientific Officer) will report urea additives trials from 1997.

The Hon. Monty House, Minister for Primary Industry, will speak on partnerships in agriculture. Geoffrey Marshall (WANTFA Committee Member) and Professor Murray McGregor (Director, Muresk Institute of Agriculture) will describe WANTFA's partnership with Muresk. Terry Budge (Managing Director, BankWest) will then discuss financial management and benchmark farmers.

Journalist Ken Wilson will present the Farm Weekly "No-Till Achiever of the Year" Award, and Bevan Bessen will show the Alcoa Landcare Vision three-dimensional audio-visual. Farmers Stuart McAlpine (Buntine), Chris Syme (Cunderdin) and Norm Flugge (Katanning) will then describe details of their successful no-till crop rotations, followed by a panel discussion prior to an evening barbecue.

An "Extending Rotations" session will be held at 9.00 am on Wednesday, 25 February, (following the AGM at 7.45 am). Farmers Tony White (Miling – WANTFA Secretary/Treasurer), Geoff Bee (Chair of Jerramungup LCDC), Ken de Grussa (Esperance-WANTFA's Immediate Past-President) and WANTFA Subcommittee-member - and former Committee-member, Jim Baily (Wellstead) will report on their experiences including lucerne, sorghum and sudax in rotations.

CSIRO researcher Phil Ward, consultant Tony Seymour (Narrembeen) and Peter Norris (SBS Rural-IAMA, Geraldton) will also describe their observations of warm-season crops such as lucerne, sorghum, sudax and sunflowers.

Increased canola and wheat yields have been observed by WANTFA members following warm-season crops such as sorghum, sudax and sunflowers, paralleling WANTFA's 1996 keynote speaker Professor Dwayne Beck's findings in South Dakota, USA. Indications of deeper-rooting have also been observed in sorghum at Morawa, which is expected to lead to increased water-use.

The consequently-reduced saline watertable recharge is expected to result in a reduced rate of increase in the area of cropland lost to production through salinity. Current official predictions suggest that some 30% of WA cropland will be lost to production because of increased salinity in some 30 years time. (About 9% of former cropland is now not available for grain production because of increased salinity)

David Pfeiffer of SBS Rural-IAMA, will then talk on pesticide use with no-till, and AgWA researchers Paul Blackwell (Geraldton) and Mike Collins (Northam),on the performance of a range of no-till seeder openers.

In a final session on sustainability, Mike Grimm (AgWA, Albany) will talk on insect problems and solutions in stubble-retention systems. Consultant Lyn Sykes will discuss personal relations aspects of the sustainability of a family farm business. Alex Campbell (Chair of the State Salinity Action Council and the Australia-wide Land and Water Resources Research and Development Corporation) will then talk on no-till crop rotations and sustainable profitable farms.

BankWest is the major sponsor of this sixth Annual WANTFA Conference. Wesfarmers CSBP Limited are providing a marque and displays on the lawn outside the Muresk Conference Hall. If too many attend to fit into the approximately 300-capacity Hall, then a video link-up is planned in a nearby Lecture Theatre to cater for the remainder.

Attendance on both days costs $100 for WANTFA members who register before 13 February, and $150 (including a year's complimentary WANTFA membership) for non-members. Registration fees increase to $110 and $160 respectively - and registration cannot be guaranteed - after 13 February. Attendance on one day only costs $60 and $90 respectively.

Please send the relevant registration fees with names and addresses of attendees - on the enclosed registration form, if possible - to the Conference Secretary, Yvonne Powell, Suite 1, 105 Broadway, Nedlands, 6009 by 13 February. For details or further information, phone Yvonne on (08) 9386 4404 or fax (08)9386 4677.

Low cost and tidy accomodation is available at the Northam Camp School, near Muresk. Call the Northam Tourist Bureau on (08) 9622 2100 for Hotel or Motel bookings (ask for Don or Anne).

/ANTFA's NORTH AMERICAN NO-TILL TUDY TOUR ON CROP ROTATIONS

Aug - 15 Sep 98

evin Bligh, Vice-President (08) 9755 7589, fax 90

Professor Dwayne Beck of South Dakota State Univer- y aroused considerable interest during his 1996 visit, with orts of 0.5 t/ha higher wheat yields in the three-year rota- ns including a warm-season grass or broad-leaved crop, n without – and 1.0 t/ha higher in four-year rotations, by luding both warm-season crop types.

WANTFA members such as Ken de Grussa (Esperance) ny White (Miling) and Derek Chisholm (Morawa) report ilar preliminary results on their farms in 1997, following ghum or sunflowers in 1996. It may therefore be a good e for a WANTFA party to revisit Dwayne and the farmers works with in South and North Dakota and other areas, to what further relevant information we can pick up that y be useful in Western Australia.

A month-long itinerary is proposed in North America and Eastern States. Two and-a-half weeks in the US North- Great Plains and Canadian Prairies will be followed by e days on a whole-farm-management visit in California – climate similar to ours – and the week-long, second Aus- ian no-till farmers' Confarm National Conference at woomba, Queensland and Moree, NSW on the way home!

Costs are anticipated to work out at about $130 per day, s air fares. Overland travel will be by seven-seater self- e vans or cars. All common costs will be pooled and billed articipants at the end of the study tour. Motel accommo- ion, obtained as we find it "en route", will be the responsi- ty of participants. (We only had to drive on once on the 4 study tour, when an insurance convention had booked up available accommodation).

Air fares and bookings (estimated cost; $2,700) must also arranged privately by participants. Participants are, of rse, free to join or leave the study tour at any stage, pro- d they make their own transport arrangements, without dvantage to the remainder of the touring party.

The Australian Taxation Office have advised that the cost study tour "would be an allowable tax deduction if the ject of self-education, being in this case no-till, is directly vant to the activities by which assessable income is cur- ly derived".

The tour will meet and depart Minneapolis airport, at 8.00 on Monday 17th August, driving to visit Dwayne Beck at re, South Dakota. After further visits to farmers working Dwayne, it is planned to investigate experiences in the 0's in preventing rising water tables and salinity in North ota and Montana.

No-till rotation systems will also be investigated in the adian Provinces of Saskatchewan and Manitoba, before rning to Minneapolis to fly to Los Angeles on about 1st tember. A visit to no-till farmers, George and Elaine Work's h about half-way to San Francisco, will then allow dis- ion of holistic management, before flying on to Sydney on September.

The touring party will then drive to Moree, NSW on 6 Sep- ber, for the beginning of the Confarm National Confer- on 7 September. The conference finishes at Toowoomba, Queensland on 11 September. Further agreed visits in Southern Queensland, and Northern and Central New South Wales, may then be generated from contacts at the conference, and can be made on the return leg to Sydney, returning by about 14th September.

In drawing up a detailed itinerary, I will endeavour to allow a day of little or no scheduled activity once-a-week, allowing participants the possibility of agreed further visits, including to scenic attractions of tourist sites en route, or rest and recreation.

As in 1994, I'm happy to bear the additional cost of a round-the world air fare to lead this 3rd WANTFA no-till study tour, following private visits to Ireland and Europe. I would appreciate it on this occasion, however, if my overnight and transport costs, only, could be included in the common costs of arranging and leading the study tour.

Following my 1991 Wesfarmers Churchill Fellowship studying no-till seeders and their adoption in North America, I was pleased to arrange WANTFA's 1994 and 1996 study tours. About twenty North American farmers, scientists and engineers have since made return visits to WA, including invited WANTFA Keynote Speakers, Canadian agricultural engineer Ben Dyck in 1995, and Dwayne Beck in 1996. So do consider coming! It can be a broadening experience!

