



# Wantfa News

Newsletter of the Western Australian No Tillage Farmers Association (Inc.)  
PO Box 1731, Esperance WA 6450

APRIL, 1997

## EDITORIAL COMMENT David Rees

By David Rees, farm consultant  
Phone 098 422 770

### ALBANY

Our association moves on to a new stage with a new president and committee. The no-till methods have become part of mainstream farming, and not the controversial issue that it was several years ago. For instance both the president elect and vice president have been publicly honoured with various awards within the last year.

In fact a suggestion by one of my clients has been that from now on, any trials - varieties, herbicides etc, should only be done with no-till seeding because any other seeding method will become irrelevant.

Several stories in this newsletter have been stimulated by the conference - "one of best ever held" was some feedback I received. Margaret Roper's perspective on the effects of no-till on soil micro-organisms will become more relevant as some soils develop under no-till methods over the years. Also, Brendon Lynch's reminders about the cost benefits of no-till are timely. Bill Crabtree has again contributed to this issue. He was enthusiastic enough before he left, so we have a lot to look forward to when he returns from Canada. On the other hand, it is farewell to Bob Bradley as he returns to Canada. Finally, this is my final issue as editor of the newsletter. Thank you for the support while wearing this hat, and I hope you continue to support the cause through the newsletter.

## Message from Graeme Malcolm - Chairman



1997 can best be described as a continuation of the initiatives started in 1996 under the guidance of 1996 Chairman Ken De Grussa and team. Some very important changes have had to be made as our organisation grows past 1000 members. Recent changes, like our administrative officer and development officer will have a large impact on the service we provide to the members. Many other ideas are in the pipeline and will be reported on during the next few months. My immediate challenge is to structure the committee and advisers so that the workload is shared between us all.

Setting up a budget to work within, as well as pursuing grants and sponsorship to support each portfolio within the committee is essential.

The opportunity for members to become involved with the sharing of their knowledge and achievements in no till systems / rotations is with stories and surveys in these newsletters.

Please help us make our newsletters more informative by contributing articles. We must use the newsletter to share knowledge that we have gained over the last year. The best research and ideas are no good if nobody knows about them. The aim of WANTFA in 1997 is to maintain the momentum towards no till mainly by sharing knowledge and experiences between members to maximise returns and bring with it, landcare benefits to all Australians.

Graeme Malcolm

## WHAT WANTFA MEMBERS THINK ABOUT NO-TILL

By Bob Bradley

My questionnaire to WANTFA members gave the following results -

- There were 53 responses, 47 from W.A., five from South Australia and one from Victoria.
- Most of the respondents (43 out of 53) have been no-till cropping for only five years or less.
- The most frequently reported reason for no-till was - to reduce soil degradation (32). Next in importance was to reduce work (15). Other benefits were to improve soil structure (13) and conserve moisture (12), to manage stubble without burning (7), for herbicide resistance (more trifluralin) (6), better seed placement (6), fewer weeds (5), for rotations (5), and for economics (5).
- Tine machines (47) were much more common than disc implements (9), and more than half (27) used press wheels. A considerable number of respondents had modified existing machinery (12).
- The biggest problems were weeds (20) and stubble handling (17).
- WANTFA was the most frequently used source of no-till information (31), followed by other farmers (22) and Agriculture W.A. (15).
- A large majority reported that they spread chaff and straw at harvest (41, 12 did not).
- All but one (51) saw the need for a manual on no-till crop production systems, and most thought this should be done by WANTFA or a combined effort by WANTFA and Ag WA, industry or the Kondinin group.

## NO TILL - HOW WE DID IT...

By John Smith with Lesley and son Paul

I had a phone call from Ken de Grussa the other evening asking for a story on our no till.

We have been in minimum tillage for 12 to 15 years and have been out of sheep for over 20 years. I am not saying no till will not work with sheep, because many farmers are no-tilling with sheep. In those early days we were direct drilling with Mark 3 Shearer fieldspans and air-seeders, but even with these we found the hard patches were getting less, even with a tine break-out pressure of only a few pounds.

We also had Western ploughs 70 discs behind the air-seeder for sowing lupins. The next step was about ten years ago when we purchased two 13.2 metre, five row Allfarm cultivators, used behind the air-seeders mainly for trash clearance, together with a Wilkins rake. However raking was not too successful. After raking the prescribed amount of stubble, then burning the rows in the cool of the evening, the paddock was completely black next morning. As a result, the rake went, and also the Western ploughs and we burnt one year out of the three year rotation, and could sow wheat into the lupin stubble and lupins into the second wheat stubble without burning.

Three years ago the step was to take out half the tines and put on super seeder points with angle disc coulters to cut trash in front of the tine.

We have been extremely happy with wheat on the 14 inch spacings even though the neighbours say you cannot get a good crop sowing only half the paddock and Agriculture W.A. saying we get a yield loss on rows wider than seven inches. What the department does not say is that by not working moisture out of the soil and sowing most of the crop on the first rain, and by keeping the stubble to stop blowing and evaporation we will make more than the four per cent penalty for wide rows.