Your final decision on whether to take part in the above 1998 North American and Eastern Australian No-Till Study Tour on Crop Rotations, can virtually be made right up to the start on 17 August. However, seasoned travelers suggest it may be desirable to arrive in North America up to two days earlier, in case jet-lag knocks you about!

Please let WANTFA Scientific Officer Bill Crabtree know of your intention to participate by 31 July, so that appropriate vehicle bookings can be made in North America.

In order to make preliminary arrangements - and to assist other would-be participants in making a decision on whether to come - I would appreciate it if any WANTFA member, who might be interested in joining any part of the proposed study tour, could let me know immediately, or by 31 March 1998, if at all possible.

For further information or to make suggestions - which are guaranteed a warm reception - I can be reached on (08) 9755 7589, and fax 90. My postal address is RSM 442, Busselton, 6280 and Email, "walburra@netserv.net.au".

WANTFA GEARS UP TO ENTER THE NEW MILLENIUM

Graeme Malcolm, President (08) 9971 5002, fax 35

As this is my last "Chairs Corner" I would like to thank all those members who have contributed to the success of WANTFA in 1997. This has been a big year in the growth of WANTFA and 1998 will bring better value for money for our members starting with our seminar and AGM in February

Our long term goals have been enhanced by taking steps to provide focused, relevant information to members well into the future as part of our strategic plan. One of the major steps was the appointment of Bill Crabtree as our Scientific Officer funded by a GRDC project for 5 years. The results of Bill's work can already be seen in this and previous newsletters and at the various WANTFA events.

Another step has been the recent engagement of consultant John Duff to provide management advice and services to the association. John recently resigned from his position as Deputy Commissioner of Soil Conservation in Agriculture WA to pursue his plan to work with agricultural and other natural resource managers in a more independent capacity. John is working in association with consultant Clint Lester.

So far John has helped organise the Annual Conference, and with committee members, began further developing partnerships for WANTFA with industry and has commenced, at the request of the committee planning to hold the first International No-Till Farmers Conference in Perth in October 1999.

WANTFA's committee is confident that these moves will enable it to be well set up for the future. Please take the opportunity to talk to WANTFA committee members, John and Bill at the 24-25th Conference.

'LIFE IN THE SOIL'

Dr Gupta, CRC for Soil and Land Management, Adelaide

One teaspoon of soil contains more organisms than a whole stadium of football fans. Of course they would need to be shrunk by about a million times, but it helps to illustrate the density of population of soil organisms which make up the soil biota.

Surface Stubble

Incorporated Stubble

Stubble incorporation favours bacteria and bactivirous fauna whereas stubble left on soil surface supports more fungi and fungivirous fauna.

With the majority of soil biota invisible to the naked eye, it is easy to forget that 80-90% of soil biological activity is carried out by bacteria or fungi. Millions of organisms are concentrated in the top 10 cm of soil, yet only a small proportion have been identified, for example, 5% of fungi and 3% of nematodes. However, the knowledge already accrued by scientists indicates that there is an important two-way relationship between soil organisms and agricultural practice.

Harnessing the benefits provided by a balanced soil organism food web is seen as an important new frontier for sustainable agricultural production. Particularly when coupled with no-till and stubble retention. It is for this reason that myself and other colleagues at the CRC for Soil and Land Management in South Australia have published 'Life in the Soil' describing the relationship between agriculture and soil organisms and how these can be optimised.

The first section of the publication deals with the activity of soil organisms in the regulation of organic matter turnover and nutrient cycling, biological degradation, maintenance of soil structure and their interaction with plants. The influence of agriculture on the activity of soil biota is dealt with in the second section. The impact and benefits of stubble retention, crop rotation, no tillage and inputs are all assessed. To assist in bringing the soil organisms to life, the third section of the publication contains details of practical methods for measuring some types of soil biota.

Drawing on the latest Australian and international research 'Life in the Soil' presents the roles played by the different levels of soil organisms and illustrates the complex food web which exist in natural and managed soil environments. These 'predator-prey' relationships help to control the balance of species present in the soil. When these relationships have evolved and a reduced incidence of disease occurs, such soils are termed 'suppressive'. The development of suppressive characteristics is viewed as a potential new breakthrough in the sustainable management of agricultural and horticultural soils.

Using simple technical language, colour illustrations and pictures 'Life in the Soil' is designed to help us better understand the beneficial activities of soil biota while minimising their detrimental effects. 'Life in the Soil' is available from Jan Ward, Primary Industries and Resources SA, 1800 35 6446 or fax (08) 8535 6427

PRESS WHEELS SURVEY FROM SA

Andrew Harding, Primary Industries and Resources SA, Clare (08) 8842 3900

With the adoption of less tillage there is farmer confusion in South Australia as to whether or not to buy press wheels. We conducted a survey of 20 farmers who have used press wheels in the mid-north of SA in 1997. The farmers were selected at random and they represented the majority of farmers using press wheels throughout the district.

Andrew Harding

The respondents were using press wheels on a range of soil types from black cracking clays and hard setting red-brown earths to light sandy loams on flat to hilly country and in areas of 250-600 mm rainfall. Almost all the farmers were using reduced tillage techniques, with more than 80% using knife and narrow points (12-50 mm wide).

Most farmers (95%) were using solid rubber press wheels with a narrow profile, either banked wedged, flat or 'V' shape. Semi-pneumatic press wheels will flex and reduce mud build-up on heavier sticky soils, but are more prone to damage from stones, sticks and stumps, and can run off their rims. Eight respondents were using the walking type of press wheels which give accurate press wheel pressures, because of the consistent pressure on each individual wheel. Walking designs also maximise wheel clearance for soil, trash and stones.

Benefits

Most farmers felt that press wheels gave better and more even crop emergence, with increased early crop vigour from better seed-soil contact, and a more consistent depth of soil cover. Their crops looked better due to improved emergence, and they thought they were getting better yields, but were unsure of how much.

Two farmers had replicated trials with SARDI (SA Res. & Dev. Inst.) researcher Rohan Rainbow. One of the farmers had a cereal yield increase of 7% while the other in the drier area had cereal yield increases of up to 16%. Rohan's trials show that press wheels can improve emergence by 15%, increase early crop growth at early tillering by 25% and cereal yields by 10%, and in some cases more than 20%, on a range of soil types.

Respondents thought press wheels reduced soil drying, giving better emergence in marginal soil moisture (see Mike Collin's article in this issue). Blockages from trash were minimal compared to harrows and finger tines. Also press wheels did not excessively disturb the soil, drag stubbles or create an uneven depth of soil cover compared to other covering devices. Trifluralin was also more safely used with press wheels, due to better seed placement in relation to the herbicide band.

Setting up

Most farmers felt that press wheels were relatively easy to set up and align, although it did take time. Once they were properly set up, 85% of the respondents left them on the combine or airseeder and sowed all of their crop. Press wheels were used on all crops including cereals, pulses and canola.

Many were unsure of the pressure that they were using, and guessed the pressures so that the soil was left firm. One farmer commented that "If the ground became too rough I would take the weight off", while another farmer felt that he may have had the pressure too high as he had trouble with the emergence of pulses.

Research has shown that press wheels are more effective if they are set to optimum pressures for various soil types, moisture content and crop. It may be worthwhile spending time prior to seeding, setting the recommended pressures for various soil type and conditions.

Problems

Several problems with press wheels were raised, included greater paddock roughness, crabbing and poor tracking, stones jamming between the press wheels, a build up of mud around the wheels, bearings giving way when lots of cornering is done. More pressure is put on the seeder, the definite furrows increase the water erosion risk and mice burrow and shelter in the furrows.

Suggested solutions to these problems included; get the pressures right, lift the machine out of the ground on corners, use scrapers (or wait till the soil dries), contour sowing on hilly ground and sow the headlands first rather than last.

Conclusion

Even though press wheels and the frames are an expensive outlay, at approximately $160 per sowing row, the majority of the respondents believed that they were a good investment, and more than one third of the respondents felt that they covered their cost within the first year. All respondents felt that press wheels were beneficial within their farming system and felt confident in recommending them to other farmers.

SCIENCE SECTION

A COMPANY AGRONOMIST'S VIEW OF NO-TILL

Wesfarmers Dalgety MERCHANDISE

Alex Aitken, Wesfarmers Dalgety (08) 9273 5449, fax 2158

The no-till revolution sure has put extra pressures on our technical extension services as there are many aspects of the "whole system" that are clearly not fully understood. However, the information available to the farming community and advisory services shows that there are very distinct advantages with no-till systems in our moisture-stressed grain belt.

The moisture conservation and water harvesting ability of no-till systems, particularly with press wheels, is one of no-till's greatest advantages. This gives better crop germination in sandy soils, where the soil surface can dry out very quickly and give a poor germination. This raises the question of herbicide activity under this new system.

By harvesting water and depositing it in the furrows, are we then moving some herbicides that were traditionally incorporated, too near to the germinating seed? To look at this question the Wesfarmers Dalgety agronomy team undertook a series of trials from Northam to Yuna. However, the trial results were inconclusive with only one plot out of 230 showing any significant difference in yield, although there were consistent yield increases with press wheels over prickle harrows. This trial was in cooperation with the Morawa Agricultural School and AgWA.

This is probably an accurate reflection of many farmers experiences this season and underlies the unpredictability of chemical activity under no-till systems.

One comment from the Wesfarmers Dalgety agronomy staff concerns the definition of "no-till". Perhaps "no-till" should be replaced with something like "minimal soil disturbance sowing" as the majority of the machinery used in the seeding process is providing some form of slot disturbance.

Obviously some soil disturbance is useful in some situations to ensure adequate uptake of some soil applied chemicals. Our suggestion is long winded but would be a more accurate description of the process, but perhaps that is being pedantic *(Editor – Alex, the WANTFA committee welcome your views and we are aware that the terminology (as outlined in the November '97 newsletter) is not perfect! Any better suggestions we would be keen to take on board. I personally think that min-till has similar problems as no-till, for what is the minimum amount of tillage you can achieve? WANTFA believe that tillage (by definition) is "complete rearrangement of the entire topsoil structure" and clearly knife point or minimal-soil-disturbance disc seeding is not rearranging the entire topsoil structure, and is, therefore, not tillage. Also of note is that national and international agricultural scientific publications constantly use the word no-tillage.)*

The real problem from an agronomists point or view is that we can't predict with the accuracy needed, the reaction of the IBS or PSPE chemical applications. The best answer to the many of the State's weed control problems is higher rates of knockdowns to ensure total pre-sowing weed control.

Farmers in many areas were using rates far higher than they had ever used before, like 1.2-1.5 L/ha of glyphosate,

and they have reaped the benefit at the seasons end with some of the cleanest crops they have ever had with minimal in crop herbicides needed. All trials this year showed that it was cheaper to add an extra 500 mL/ha of glyphosate or SpraySeed than to try and salvage the crop from strong early germinated weeds.

The effective use of knockdowns will go some way toward delaying the onset of herbicide resistance. The potential for reducing weed populations and seed banks of weeds with low dormancy rates is great but this may be offset by the ability of weeds such as radish to adapt to the system quickly.

It is a consensus among our agronomic staff that "no-till" systems have advantages that will outweigh the known disadvantages. As we are not equipped with "crystal balls" the long-term effects of the system on fungal diseases, weed spectrum changes and stubble management are hard to predict. However, some basic things we constantly observe with good no-till systems include; excellent knock down control, controlled seeding depth for the crop type, correct herbicide choice for pre-emergence or in-crop weed control and stubble management. When these are achieved increased returns result with better soil structures for longer term sustainability.

No-till farming systems are only part of the overall farming system. The full system must include good cropping rotations over at least five years to ensure that the pressures put on weed selection and the amount of herbicides applied do not undo all the potential good that no-till can achieve. Our experienced agronomic staff at Wesfarmers Dalgety will be keen to discuss these and other no-till issues if you require.

HERBIRATE TO CALCULATE RATES

David Minkey, Merredin AgWA (08) 9081 3111

A recent GRDC project enabled myself and John Moore (Albany AgWA) to investigate how much herbicide is needed to kill weeds in different environmental conditions. A subsequent new model was developed that will help us predict the performance of Roundup CT®, Sprayseed 250®, Hoegrass® and Diuron/MCPA.

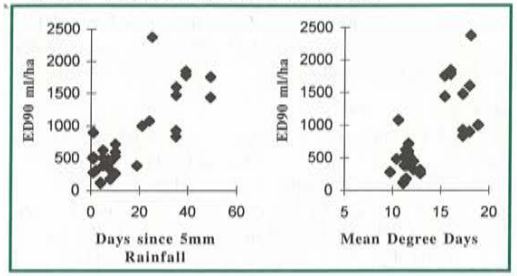
Optimising the timing and application of herbicides; will lead to more efficient herbicide use, which is likely to benefit the environment, and may slow down the onset of herbicide resistance. Without the ability to predict herbicide performance none of these benefits can be achieved.

The model predicts the rate of herbicide required to achieve 90 % control of weeds that are commonly found in WA. Its purpose is to reduce the risks associated with selecting herbicide rates by considering plant age, development, height, density, moisture status, nutritional status as well as climatic factors such as temperature at the time of application, rainfall distribution and mean degree days.

The model was developed from dose response trials based at Albany, Mount Barker, Merredin, Katanning, Newdegate and Gairdner from 1995-97. Environmental and agronomic data collected at each site was correlated against herbicide performance and used to predict performance. We have tried to use parameters that are easy to measure and which correlate well with performance. Estimates of stresses such as moisture stress are also used, instead of a direct measure, which either takes too long or requires the use of expensive, hard to use equipment.

Results

We found that humidity and temperature (mean degree days) from germination to spraying, varied significantly between years from 11.9°C, 16.2°C and 13.6°C for 1995, 1996 and 1997. Increasing temperature and decreasing humidity decreased general herbicide effectiveness, as demonstrated for glyphosate in the graphs below. The left hand graph shows number of days since last 5 mm of rainfall and the right hand graph shows mean air temperature on the rate of Roundup CT (mL/ha) required to give 90% control (ED90) of annual ryegrass.



The scientific literature shows that hot and dry conditions encourage plants to increases their cuticle thickness and build up waxy deposits on the leaf surface, making herbicide absorption more difficult.

Herbicide performance was also affected by rainfall distribution, and in particular the time since the last "decent" rain. We have arbitrarily chosen days since the last 5 mm of rainfall. A rainfall of this size not only reduces moisture stress but also washes the dust off the leaves and perhaps helps hydrate the cuticle. Increasing the number of days since the last 5 mm of rainfall decreases herbicide effectiveness. These parameters can be calculated before spraying and possibly used for predicting required rates in each season and district.