We found it hard to get hold of tried chemical rates and of course chemical costs are up, but we sow over 2800 ha with two rigs and put only 120 hours on the clock. The tractors are old but I cannot see them wearing out before

they become obsolete, especially as they are now worked at less than full load. This year is another big change with two Ezee On wheel-driven fan, tow-behind seeder bins with 13.2 metre Ezee On chisel ploughs. The reason for the chisel ploughs is frame height. Allfarm is too low for stubble flow and the disc coulters hit the frame going over rocks etc. The chisel plough has 650 pound break-out and 950mm height.

The reason for the tow-behind is to get better visibility of the bar, and it is easier to steer the bar around obstructions. Also wheel marks are not a problem in emerging crops, with the no till seed being placed in a furrow which is not compacted by following wheels.

We have used trifluralin in no till with some success, followed by prickle chain on the bars, and have experimented with granular trifluralin in stubble. Nufarm made it, as have the Americans, but Nufarm chose to make it double strength - I suppose to save freight, but double strength has twice the distance between granules so more opportunity for weeds to grow through.

We have also tried spreading creek sand, mixing one litre of neat trifluralin with 35 kg of sand per hectare. It did a good job but we have not worked out how to handle that much sand and mix it, or whether it can be pre-mixed. Boom sprays are a major part of no till. We have two 26.5 metre self propelled sprayers, and each will cover two seeder widths, making it easy to follow previous workings whether pre or post sowing, which saves misses and overlaps.

The sprayers are built on Cummins powered trucks (200HP) on large wheels, and we have one set of tall narrow wheels for spraying grubs and aphids in tall crops. The sprayers can cover 800 ha a day in daylight which is important as spraying on time can save a lot on chemical cost and give better results too.

We are now putting the angle disc coulters on a separate beam with hydraulic lift. There are times when more pressure is wanted and times when they need to be lifted clear of the ground when the stubble is damp and tough.

The ploughs, scarifiers and cultivators are all gone. I did not mention that the new bars are only 300mm spacings but that is how they were. We are sowing fertiliser deep and wheat above and slightly to one side, hopefully with the seed boot in front of a small wheel that will control the seed depth and press the seed a little. Next year I will be able to tell

you how it went.

We find that the soil is getting loose, loads of grain are harder to pull in the summer, and yields are up.

This year was our biggest crop even with the rain being below average in this area. We looked at no till in America, Canada and other parts of Australia and decided to go for tines with knife points rather than discs mainly because our large amount of rocks have done less damage to tines than to discs in the past.

## PULSES FIX MORE N WITH LESS TILLAGE

By Doug Derksen, Brandon Research Centre, Manitoba

Would you like to cut your N fertilizer bill? Well with less-tillage we have found that legumes fix more N.

Several explanations exist for this discovery. Firstly, legumes in conservation tillage grow in a less stressful environment. There is more available soil water and less heat stress.

Secondly, the soil surface layer is more biologically active in conservation tillage. This area has not been explored by researchers in Canada. However, soil samples taken from this study are being analysed to see if a difference in microorganisms will explain the difference between the tillage systems.

Thirdly, since cultivation releases nitrogen from the soil, legumes grown in conventional tillage use released nitrogen rather than fix new nitrogen. To date, a yield benefit from legumes has occurred in the next years wheat crop. This has been about 10 per cent. Coupled with the yield benefits of conservation tillage, putting lentils or peas in your rotation makes dollars and sense. The following long term rotation work was done at Indian Head in the early 1990's.

Crop	Zero-tillage	
	Conventional	Tillage
Yield (t/ha)		
Lentil	1.15	1.12
Pea	1.40	1.36
%N got from the air		
Lentil	72	62
Pea	79	48

Clearly peas were most encouraged to fix atmosphere N without tillage, but the same was true for lentils. This has been shown true for soybeans in the US and observed with lupins in Australia.

## 1996 NORTH AMERICAN NO-TILL STUDY TOUR

By ... Matthew Jones,  
P.O. Box 208, Esperance

After flying from Esperance to Los Angeles, via Perth, Sydney, and San Francisco (not the original planned route of travel) getting to Los Angeles to meet Maurice Fitzgibbon at the pre arranged time became quite a feat and the Jolly Rodger Motel and its Restaurant was a very welcome sight. Maurice and I started our No-till tour by visiting AthelMarkets, downtown Los Angeles, Beverly Hills, Melrose, Universal Studios and Disneyland.

Unfortunately we found it difficult to find anything at these places which we could relate to our No-till systems!!! We then flew to Minneapolis via Denver where we met up with Tim Barndon and eventually found our hotel after numerous misunderstood directions. While in Minneapolis we stumbled across "The American Mall" the largest in the U.S.A. with its water slides, ferris wheel, night clubs, movie theatre and thousands of stores all inside one building. Leaving Minneapolis we travelled to Fargo and on the way stopped at an Outlet Store Complex where shopping was very good.

During our first day at Fargo we went to the North Dakota State University, where Vern Hoffman showed us some slides, and some experimental equipment students were developing. We then drove to Rugby where Don and Beverly Brusegaard organised for us to have lunch with some local farmers. From there Don showed us around where we saw a wide range of things including potatoes being harvested, a shellborne stripper front harvesting wheat and edible beans being cleaned using a gravity table. On our way back to Fargo we passed a header travelling along the highway with its 30 foot front still on!!!