Conclusion

After three years trial work in the Western Australian environment working models have been developed for predicting Roundup, Sprayseed, Hoegrass and Diuron/MCPA performance. Seasonal conditions measured by degree days and rainfall distribution have a large effect on herbicide performance. Researchers have acknowledged that conditions before, during and after the spray event are important in determining herbicide performance, but few have assessed these effects under field conditions or in different seasons. Using seasonal and day-of-spraying conditions we were able to predict 84-98% of the variation experienced in herbicide performance in the field.

This work allows us to determine what herbicide rates might be required without a reduction in performance and could save expensive repeat applications that are required after failures. It also has the potential of reducing the onset of herbicide resistance by ensuring a good kill with knockdowns, or by using the model in long-term management strategies which avoid resistance.

Herbirate is a useful learning tool for looking at trends in herbicide performance. It can tell us what happens under certain conditions, and the benefits of spraying young actively growing weeds. However, Herbirate does need validation. The model was developed from only three seasons of data and may need many more before it can accurately predict herbicide performance. Following label recommendations and personal experience should still be the main source of information when selecting a herbicide rate.

NOTES FOR NEW NO-TILLERS

Bill Crabtree, Scientific Officer 0417 223 395

Given the great opportunities no-till systems offer it is no surprise that its adoption statewide could be more than 40% in 1998. However, before adopting no-till, good crop agronomy is a must! Stubble needs to be well spread at harvest, weeds must be controlled early, higher rates of knockdowns are needed, wider rows are often part of the package to reduce frustration at seeding, sensible rotations need to be used, fertiliser toxicity must be avoided and slower early cereal vigour should be managed for.

Manage weeds well

Weed numbers must be effectively manipulated and spraytopped in pasture before a cropping phase. Those autumn rains can be 'caught' in the soil with low rates of glyphosate and maybe 2,4-D and Garlon, soon after the rain. The main weed germination after the break could require higher rates of glyphosate - perhaps twice what you are used to with direct drilling. Waiting 10 days after the break before spraying is a must to ensure good weed control and less resistance pressure on selective herbicides.

Then to be sure the weeds do not revive, many no-tillers use a low dose of Spray.Seed mixed with high rates of trifluralin and 800 mL/ha of diuron just before sowing on 10-12" row spacings. The herbicide mix depends on the crop sown. Leaving weed seeds on the surface is a good tool to use against herbicide resistance. Zero-tilling with disc seeders do this best. Often no in-crop grass selective is needed with many no-tilled crops if weed management has been good. Avoid using diuron post-seeding with no-till as it can wash into the furrows and cause crop damage.

Consider wider rows

There is much debate over row spacings. My view is that wider spacings (10-12") offer many benefits that usually outweigh the slight yield losses (1.5% per inch) that might occur with the wide rows. Wider rows means many things, including:

WITH WIDER ROWS
Better trafficability • No trifluralin damage
Less soil damage • More earthworms
Keep seeder at lupin spacing • Can control soil interow shape
May increase farm yields • Whole farm TOS is better
Fewer blockages • Wider seeder - same cost
Less wear and tear • Less horsepower • More fertiliser toxicity
WITH NARROW ROWS
Looks more cultivated (and is) • Risk of trifluralin damage
More N released • A bit more crop vigour
Down-time to adjust seeder • More ridgy surface

There are many other advantages that I discussed in the May 1995 WANTFA newsletter. Also Canadian researcher Dr Guy Lafond outlines similar views in the August 1997 newsletter.

Avoid fertiliser toxicity

No-till increases the risk of fertiliser toxicity. With no-till the seed and fertiliser slot is often so narrow that toxicity is more likely than where the opener (point) is wider. There are two types; one is a salt effect where 200 kg/ha of superphosphate at 14" row spacing has caused damage to emerging lupins on sandplain soils. Both phosphate and sulphate salts are involved, mostly in drying conditions. The second type of toxicity is from urea which converts to ammonia and ammonium, and damages emerging plants. In both toxicity cases, increasing the distance between the crop-seed and the fertiliser increases crop safety.

Increasing cropping, at the expense of legume based pastures, is financially rewarding but means that more synthetic N is need for growing non-legume crops. There are several ways around the fertiliser toxicity problem, these are:

1. providing some distance between the seed and N,
   a) splitters on knife point openers,
   b) banding below or to the side,
   c) using a disc to place fertiliser off to one side and
   d) topdress urea before seeding.
2. using liquid fertilisers with uniform flow (is ~30% less toxic and more expensive) and
3. treating urea with substances like;
   a) Agrotain® or
   b) a plastic coat.

Agrotain® is available from Elders and Summit for $85 per 5 L which will treat one tonne of urea. My work shows that Agrotain® could halve urea toxicity, or you can use twice the rate for the same degree of toxicity. This is similar to work by WANTFA Annual Conference Keynote Speaker, Canadian researcher Dr Cynthia Grant. Come to Muresk (24-25th February) and hear Cynthia and myself discuss this subject and present data, which will also be published in our next newsletter. Plastic coated urea will also be discussed.

We need to be careful to keep the P with the seed and the N away at least 2 cm (off to the side is better than below). Remember that Impact® treated fertiliser needs to be near the seed to be effective.

Sensible rotations

Growing barley after wheat is not the best option for disease and stubble management reasons, although it would ensure appropriate protein levels for the two crops. It makes sense to try and mix up the crops and create diversity. Alternating between broadleaf and grassy crops makes a lot of sense for disease, weed and other pest reasons. Faba beans, peas and lupins are all useful legumes. Cereals and canola are quite different crops.

Slower vigour

Since the soil has not had the nitrogen flushed out of it by tillage early plant growth is slower in the first few years of no-tilling. This can be compensated for by applying more N at sowing in the ways mentioned above. However, we have noticed that these no-tilled crops are more sluggish than others and are therefore more susceptible to insect damage. Consequently, insecticide may be needed to protect early plant growth.

Use press wheels

It is clear to me that press wheels are so valuable in so many environments that I think they are worth the small cost (see Andrew Harding's story – this issue). But there are cases where you would want to ensure they were applying

very little pressure, like 2 kg of verticle pressure per cm of press wheel width. This is likely to be beneficial when growing lupins on yellow sands (as Amjad discussed in the August '97 Newsletter) or sands that have any sealing tendency. Another case where press wheel pressure probably should be light is on sticky clayey soils.

Press wheel pressure could be checked with the bathroom scales (but get permission first!). Ensure the seeder is in the ground and dig under it, place a flat piece of wood as a base and lower the wheel on the scales. Ensure that your hole is deep enough so that the press wheel elevation is the same as all the other undisturbed press wheels on the machine. Take your reading, and if your press wheel is 5 cm wide then you would want 10 kg pressure if you have a situation where you are concerned about too much pressure.

K-KOMPLEX TRIAL RESULTS

Bill Crabtree with data from SA and WA researchers

As WANTFA's Scientific Officer I have been frequently asked by WANTFA members about K-Komplex fertilisers from Rural Liquid Fertilisers (RLF). Part of my response is often "I have been keenly waiting for some independent trial work to be done with K-Komplex". For five years I have been watching farmers apply K-Komplex to their crops, either as a seed dressing and/or a foliar spray. Now I have located ten groups of people in SA and WA with their own trial data.

I also know of other reputable researchers who have conducted trial work on K-Komplex in past years, but their research has not been made public. It would be good if these data were released in their entirety. Consultant Bill Roy (08) 9641 1080 has also done some 1997 work with the Beverly LCDC, which will soon be public. You can visit the Internet web site of Rural Liquid Fertilizers (RLF) who sell K-Komplex for some trial information where positive data is presented, see www.rlf.com.au.

I am also aware of individual farmers who, in this past season, have spent thousands of dollars on the product in the hope of profitable returns. I know there is plenty of non-replicated trial data out there, which is of some use, and there is data from RLF. Data from independent sources is valuable and should be made public. This article is an attempt to do this.

Murray Mallee trials

Under the supervision of Richard Saunders at Loxton SARDI on phone (08) 8595 9100 nine replicated sites throughout the Murray Mallee were conducted in 1996. These trials compared K-Complex applied, at the recommended times and rates, to Frame wheat seed (2 L/t of seed) and foliarly at 4 L/ha. All treatments were in addition to a basal rate of granular fertiliser, which was either 63 or 90 kg/ha of MAP (mono-ammonium phosphate).

SITE	No K-Komplex (no fertiliser)	K-Komplex (+ fertiliser)	LSD* at 5%
Lameroo	2.80	3.06	0.33
Nangari	2.26	2.27	0.05
Parrakie	3.31	3.48	0.43
Paruna	1.22	1.32	0.16
Pinnaroo	**3.91**	**4.13**	**0.11**
Sandalwd	1.69	1.55	0.30
Waikerie	1.70	1.77	0.16
Wanbi	0.55	0.49	0.09
Wunkar	1.65	1.56	0.11
Average	**2.12**	**2.18**	**0.08**

LSD* = significant difference at the 5% level.

Grain yields varied from 0.49 t/ha at Wanbi to 4.13 t/ha at Pinnaroo. Sites were markedly different in soil type and fertility, from sand and sandy loam to more substantial loam. Only at Pinnaroo was there a significant yield difference (see bold print in table) where K-Komplex seed dressing increased grain yield. However, averaged over all the sites, there was no significant yield increase to K-Komplex use. There were some visual differences observed throughout the year, but there was no visual difference in grain quality.

Field Crop Evaluation Program throughout SA

In the same year (1996), Rob Wheeler coordinated 14 SA trials with K-Komplex seed dressing which was tested on Schooner barley for grain yields. The K-Komplex was applied to the seed at the recommended rate of 2 L/t of seed (data from Jim Egan). There were no positive significant responses to the seed dressing, but there were two negative responses (see bold print in table)!

LOCATION	GRAIN YIELD CONTROL	(t/ha) +K Komplex
Arthurton	3.96	3.66
Brentwood	**3.26**	**2.97**
Bute	2.19	2.06
Cooke Plains	0.91	0.97
Crystal Brk	1.74	1.63
Cummins	3.12	2.99
Elliston	2.62	2.51
Mangalo	3.01	2.86
Minnipa	2.98	2.87
Port Clinton	3.84	3.80
Salters Spgs	3.61	3.50
Streaky Bay	**2.36**	**1.95**
Turretfield	3.90	4.03
Wanilla	1.80	1.82
Wharmida	1.53	1.50
Mean	**2.72**	**2.61**

Rob Wheeler's other trials

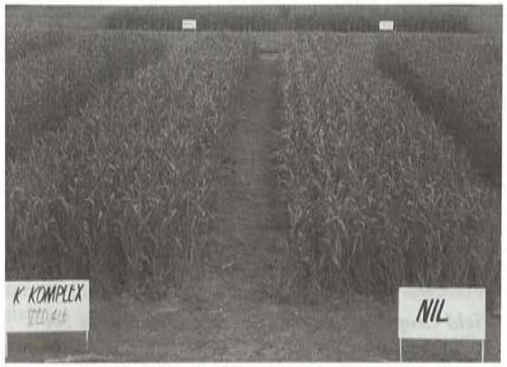
If you visit Rural Liquid fertilisers web site on the Internet, you will notice some of Rob's data (sponsored by RLF) which shows a yield increase to foliar applied K-Komplex at 4 L/ha. The 8 L/ha did not respond. However, the improvement with the 4 L/ha rate was not significant at the 5% level. Rob has two other data sets of foliar applied K-Komplex, plus those in the table.

Minnippa Research Station

One trial at Minnippa on the Eyre Peninsula in 1996, under the supervision of Dr Bob Holloway, showed no significant yield differences with any K-Komplex application. K-Komplex was used as a dressing at 2 L/t of seed (0.85 t/ha), as a foliar application at 3 L/ha (0.89 t/ha) or both used together (0.80 t/ha). These yields were no significant improvement over the control, no fertiliser, treatment (0.85 t/ha).

Hart Field Day site

One trial at the Hart Field Day site in 1997 also showed no significant yield differences in what was a good season at Hart. Janz wheat was sown on 30th May at 80 kg/ha, with 80 kg/ha of DAP. Four replicates were used. K-Komplex foliar was applied at 4 L/ha (23rd July) and the seed dressing was at 4 L/t of seed. Grain yields for the nil, foliar and seed were 3.06, 3.09 and 3.05 t/ha (see photo below).



Mid North of SA

Consultant Mick Faulkner on phone (08) 8843 4282 conducted two trials for his farmer clients, again with no significant yield improvements. At Mintaro he compared K-Komplex as a seed dressing at 2 L/t of seed and as a foliar spray at 4 L/ha after seed dressing. Wheat was sown at Mintaro after a late break on 3rd July 1996 with 50:20:0 (N:P:K) and 5 kg/ha of Zn. The control plot went 4.48 t/ha, the seed dressing went 4.65 t/ha and the seed dressing plus foliar went 4.61 t/ha.

Mick also tested oat hay for K-Komplex responses at Balaklava in 1996 and found no significant response to K-Komplex. The control treatment yielded 5.08 t/ha and the K-Komplex seed treated and foliar applied treatment yielded 5.03 t/ha. In contrast 5 kg/ha of zinc lifted yields to 6.27 t/ha on this known zinc deficient site. Note that K-Komplex is considered to contain zinc.

Narrogin work in WA

Pierre Fievez on phone (08) 9389 8860 worked with K-Komplex for two years and found K-Komplex slightly improved pasture growth and sheep live weights – see www.rlf.com.au. He also conducted eight K-Komplex crop trials, six with wheat in 1995 and two were with lupins in 1996. In some of these trials, grain yields were slightly improved with K-Komplex application.

Elders in Geraldton

Richard Quinlan, Elders agronomist conducted two trials in the Geraldton Region in 1997. These trials were conducted side by side at Mingenew and compared seed dressings, two of which were K-Komplex (3 and 6 L/t of seed). One trial was looking at seed dressings in isolation (97RQ12) and the other trial (97RQ13) was concerned with determining if seed dressings were essential to ensure a response occurred from foliar applied K-Komplex. The trials were sown on 22 May with 100 kg/ha of Agrich at seeding and 50 kg/ha Urea topdressed on 30 June.

97RQ12 (Seed dressings in isolation): Richard found no significant grain yield or quality advantage from applying K-Komplex at 3 or 6 L/t to Tammin wheat. The grain yields were 3.24 t/ha for the control, 3.31 t/ha for 3 L/t and 3.27 t/ha for 6 L/t.

97RQ13 (Interaction between seed dressing and foliar K-Komplex): Once again there was no significant increase in yield or quality from applying K-Komplex at 3 or 6 L/t to Tammin wheat. The grain yields were 3.54 t/ha for the control, 3.56 t/ha for 3 L/t of K-Komplex and 3.69 t/ha for 6 L/t. More importantly, there was no interaction between seed dressing and foliar K-Komplex.