The next day back at Fargo we went to the Big Iron Field Day, which is similar to Dowerin Field Days. Here

we saw a lot of impressive machinery from Flexi-coil's new no-till disc to many different large self propelled boomsprays. In the tractor department John Deere and Case both had their new tractors on display fitted with radial tyres and lots of cast weights to compete with their new rubber tracked cousins. John Deere had their new tracked tractor under cover but Case and Cat were out in the demonstration paddock. Tim, Maurice and myself all lined up and drove both tractors and were very impressed, although we were told "You Aussies drive very fast" - mainly referring to Tim, who set a good example for Maurice and myself for the remainder of the tour.

From Fargo we travelled to Manitoba, Canada where we met Bill Crabtree and the Whittingtons at Agquest, a research farm near Minto. Then it was on to Art Cowan's farm where they, and other farmers own an Elevator (Grain handling and Cleaning facility) and market their own grain very successfully. That night we stayed with the Crabtree Family at Brandon.

Next day Bill took us to the Manitoba Zero Till research station which had a lot of interesting research going on. Trials were being carried out on Roundup resistant canola and the new flexicoil no-till disc. This was a real highlight of the tour for me and no doubt Bill will bring back to W.A. interesting information on a variety of subjects.

From here we visited three very progressive No-till farmers, learning of their experiences with rotations and equipment including G.P.S. yield mapping and silo aeration. The next day Bill took us to see the Seed Hawk no-till machine (similar to the Conserva-pak) and then onto the Indianhead research farm, and conserver-pak factory. Our last visit with Bill was to Don Kirby's just out of Regina, where he showed us his new no-till disc, he also showed us his home built spray unit and his emus!!!

The next day we crossed back into North Dakota and drove to the St. Croix farm where we were shown silo aeration in more detail. The importance of this operation being that once the unit is switched on it is not to be switched off until the moist layer had been forced out the top of the silo. This is monitored by a moisture censoring cord, hung from the roof of the silo. Heat was added to the airflow during winter. From here Maurice, Tim and myself went to Wilston where we had a rest day heading off in the afternoon to Beach, crossing the great Missouri River. At Beach we met with

Dale Ferebee who showed us around the area which has a lot of very progressive no-till farmers. Three of the farmers we visited had fully enclosed chemical handlers, of which two were mounted in trucks. We also met a contract fertiliser spreader who had G.P.S in his truck and also a G.P.S. soil sampler and spread fertiliser according to clients requirements.

It was then onto Montana where their speed limit is "What prevailing conditions allow!!!" which consequently made for a quick drive to Billings. There we met with Mike and Sigrid Greytak who showed us a couple of no-till farms. An interesting part of their operation was "High speed spiking" which is very shallow high speed cultivation using a knife point. This is done after harvest to simulate a germination before they seed. The next day Mike and Sigrid took us for a drive over the Rockies where we saw plenty of snow and unbelievable scenery. We then headed for our last no-till stop at Pierre, South Dakota via Mt. Rushmore. Our luck with the weather ran out when we got to Pierre and they had three inches of rain over night and it rained most of the time we spent with Dywane Beck. Dywane's work with rotations and seeding machine development was very interesting and he showed us around his research farm which included some irrigated corn with very impressive yields. From there we made our way back to Minneapolis passing yet another header with its front on!!!!. This ended our tour and we all then went our own ways.

On my return to Australia I was saddened to hear of the passing of Barry Whittington. His company and the contribution he made to the tour was indeed a highlight for me. He considered it a must for the farmers of today of continue to study and pursue improved management practices in farming. Finally I would like to thank Kevin Bligh for his hard work organising the tour.

*WANTFA has recently appointed Bill Crabtree as Development Officer for five years funded by GRDC. It is hoped Bill will live in Northam and will work from there. He will be due to start early May.*

## NO-TILL ON EYRE PENINSULA

*SOUTH Australia agricultural consultant, Brenton Lynch, was a speaker at the WANTFA annual conference held at Darkan in March. Mr Lynch, from Wudinna, has a client base of about 70 farmers on Eyre Peninsula, a 350mm rainfall region consisting mostly of alkaline calcareous (calcium carbonate) soils with some non-wetting sands. In 1995 he visited WA, along with some of his clients, looking at no-till systems. Now an increasing number of his clients, are adopting no-till and he praises WA farmers for their pioneering work. Last year farmer trials on Eyre Peninsula comparing no-till and conventional systems showed no differences in yield. At Darkan, Mr Lynch highlighted some of the benefits and challenges he sees facing no-till including the challenges of herbicide resistance, use of rotations and how to incorporate trace elements into the system. The following are extracts of his talk.*

"On a trip here in October, 1995, myself and a plane load of clients visited Steve King at his property (at Lake King) and it was that trip that fired us up (for adopting no-till). Steve has been a major help in getting us established. Soil erosion was a big motivating factor in our looking at no-till and its application on Eyre Peninsula. But it wasn't the only reason. At the start of every year after having done our budgets and forward plans we analyse our cash costs per tonne of production and our overhead costs per tonne. One of the frightening things on overhead costs was that on average the cost of depreciation was \$24/tonne. Over my 70 clients about 50% of the cost of production is overhead costs split into wages and taxes, debt servicing, depreciation on farm equipment and insurances. So at \$24/tonne on depreciation we were keen to have a long-hard look at that... something, by the way, my brother who is a machinery salesman in Wudinna isn't too happy about.