The trial design makes it impossible to gauge whether K-Komplex as a foliar spray significantly increased yield. Richard's concluding comments are: "the difference in mean treatment yields between trials cannot be assumed to be only the effect of foliar K-Komplex but will also include variation in soil type and trial error" and "because there were no treatments in 97RQ13 without foliar K-Komplex it is impossible to gauge the effect of foliar K-Komplex in isolation."

In another interesting seed dressing trial Richard conducted on a yellow sandplain soil produced the following result. The nil plot went 4.05 t/ha, 4 L of K-Komplex per tonne of seed went 3.98 t/ha and Vegemite at 1 kg per tonne of seed went 4.11 t/ha and it was statistically higher than the K-Komplex and the nil seed dressing treatments.

AgWA at Geraldton

Frances Hoyle (phone (08) 9956 8555) conducted two trials at Northampton in 1997 to investigate the effects of K-Komplex on the incidence of black point in wheat. Trials were located on sandplain and sandy clay loam soils, at two sowing times (21/5/97 and 10/6/97) with 50 kg/ha DAP and treatments of K-Komplex applied at two crop growth stages. Treatments consisted of foliar application of K-Komplex at 4 L/ha at late tillering and ear peep. Cultivars used in this trial were Eradu and Tammin. The results show no reduction in black point levels or change in protein and no significant yield effects with any application timing compared with the control.

SITE	No K-Komplex	K-Komplex (late tillering)	K-Komplex (ear peep)	UREA (50 kg/ha)
		Yield (t/ha)		
Sandplain	1.04	0.95	0.97	1.11
Loam	1.37	1.30	1.46	1.47
		Protein		
Sandplain	10.3	10.1	10.2	11.3
Loam	10.7	10.6	10.7	11.1

AgWA at Buntine

Chris Gazey conducted a lime trial, and wanted to determine if lime was having any negative nutrient effects on plant uptake. Chris used K-Komplex as a general foliar application to reduce this likelihood on both wheat and lupins. Chris found no yield improvements with the foliar application of K-Komplex to the wheat, while he observed that the plots sprayed with K-Komplex went slightly purple on some leaves after application.

Chris believes that the lupins gave a significant yield response to foliar applied K-Komplex. He also found significant responses to Mn and a response to K. Obviously the site

did have several nutrient deficiencies. Chris is in the process of doing a full plant analysis which will be available soon. He can be contacted on phone (08) 9368 3633.

Acknowledgements

I spoke to local RLF distributor, Ian Simington from Northam on phone (08) 9622 3897 and I thank him for referring me to agricultural consultant Bill Roy. I also spoke to Dr Hooshang Nassery from RLF in Adelaide on phone (08) 9385 5444 about some independent trial workers and I thank him for providing four of these contacts.

Conclusion

I have just spoken to Alan Hancock a consultant with RLF who has read this article. Alan's comments were: *"I am surprised at the lack of positive grain yield data in response to applied K-Komplex as documented in this article. RLF does have a considerable amount of positive trial data for K-Komplex and I suspect one reason these 'not so positive results' could be due to timing of application or some other confounding factor. As discussed with Bill Crabtree (Editor) we would be pleased to present additional independent data in the next newsletter."*

MICROBES REDUCE REPELLENCE

Margaret Roper, CSIRO, Perth (08) 9333 6668, fax 9387 8991

Water repellent soils lead to uneven and delayed germination of plants, poor stand establishment and greater risk of wind and water erosion. Water repellence is caused mainly by plant waxes and their biodegradation products coating sand surfaces. For five years, as a microbiologist with a team, I have been investigating biological solutions to water repellence, and am glad to report some positive findings.

We have travelled the state collecting soil microorganisms (including bacteria) from drains outside farm butchering areas, sewage outlets, sheep camp areas and from organic gardens. Interestingly, most soils investigated have bacteria capable of degrading plant waxes. If soil moisture is adequate, then these naturally-occurring wax-degrading bacteria are stimulated, and soil wettability slowly improves. The difficulty is, we need wet soil to help the bacteria break down the waxes, but repellent soils do not wet very fast unless steady rain falls during warm soil conditions, such as in autumn.

We isolated 70 wax degrading bacteria, of which most were actinomycetes (*Rhodococcus*). These microorganisms use a wide range of organic compounds as their sole sources of carbon for energy and growth. As part of the screening process, we tested their ability to produce surfactants and grow on hydrocarbons (waxes). The more efficient the growth on hydrocarbons, the greater the potential to eliminate waxes on sand grains. Biosurfactants help release hydrophobic substances from soil particles, and make them more susceptible to breakdown. Of all the microorganisms that grew well on hydrocarbons, seven were efficient surfactant producers. These were tested further for their abiltity to ameliorate water repellent soils.

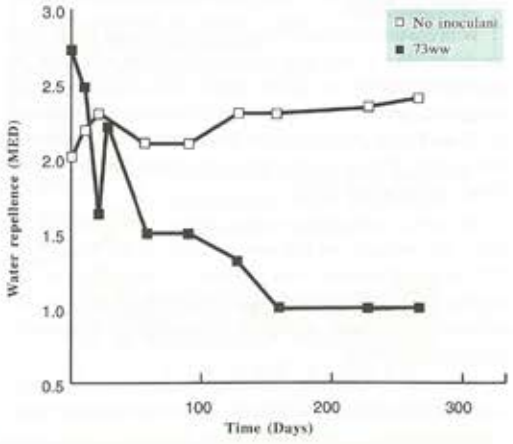
When water was applied and moisture maintained, in many of the water repellent soils we collected, gradual reductions in hydrophobicity occurred. This was attributed to naturally-occurring populations of wax-degrading microorganisms. This also occurred in the field where water repellent soils were irrigated, but, not so in soils which had been dry for some time. Laboratory studies with these soils showed that only after inoculation with efficient wax-degrading bacteria, like 73ww (see below graph) did wettability improve. Such inoculation may be useful in agriculture and horticulture, particularly where natural microbial populations have declined due to long periods of dry and sometimes hot conditions.

Water repellent soils do take time to wet up after the beginning of winter rains, especially if it is cold. These soils also drain rapidly between rain events. We needed to find ways to increase the rate of improvement of wettability in the soil during the times when soil moistures were ideal. Clay is one option, but South Coast farmer experience pointed us to lime.

Frank Ford is one South Coast farmer who for a long time has been convinced that lime improves water repellence. A lime trial by Ron Glencross (Albany AgWA) in the early 1980's on Gerald Kilpatrick's farm near Woogenellup clearly showed how, on repellent soil, soil wetting is improved greatly by adding 2.5 t/ha of lime.

Our work also showed that lime improved soil wettability, apparently due to a stimulation of microbial populations which are responsible for degrading waxes that cause repellence as well as to a direct physico-chemical effect. Initially, in a laboratory experiment, we clearly demonstrated that adding lime to moist soil reduced repellence. There was a rapid drop in repellence in the first three weeks, followed by a slower change, until the soil was almost fully wettable. The slower second phase was considered to be due to microbial decomposition of waxes.

These results have been supported in the field under both dryland and irrigated conditions. In the dryland field experiment, populations of wax-degrading microorganisms were measured and significant increases in population sizes were found in lime treated soils. Lime application is a relatively simple tool in agricultural management, and has other benefits such as raising soil pH potentially improving nutrient availability. Thanks to GRDC for funding this work.



FARMER (ART) SECTION

WEED MANAGEMENT IN A NO-TILL SYSTEM AT MILING

Tony White, Secretary/Treasurer, Miling (08) 9654 1025, fax 54

We farm on soil types that vary from yellow sandplain to heavy grey clays in 350 mm rainfall. We seed on 250 mm spacings with 13 mm knife points. We have no set rotation but it is generally lupins:wheat:barley on the lighter country and 2-3 yrs of pasture:wheat:barley:pasture on the heavy country. Now we have canola to help push the rotation out more.

Weeds are a problem in any cropping and grazing system. Our system is 70% cropping and the rest is grazed by sheep and cattle. The hardest thing to do is to get the right balance. I guess it is called an integrated weed management system. The livestock help control the weeds at different times of the year.

The sheep can be used on a resistant ryegrass paddock and the cattle love barley-grass and melons. The cattle have nearly eradicated the melons in a 100 ha paddock. They are also used to graze on the forage sorghum in the summer. The livestock used to be the main source of wind erosion in the summer and autumn, but this has changed with the no-till system. We are not disturbing the soil as much and the stubbles are all left on top so the paddocks can be grazed a lot longer. The livestock give the stubble paddocks a tickle up without even starting a tractor. This gives a good weed germination at the break. Pasture manipulation is a dilemma. If it was done this season the animals would have no feed!

When I was starting no-tilling there seemed to be only three major things to overcome, that was weeds, disease and pests. It did not seem to matter which way the seed was put in the ground because 80% of no-till was going to be in the agronomy. It turned out to be correct. One of the many pieces of advice from WANTFA's 1996 Keynote Speaker Dwayne Beck from South Dakota was "Competition, sanitation and rotation are my three cultural practices. Herbicides to me are only something that aids my crops competitiveness - we're not going to eradicate all weeds."

With our no-till system I have noticed a change in the weed spectrum. For a long time ryegrass and wild oats were the problem weeds in our cereal crops. Because we were not using wide points and not getting a full working of the ground, we found barley grass and silver grass became the main problem weeds. This is now being fixed by diverse rotations with better pastures and canola.

By using knife points we have many more chemical options, and we have not lost any old ones. In the lupins I use 500 mL/ha of atrazine with 1.5 L/ha of simazine when dry seeding, and 1 L/ha of glyphosate or 1 L/ha of SpraySeed if a germination of weeds occurs. The rain seems to incorporate the chemicals well.

With this no-till system our lupins are growing vigorously and compete well with the weeds. It is very important to use a grass selective in the legume phase, because in many cases I do not use a grass selective in the following cereal crop. One disadvantage is that when leaving the stubble standing you cannot work at night because you can't see your last lap.

The triazine resistant canola has given us a tool to clean up our grassy pastures before they go into a cereal. The simazine cleans up the silvergrass well. By windrowing the canola, the weeds that are left can be burnt in the chaff after harvest.

Wheat is the main enterprise and 1,000 ha was seeded in 1997 - all no-till! The lupin and sorghum stubbles are a one-pass operation, so they are seeded first. The pasture paddocks usually get an Autumn tickle in April with the knife points. It is done wet or dry. This roughens the surface to trap light falls of rain and also stimulates a weed germination.

On a dry start like 1997, we are ready to sow on 10 mm of rain. Most other farmers waited for more rain. We had a good germination of weeds on a small amount of rain. These were given 1.0 L/ha of glyphosate and 5 g/ha of Glean to kill any radish. If silvergrass was present I would use 1.5 L/ha of SpraySeed with 500-700 mL/ha of diuron plus 35 g/ha of Logran. On a lupin stubble that did not get a grass selective last season, and had a big ryegrass problem, I used 2.5 L/ha of trifluralin and 600 mL/ha of diuron, and it is very clean.

We did not have any paddocks crust over this season, except where we used wide points. If I have any transplants, I go back with 700 mL/ha of SpraySeed at the one leaf stage of the wheat. This is where it is important to have good strong seeds because the plant draws from its reserves a bit longer than usual. Wheat seeding rates have varied from 100 kg/ha on sand to 45 kg/ha on clay. There have been mixed results due mainly to moisture. The aim is to get good competition and get the wheat to canopy as quickly as possible, and out compete the weeds. The most frustrating thing is sitting back and waiting for the weeds to germinate in the crop.

Barley is sown after wheat. The previous wheat stubbles are harvested as low as possible and the straw spread. With the stubble cut 250 mm high, you can see a lot of ground to get the chemical on. We use 3 L/ha of trifluralin on the light country and 3 L/ha plus 700 mL/ha of diuron on the heavy soils. With our machine we get just enough inter row soil throw to cover the herbicide. Some probably gets tied up in the stubble. If there is a ryegrass problem we windrow the chaff at harvest, graze it with cattle, and still burn the windrows in the autumn. A successful no-till crop starts at harvest!

We tried forage sorghum last spring. The paddock had a big radish problem. It was sprayed in August with 2 L/ha of glyphosate and 1 L/ha of atrazine. Once we got the forage sorghum established, it grew very quickly on very little rain. We grazed it regularly during the summer. The cattle got good feed from it, and I got good weed control and the rotational benefit from it. I sprayed it with 2 L/ha of glyphosate and 35 g/ha of Logran. The following wheat did better than the wheat on the lupin stubbles.

With no-till we get good seed to soil contact, and good uniform seeding depth. Before, using the culti-trash, we threw the seeds and herbicides all over the place. Now it is a lot more organised, and no chemical comes into contact with the seed so you give the seed a better chance. Our paddocks are smoother to drive on, and I have always been able to get on the ground to spray.

What we are striving for is a more sustainable, higher production and profitable farming system. We have got to use more of the excess water that is causing salinity. I believe we can achieve this through diversity in rotations.

You must have a good boom spray, because timeliness is the key to getting maximum results from the herbicides. Most people think we use more chemical. I can say that we don't. We use more knockdowns, but less in-crop, so it is still about the same. It is a lot quicker to spray a paddock than work it up.

We still keep our options open, though. We still own a plough, but hopefully will never need to use it again. We can put sweeps back onto the bar if necessary. The key is flexibility. You never know what is going to happen in farming, like anthracnose - some farmers were told to use the ploughs to turn the crops in. Or for resistance to glyphosate which is a real possibility. We need to learn from past mistakes with the overuse of one chemical. We need to rotate our crops and our herbicides as much as possible.

Some things that might change farming in the future could be genetic engineering and site-specific farming. Hopefully they will make our farming systems more profitable, as no-till has.

KNIFE POINTS DO WELL IN THE DRY

Don Fischer, Pinnaroo SA (08) 8577 8217 (p/f)

Having grown up using the old traditional farming methods of our forefathers, I have found that knife point seeding has given me a new lease on my farming life. Cropping has become more flexible and interesting, as well as challenging. After more than a decade of stubble retention with no soil disturbance, I can clearly see that it is doing some good things for the soil. We don't understand all the effects, but they are mostly positive, and they sure are interesting, as well as making cropping more profitable in our dry Murray Mallee region of South Australia.

When I first started retaining trash I used a Trashworker with most discs removed. These first attempts at mixing the seed, fertiliser and residue into the soil with direct drilling were a disaster. We had little control over seed placement and the residue ended up in all sorts of places. I have visited Allen Postlethwaite's farm in Victoria and have switched to Janke narrow points under a Grasslands combine. We adopted 36 cm (14") row spacings and found this overcame our trash problems, partly by keeping the crop seed away from any residues, and this system is continuing to help us achieve excellent crop yields.