As example, last year one of my clients went from having two sets of plant and spending 670 tractor hours on cropping back to one plant, freeing up some capital, and doing the same program in 400 tractor hours.

My approach has been one of concentrating on rotation design and

minimising root diseases - to me it is crazy pouring inputs into inefficient root systems incapable of picking it up. Rotation design doesn't cost very much but if you get it right it can bring phenomenal results - introducing grain legumes into the pasture/medic phase, green manuring vetches and the selection of the right sort of wheat varieties.

I've been crop monitoring for seven years and a few years ago came across root-lesion nematode - for years I think people have been diagnosing rhizoctonia and confusing it with nematode damage. Unfortunately, our medics have been hosting the root-lesion nematode. So now we're looking at Excalibur wheat to reduce the build up. Choice of these medics and wheats doesn't cost very much but by jingo they can impact on yields.

Last year we had opening rains the last week in June and I recall looking at crops and thinking they've only got 16 weeks to produce a crop. However some of my clients actually had their best yields for certain paddocks through minimising root diseases and chasing appropriate varieties at very little cost and making use of the investment in plant breeding.

I see trace elements as one of the next huge steps, to overcome the lack of opportunity under no-till to get trace elements into the system because of the lack of tillage.

Talking of trace elements, let me give you an example of a client of mine. He had a crop going yellow on a sandy, loam ridge and he rang me to say he'd just put 30kg urea out but the crop was going yellower. I knew from previous tissue test results he was in a zinc deficient area so I asked him to put out \$1.40/ha of zinc on it and ring me back when it was going green. Two days later he rang me to say it was greening up. What I'm saying is that the problem wasn't \$15 or \$20/ha in urea, it was \$1.40/ha in zinc.

And when somebody asked earlier today about what effect nitrogen is doing and its effect on our trace elements, I'd say it is pumping our system up. But it's a bit like filling up your car with petrol when your spark plugs aren't clean - plenty of potential oomph but some fine tuning required.

I think the timing of applications of trace elements is a real issue - this going in at six weeks with a one-off application and saying it will be right is just not on. Zinc and to a lesser extent, copper, we've found to be very volatile depending on weather conditions.

The cost benefit of trace element inputs we found last year was phenomenal. And that was a year when we wouldn't have expected such a

response - 10 inches of rain after a June start and an early finish.

**Agmaster**

Many of my clients have adopted the Harrington system because it represented the least capital cost and least risk. You could convert back and when I was talking a while ago about depreciation of \$24 a tonne you don't want to be converting to very expensive machinery and wishing you hadn't down the track.

So last year we were pretty happy with the Harrington system in a year that tried us out. We are now looking at how can we make it better but rotations, root diseases and trace elements need our attention before machinery.

Last year was our first real year of using the no-till system. One lesson we learnt was that we've got to be exceptionally careful about the rate of knockdown we're using because it generally wasn't enough. We were, however, very pleased with the results of treflan in the system - we've had some pretty ordinary results with sulfonylureas on Eyre Peninsula and I swore most of my clients off them about three years ago. CSIRO Division of Soils' researchers in Adelaide have found pretty alarming stuff about what SUs actually do in reducing microbial content and activity in soils... things like every full application knocks off around 10 per cent. SUs have cranked up rhizoctonia, take-all and to a lesser extent cereal cyst nematode. SUs also induce zinc deficiency so we've had a big re-think about their role. So I'm really pleased with the results of treflan.

**Resistance**

I think the biggest challenge in our short time of using the system is weed control and the prevention of the on-set herbicide resistance. We're fortunate that we haven't had a high input system on Eyre Peninsula where we haven't used a lot of herbicides. But even so we're finding herbicide resistance the more we test. I see the onset of herbicide resistance as the biggest hurdle we face. A colleague of mine in the Mid North now spends now spends 60 per cent of his time on herbicide resistance in his full consultancy. So we've got to be careful how we approach it.

Many people last year opted for a Roundup chemical fallow and we had very good results with that - it means taking sheep out of the system, something I'm continually nudging my clients about because in our fragile environment if you're going to be fair dinkum about cropping it requires in about July the mental discipline to be more ruthless with sheep numbers and more stringent on pasture preparation for next year.

## NO TILL ON EYRE PENINSULA (Cont)

So we've had good results with chemical fallows using Roundup but also we need to take into account we can't keep doing that every second year or we'll lose our medics. Again it comes back to rotation design.

### Dressing

Something we're going to get stuck into this year is grain nutrient seed dressing. Last year we used Dextrolac zinc dressing. I did an analysis of a range of dressings and Dextrolac had the lowest levels of elemental zinc and yet it gave us a very good response. We also got very good results to zinc foliar sprays. With all of this zinc we can pour into the system there's nothing like using your eyes. The number of occasions last year when zinc leaf tissue tests at six weeks showed not a problem. Ten days later you go back and say take me to where you got your samples and it would be starting you in the face. Whenever you get a dry spell zinc is not in solution so can't be taken up and the only way to correct it is a foliar spray and we were getting immediate responses.