We farm 1,350 ha in about 360 mm rainfall area with variable soil types. We have both heavy and sandy soils. Some are badly water repellent. The repellent soils we leave to pasture and we easily get fertiliser toxicity on these soils. We crop about 70% of the farm each year in a 3 year rotation, typically pulse crop:wheat:barley (or triticale). Our pulses are lupins, beans or some peas, although I don't like peas because of the erosion risk they present.

Since adopting this system we have noticed many good soil changes. We think our soils are going darker, and the heavier soils have become more friable. We have large numbers of earthworms in all soil types, and we have seen fungi (toadstools) appear in the crops in wetter years. We can now grow wheat on soil that would not grow wheat before. Obviously our diverse rotations, as well as using knife points and stubble retention cropping, have both helped these wheat crops.

We use 75 kg/ha of 16:18:0 (N:P:K) plus zinc, which we put below the seed (on wide rows). This has proven safe enough from a N toxicity angle, and seems to give us enough nutrients for our crops. We have not needed to topdress urea, and our wheat proteins are now 2-3 % more than they used to be. We stick to the same seeding rate as before. We use press wheels as we have constantly observed emergence improvements with them. We also drag a round steel pipe in front of the press wheels which helps pull some soil back into the furrows to improve seed-soil contact.

In my mind the straw we retain is doing great things for the emerging crop. The straw seems to really slow evaporation losses, while protecting the soil from the elements, and wide rows amplify these benefits that are obvious soon after seeding. Then, surprisingly, the stubble breaks down quite quickly in early spring. Sometimes it is hard to believe these stubbles were 3.5 t/ha cereal crops the next spring. Also we have noticed that the subsequent crop roots are able to effectively explore the soil in the 36 cm inter-row by springtime.

Another thing we have noticed is quicker leaf development. We have monitored the cereals up to six weeks after seeding and believe we have observed a new leaf every 3 days for this period which seems to be a lot quicker than normal. I would appreciate some feedback on this.

We have also had some changes in the weed spectrum, as you might expect. On some heavier soil types after 8 years of continuous crop, we have needed to de-rust the off-set discs to chop up stemless thistle and the odd calthrop. We believe in being flexible and realise that we must keep our options open, even if we have to undo some good soil structure in the process.

Now that we have adopted this type of farming system it makes farming so interesting. In two recent dry years ('93 and '97) we have still managed some 2 t/ha cereal crops, whereas if we were continuing to cultivate and destroy stubble and lose moisture, I'm sure we would have been struggling to achieve half this. I think my son is wondering if I will ever retire!

EVOLVING ROTATION SYSTEMS

Chris Syme, Cunderdin (08) 9635 1303, fax 09

Like many farmers, my rotations and tillage systems have been changing through time. In partnership with my wife, Jeanette and father-in-law, Ian we crop 2,800 ha in a 315 mm rainfall area on mostly sandy surfaced soils, with some gravels, and 600 ha of this is heavier soils.

History

Like most farms in the district, we had poor pastures in the early 1980's. Doublegee and barley grasses were the dominant species. Our wheat yields after these pastures were typically 1.25 t/ha. In the mid-80's three main factors helped us lift production quite rapidly. We purchased a robust Fusion Harrier bar, employed a good consultant and put lupins into the poor pastures in a L:W rotation.

Instantly our wheat yields doubled and we even made money on the lupins. The profitability of the wheat crop (typically 2.5 t/ha) encouraged us to go for a L:W:W rotation with the second wheat crop yielding 25% less than the first crop. However, with this rotation we had to remove the stubble from the first wheat crop. We didn't like the erosion risk that burning created, so we decided to rake the stubble. Stubble raking took time, and was hard on the rake.

Our lupin seeding technique, since the mid-80's, has been nothing special - but it has been effective. We use a Walker culti-trash but with only one row of discs, and an aggressive (40 degree) Pheonix rotary harrow following.

We know that stubbles must be managed well for good trash flow. We use two John Deere 9600 headers with a 30-foot cut. With a chopper and spreader we probably get 80% coverage and we cut about 25 cm height.

Rotations diversify

While visiting South Australia in 1992 a comment that stuck in my mind was "a 1:1 rotation must be too tight!" Also there were faba beans being grown in SA, as there was in Esperance. Consequently, I grew fabas on some of my heavier and acidic (pH of 5.3) soils.

Fortunately, Lorelle Lightfoot's liming trials had convinced me of the need to lime a few years earlier. Liming has improved our soils, even on the heavier soil types, helping us to grow more profitable crops. Our 100 ha of fabas that we grow each year have benefited from this earlier lime application. On this soil type we grow beans then two wheat crops (B:W:W).

We had been improving the quality of our subclover pastures since we saw the wheat benefits following the clean lupins. These pastures are restricted to the soils that grow the poorest legume (pulse) crops and on these soils we use a P:P:W rotation. Machete wheat usually achieves hard wheat quality in this rotation, but it does not yield better than the first wheat after lupins on the sandier soil.

It is a struggle to keep the pastures clean of weeds – due to occasional dry periods in winter when selectives are less effective or not applied. We always spraytop and usually manage to manipulate as well. Topdressing pasture is a feature of my farming heritage. My dad used to say - "we'll never go broke buying super".

Last year was our first attempt at growing canola and it was moderately successful at 1.44 t/ha. However, we applied too much N and our oil content was only 33%. This year we grew more canola with two different experiences. Canola that germinated on the 15th April yielded 1.23 t/ha with a 39% oil content, while on a similar paddock the canola that germinated on the 26th April yielded 1.60 t/ha and had an oil content of 40.3%.

Consequently, we plan to extend our major rotation to L:C:W:L:W. Interestingly, our L:W rotation is still performing well. What would really be nice is to have a suitable pulse crop for the soils that are too heavy for lupins. Peas don't suit due to the increased erosion risk they create. We need better and more reliable pulse crops!

No-tillage experience

In 1994 we bought some narrow points and used them with some success. The next year we switched to narrower knife-points (Harrington's) for less soil throw. We have kept using our cultitrash for lupin seeding and some wheat, but only if we have melons or other weeds that get away from us while on summer holiday. Elsewhere we use knife points on wheat and small area of barley on salty land.

We used to use trifluralin after seeding but we have found high rates are effective and safer when used IBS with no-till. We are not keen on diuron as it has not given us good enough broadleaf control.

Deep no-tilling does not appeal to us as we tried deep ripping 10 years ago without success. Also we would rather leave our rocks in the ground. Good crop agronomy is a better substitute for deep cultivation and we are not fans of deep banding.

This year we compared lupins sown with knife points and the cultitrash. With the dry start the knife point sown lupins looked best but rain soon after allowed the cultitrashed lupins to catch up and they have yielded similiarly – but if it had stayed dry for a little longer then the difference would have been huge. We are pleased with our no-till results.

Herbicide resistance

We know that we have to be alert with herbicide resistance. We know we have Oust® resistance, which means we clearly have limited fop and SU activity left, and have been crop topping our lupins with better results each year. Initially our losses were probably 20%, but it is now much less, closer to nil. We also do some patch burning, and may consider patch tickling, although sheep do this when allowed. We are relying a bit on trifluralin and given our 10-12 year use of trifluralin from the mid-70's to mid 80's, we are conscious that we need to preserve its life.