In a paddock last year which had 2kg elemental zinc in the fertiliser and had foliar sprays we still got a one bag/acre response from zinc seeding dressings. I've found that what's adequate zinc for plant nutrition is certainly not for disease control, rhizoctonia.

WAITE researchers are finding five or six weeks after germination there's a window where if you've got high levels

of zinc around the root tip when its emerging that is your best protection against rhizo. And that's what we found in trials. The zinc dressing cost us \$3/ha but returned us \$30/ha. There was observable differences in the area of rhizo between where we'd used a seed dressing and where none was used. Also in dry years it has been shown that low zinc levels tend to make the cell wall on roots floppy and in a dry year with rising salts, boron can get in and take over the plant and reduce yields. Halberd and Excalibur are quite boron tolerant and Excalibur is known to be zinc efficient, there's another variety coming out known to be manganese efficient, so again selection of varieties can have a big impact.

We've found you need to have high zinc tissue test levels at seven weeks. Some people have taken to putting zinc out with the ester but it's too late for disease control.

### Nitrogen

In closing, a quick comment on nitrogen. The GRDC are now coming out with more accurate estimates of nitrogen pre-seeding and I think that's what we need, a better estimate of what is actually there. It was brought home to me last year - I only had one client putting on post-seeding urea, against my advice, and he delivered 1000t of feed wheat, so he spent a lot of money. Sticking it down the tube, let it be and monitoring what happens is the way to go. Thank you for inviting me.

## FAREWELL FROM BOB BRADLEY

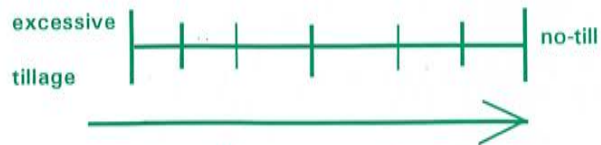
It has probably been the fastest 11 months of my life - but most enjoyable. As my wife and I return to Canada, we take with us many pleasant memories. Our involvement and association with WANTFA has certainly been a special part of our life here.

As a parting message, and something to reflect on, I refer to my "degrees of tillage" scale. It is very comforting and encouraging to know that in both Canada and Australia the move is to the right of the scale. Cropping must become completely no-till, but at a comfortable pace.

We wish WANTFA much success in the future, and will keep in touch.

Cheers for now, Bob (Bob Bradley, District Soil Conservationist Box 100B, R.R. #3, Brandon, Manitoba R7A 5Y3)

### DEGREES OF TILLAGE



Where are we at?

Excessive tillage is a major cause of soil degradation

## HERBICIDE PRODUCTION ISSUES

Bill Crabtree

Greetings from the airport. We are about to pass through Europe on the way home from 12 fantastic months in Canada. I found a few stories that might interest you. But there is one story here that is, in my mind quite exciting;

### Changing attitudes in the herbicide industry and how this might effect herbicide resistance.

Earlier this year (1997), in Florida, the annual North American herbicide "get together", group met. This is where the big companies show their new products. This year's meeting was apparently a bit different as there is a bit of re-thinking going on by these multi-national companies.

In the past companies have channelled most of their energies and monies into making selective herbicides. Herbicides that only kill certain weeds in specific crops. Now with the success of biotechnology, in particular with Roundup, players are reconsidering their past wisdom. With biotech, the insertion of small genetic material can make almost any crop resistant to a herbicide that will kill any weed. Roundup Ready crops are popping up everywhere over here, including canola, cotton, soybean and possibly wheat!

Given the general acceptance of most countries of this type of technology it appears to be changing the herbicide strategies of the big players. This offers some exciting hope in my mind to those who have struggled with herbicide resistance. Let me explain!

Many of these big companies can test 0.1 to 0.5 million different herbicides each year. Each product tested is documented and a fair bit is known about its chemistry and mode of action, even though it may develop no further. Many of these products are likely to be broad spectrum but might be more expensive than the already "out of patent" Roundup, they might also have completely different modes of action to Roundup. Previously there has always been better economic margins for companies to produce new selective herbicides. Now this has changed! And I wonder if we could see some fast working and development of new knockdown herbicides in a few years. Then the companies would need to slip the appropriate genes into the crops and bingo! It is wrong, in my mind, to think that glyphosate is so unique that there are not, perhaps thousands, of similarly effective herbicides just waiting to be released. It would be useful to those hurting from herbicide resistance. The next few years will be interesting.

## WARM SEASON GRASS TRIALS

By Richard Piggott  
Ph (098) 46 4278

*It is a year since Dr Dwayne Beck, a visiting no-till specialist from Dakota Lakes Research Farm, in South Dakota, USA, told WA farmers they needed to introduce a third crop type onto their cropping rotations. In addition to cereals and legumes, Dr Beck said we should look at warm-season grasses - corn, grain sorghum, forage sorghum and millet, to name a few.*

*Introducing warm-season grasses would lengthen the rotation, minimise disease carry-over, lessen the need for herbicides and lower fixed and variable costs. Dr Beck's parting message to farmers last year at a seminar at Wellstead was: "My opinion is that if I come back here in 10 years you'll either be growing warm-season grasses or you won't be no-tilling".*

*Some WA farmers have taken up the challenge.*

*Bruce Hobbs gives an account of his experiment growing fodder sorghum and grain sorghum on his property at Brookton.*

"The idea came about by Dr Dwayne Beck - he sowed the idea into my head when I was on the no-till farmer's tour to the US. I thought it would never work here but I spoke to him again when he came to Darkan last year.

"I said to him it's alright for you because you have got different (better) soils and climate.

And he said 'well I've been looking at your trees and shrubs that are growing naturally and there must be some moisture and your soils must have some capacity for growing things."

"I intended to do just a trial area but as the season turned-out I had two paddocks washed out that weren't going to be of any use - so the last week of September we seeded 80ha to "Super Dan" fodder sorghum and 20ha to "New Nugget" grain sorghum.

"It was seeded with about 60kg DAP as soon as I could get onto the paddock, it had been that wet.

"We put on a litre a hectare Roundup for ryegrass but it didn't do the job properly and Ashley, my son, put another litre out.

"It was seeded with a modified 28-run combine fitted with knife-points, though we're only using 21 tines across four rows and it was seeded on a nine inch row spacing.

"Soil types vary from gray clays to loose sands and gravels and it varied from being water-logged to well-drained. "Anywhere with any depth to the soil and where it was well drained did well, especially on York gum-jam country that we'd deep-ripped - by Christmas it was six feet tall on that country but the rest was variable, two feet high.

"But it all survived.

"Around Christmas a contractor came in and cut 25 big rolls from about 4ha.

"Another area of about 6ha we put 700 young wethers on to for three weeks. "We had reckoned on running an electric fence to strip graze it off but we got caught out with harvest.

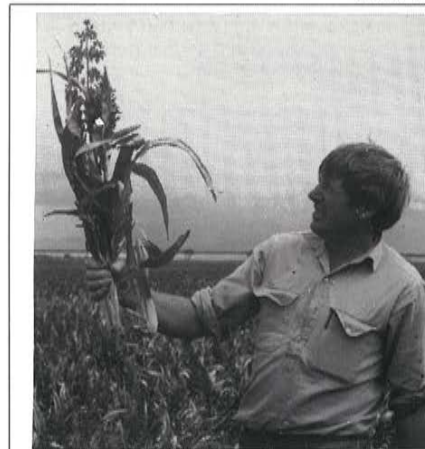
"We then got a mower conditioner to knock the top off the rest and left it in windrows.

*Jim Bailey, of Subasio Downs, near Wellstead, provided details of a 120 hectare paddock sown to New Nugget and Gold Rush variety grain sorghum and Shiroh variety millet (20ha).*

"We seeded on October 10 when conditions were reasonably wet. One section of this paddock had been blowing and we put the millet on that and the grain sorghum to the rest.

Soils range from clay to sandy gravel, pH 5.5 to pH 6.5.

We seeded at 3kg/ha with a K-Hart air-seeder on a 42cm row spacing after spraying atrazine at 1.5l/ha, plus 500ml Roundup and 250ml Ester. The paddock had been under pasture for two years. It came out of the ground okay and was growing well until about mid-December when it was looking a bit stressed and then a thunderstorm kicked it on a bit.



Jim Bailey in crop of New Nugget Sorghum

It has now come back, standing 40 to 60cm high and at the end of February and into March we grazed it off again. "The other area we grazed back to ground level and after those rains in late February it has come back to a foot high and I'm about to put sheep back in.

"We're wary of the prussic acid but haven't had a problem to date - we're told to put a 10% sulphur lick in the paddock but none were available so we used an equal parts gypsum/salt lick and they are consuming that.

"We grazed regrowth long before it got to 25cm with no problems but we're told it should be 40 to 60cm before being grazed.

"I think trying these things worthwhile, even though we didn't get much off the grain sorghum - it might be something we try on an opportunity basis.

"I see it as another string to the bow in controlling ryegrass.

"We're going to try lucerne this year, 20 ha of our better land and see how it goes."

"In January it began to show stress, though none died, and it was picked up by the 70mm we had in February.

"But because it suffered moisture stress the crop is variable with some parts ready to harvest while other areas still have green heads.

"It may be that we spray Roundup to desiccate the green crop.

"I'm growing it primarily to set up the paddock for canola.

"Hopefully they may also have some impact on lowering the water table.

"I think these sort of crops have a place, but we need to look at varieties pretty carefully.

"We also have to be able to assess soil moisture better in the spring to help us make a decision on what we're going to do.

"The millet was seeded at the same time as the sorghum with 100kg Agras banded with the seed.

It was looking quite poor before the February rain, but it has really kicked on.

"Hopefully it might be harvested at the end of April.

"The seed came from Mt Barker Seed Works - about \$5.40 for the sorghum and \$1.40 for the millet."

# SOIL MICRO-ORGANISMS AND NO-TILL

Edited from The Conference talk by  
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organisms determines the fertility of the soil. It is therefore important to farm to maintain soil organic matter.

## STUBBLES AND NO-TILL

Stubbles contain large amounts of carbohydrates which can feed microbial populations and retaining stubbles can restore, maintain or even increase organic matter.

For example measurements of microbial populations by myself and a colleague, VSSR Gupta in NSW have shown increases even after one year of stubble retention.

The sugars, cellulose and hemicellulose from crop residues are broken down by a wide range of micro-organisms which adjust

Soil micro-organisms are vital for fertility and productivity of the soil, but because they are invisible, their effects on farming have been largely ignored. We must take account of the health of microbial populations as well as the physical and chemical aspects of the soil.

Micro-organisms include bacteria, fungi, algae and protozoa, and a fertile soil may contain more than two tonnes per hectare in the top ten cm. Many cannot be isolated or even detected with current technology but one estimate is that up to one-quarter of the earth's biological matter is micro-organisms.

Micro-organisms make most nutrients available to plants for growth. For example bacteria fix nitrogen from the atmosphere, then other micro-organisms transform it to nitrogen that plants can use.

Fertile soils have large and diverse microbial populations, and hence are very able to transform nutrients. Not all soils have the same potential for fertility. For example a clay soil can provide a greater range of environmental conditions and therefore support a wider variety of micro-organisms with specific requirements. Also clays are highly reactive and have more organic matter. Organic matter supports micro-organisms and its interaction with micro-

to continued input of residues, and then decompose plant material more efficiently. Frequently the products of decomposition are food for other organisms. For example nitrogen fixation is greatly increased by crop residue retention. My experiments in NSW and Queensland have shown that free living bacteria (not associated with legumes) greatly increase nitrogen fixation where stubble is retained and not burnt. Furthermore micro-organisms which change organic nitrogen into mineral forms are greatly stimulated by stubble retention.

Lack of soil disturbance concentrates micro-organisms nearer the soil surface. This makes oxygen readily available to the micro-organisms and the concentration of micro-organisms allows rapid microbial response to break-down crop residues.

The lack of soil disturbance also increase the biomass, compared to when stubble is incorporated. The improved soil structure results in microsites which meet the temperature, oxygen and moisture needs of the micro-organisms. For example a bacteria which prefers little oxygen will locate itself in the middle of a crumb or soil aggregate. Micro-organisms produce slimes and fungi produce hyphae (fine threads)

which bind the soil into aggregates. Other organisms such as earthworms provide aeration by making pores in the soil. Clearly cultivation can break up this structure and alter microbial activity. Stubble retention and no-till also reduces soil erosion, improves moisture penetration, reduces evaporation and the soil under the straw is cooler.

There are some disadvantages though. Large amounts of stubble can make difficulties for machinery, though recent developments with machinery have minimised these problems.

Stubble retention can immobilise nitrogen, with the micro-organisms that break down the stubble holding the nitrogen in the upper soil. Once the stubble is broken down, the micro-organisms die and release the nitrogen back into the soil for use by plants. This immobilisation of nitrogen is not necessarily a problem in sandy soils where mineral nitrogen can otherwise be lost by leaching.

The sugars and no-till generally require more herbicides, and some herbicides are not readily decomposed by micro-organisms. We do not know all the effects of such chemicals on microbial survival activity, and therefore need to be careful with their use.

Stubble can also carry disease into the next crop. Alternatives are to burn stubble or rotate crops. However after some years of stubble retention and no-till, a natural suppression of disease develops. For an example David Roget in South Australia has shown that rhizoctonia gets worse for about four years after retaining stubbles, but then declines and disappears after ten years of continuous stubble retention. Similar results are being found for take-all. This suppression appears to be due to micro-organisms which become more efficient with time at destroying the disease fungus.

Another problem with no-till is hard pans present when no-till is introduced. Micro-organisms need oxygen and hard pans can limit or eliminate the availability of oxygen. Deep ripping may be needed, perhaps only once. We need to keep an open mind in deciding strategies for best results from no-till. For example for hard pans on soils susceptible to wind erosion, the crop can be sown, then deep ripped early in the crop between the rows.

I hope you are convinced of the need to look after the invisible but important resource in your soils - the micro-organisms.

# NO-TILL AT HYDEN

By Richard Piggot  
Phone (098) 46 4278

*Geoffrey Marshall, a WANTFA committee member, runs a 2400 hectare cropping operation with his wife, Vivienne. Their property "Warra Kairan" lies 40km east of Hyden in a 325mm (13in) rainfall belt. Soils are variable, mostly heavier types, and little light land. Five years ago the Marshalls ran a breeding flock of 2500 Merinos, today nil. They have been 100 per cent no-till farming for three years, a "natural progression". Geoffrey said, after many years direct drilling. Last year, their 1440ha of Stiletto and Machete wheat averaged 2.7t/ha and 11.5 per cent protein. Other crops grown were O'Connor feed barley (200ha), Merrit lupins (300ha), Dundale, Laura field peas (160ha), Ascot and Fjord faba beans (150ha) and 100ha canola. Geoffrey yield mapped and weed mapped the harvest using Global Positioning, a yield monitor and a logger fitted into his Case International 1644 header. It's all about building up paddock information. Last year he also experimented with growing warm-season grasses - forage and grain sorghum and millet.*

"I've been interested in limiting cultivation for many years and for me no-till is a natural progression from direct drilling which we'd been doing since the early 1980s.

"No-till emerged as a package for us about the end of 1993. Research was showing high rates of trifluralin under no-till was a very good weapon for ryegrass control and the development of the tungsten point was another important factor.

"I try to make it a policy not to change any single management factor too dramatically in any one year because I think you can come unstuck changing too quickly.

"But our adoption of no-till went against this policy.

"In our first year (1994) we did 100 per cent of our program no-till which with hindsight was a mistake because we didn't have any controls in place to compare the two systems.

"But I think if anything our yields were as good, if not better, than what otherwise would have been the case."

"The next season (1995) was a dry start and I started our program using no-till and kept on going. I've been committed to no-till since then.

"We don't have any fancy machinery, not a big enough operation to warrant it - a heavy duty, 48 foot Fusion Harrier bar, which we've had since the early 80s fitted with Agmaster points.

"We could adapt the system without having to buy a new implement.

"The time breakout is about 210-220 pounds which we may increase slightly.

"A set of points is lasting about one season. This Year we've bought a three-bin Simplicity air-seeder, meaning we have the option of putting fertiliser with the seed

as well as being able to separate them plus put urea down the tube also. Previously a contractor came in and spread urea but that was an operation that was also benefiting the weeds between the rows.

"What I want is the fertiliser close to the row and to starve out the weeds as much as possible.

"I see us seed and fertiliser separating with a side-by-side sowing boot and a twin delivery system.

"I've been operating on a nine inch spacing which is a bit of a compromise - I'd like to go wider for trash clearance, but nine inches is probably wider than I'd like for wheat and probably not as wide as I'd like for legumes.

"I know in the past we can handle 2.5t/ha stubbles, but as our crops get bigger it will be a challenge.

"I've been looking at Steve and David Marshall's double coulter set-up (see WANTFA Newsletter, July 1996) and have adopted that idea for this year.

## Rotations

"On our rotations my policy is to mix it and match depending on varieties, the crop type and the sowing date, basically trying to be flexible with a four to five year rotation.

"On heavier country, we've been peas, wheat, fabas, wheat but with higher proteins we may look at slotting barley in after the fabas then go fabas, then wheat, canola. "On our lighter soils we've been lupins-wheat back to lupins-wheat but now we're looking at a lupin, wheat, canola, lupin rotation but this depends on disease factors, in which case I may look at adding in peas or barley.

"As I say it's a bit of mix and match, and it's complicated especially as I like to sow areas in blocks, a block to wheat, a block to canola.

"And then the rotation can be thrown out with a late break, once its past May 15, I don't want to be seeding faba beans, for instance.

"I find field peas fit into the ryegrass resistance control beautifully because we don't sow peas until June 1st and that gives us the chance of controlling germinating weeds. "As well, you can crop top at the end of the year and loose almost no yield - we spray Gramoxone at 700ml/ha.

"Faba beans also fit into the ryegrass control pretty nicely, also lupins but you've got to expect a little yield loss and I don't grow chickpeas because they can't be crop-topped.



Geoffrey Marshall

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### ADVERTISEMENT

## CROP NITROGEN MANAGEMENT WITH CAN AND ASN

By Hans Schoof  
Consultant Agronomist

With the introduction of Calcium Ammonium Nitrate, CAN and Ammonium Sulphate Nitrate, ASN, crop Nitrogen management can be dramatically changed to meet crop and seasonal variations during the whole vegetative (up to late tiller) and even the early reproductive growing period (mid to late elongation).

This has not been possible with previous products used, which required that all Nitrogen had to be applied at seeding or within the first 4 or 5 weeks after seeding.

Nitrogen requirement by the crop is certainly important during the early growth period, however the demand for Nitrogen increases with the amount of vegetative matter and is highest at late tiller, early elongation. The primary root system depends to a large degree on the Nitrate form of Nitrogen for early vigour and due to reduced tilling and no till practices, the built-up reserves during the summer period are not being activated. This can cause Nitrate deficiency during the early growth, vital for head formation and general plant vigour. CAN and ASN, and Nitromag contain Nitrates and as such, if used at seeding provide the ideal Nitrogen form to enhance early development.

Nitrogen in the soil is subject to constant change, in as much that it is subject to nitrification, which is influenced by soil moisture, soil temperature and leaching.

Nitrification is a process involving a Nitrobacter Bacteria in the presence of Oxygen, which converts Ammonia Nitrogen into Nitrate Nitrogen which is the preferred and indeed the most efficient Nitrogen Nutrient source for most cereals and crops. Under very wet, cold and waterlogged conditions, this process does not take place or the conversion is very slow, again, depriving plants of the required Nitrogen nutrient source. Recent research indicates, that under acid soil conditions the efficiency of the Nitrobacter Bacteria is very low, again reducing the conversion of Ammonia to Nitrates. Using a fertiliser which contains Nitrate overcomes these problems and ensures that the ideal form of Nitrogen is available to enhance plant development to its full potential.

Nitrates however are subject to leaching as such they behave very similar to Sulphates. Since both these elements are required to achieve optimum grain quality and protein, an adequate supply of these elements is needed during the final stages of crop growth. In a "normal season" most of our rainfall does occur during June/July, since this is at the same time to coldest period, the Nitrification process is probably at minimum, therefore it is important to provide the plant with a Nitrate based fertiliser for quick response during the late tiller early elongation period. CAN and ASN would be the ideal products to overcome our climatic influence.

Therefore Nitrate based products such as CAN and ASN and Nitromag can be applied at seeding, after seeding, at mid tiller, late tiller and early elongation. In other words it covers the complete spectrum of plant growth and requirement.

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