



Western Australian No Tillage Farmers Association (Inc) WANTFA

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Topical Section

A NOTE FROM THE CHAIR

Ray Harrington (Darkan)

The committee has agreed to introduce a bi-monthly Newsletter to fill a requirement to get more information out to members. We acknowledge that the interest in the WANTFA cropping philosophy has been far greater than we anticipated. This has caught us a little unawares, and since we are such a spread out group, the Newsletter appears to be the best way to keep us all informed. We also need your input to this Newsletter with any item of interest no matter how large or small.

The committee and friends of WANTFA who were at Morawa in July agreed to appoint Bill Crabtree as the Editor of our Newsletter. All those trials and experiments that you are trying

are valuable to us all, and if you care to write a description in your own words - no matter how well written - our Editor will be pleased to assemble it into order for our Newsletter. Bill is keen that you feel relaxed about your writing style as he will help with the final wording.

At Morawa it suggested that we need to clarify what we mean when we talk about No-Till. We probably need to elaborate on the words "No-Till" with initials that represent words which clarify our definitions. For example, if knife points are used at 100 mm deep, we might call this No-Till DC (for Deep Cultivation). The disc machines with a deep coultter might also fall into this category. Please bring your ideas to our next AGM where we will discuss this further or send them to our editor (facs 090 761227 or post to Dept of Ag, PMB 50 Esperance 6450).

The committee agreed to make the newsletter available only to members. However, once you've read the newsletter please feel free to pass it on to a non-member so as it "whets his appetite" and this may expand our membership.

EDITORIAL *Bill Crabtree, Adviser (Esperance)*

It is with honour that I undertake the inaugural position of editor of the WANTFA Newsletter. My approach, at this stage, will be to produce a Newsletter that covers in roughly equal proportions 3 main aspects of No-Till. These are: topical news regarding No-Tillage, the science of No-Till and farmer experience with No-Till.

The science of No-Till will include contributions from various state Departments of Agriculture, CSIRO's and any other relevant national or international material. The farmer articles will be canvassed from farmers all over southern Australia. Farmer written articles will be treated sensitively as some farmers may not be good at writing, so please don't feel embarrassed about your writing style. Between all of us we can put it together.

Everyone is a potential author, however, the Editor will have the final say on the suitability of articles for publication. Both negative and positive articles regarding No-Till are encouraged provided enough information is given to enable people to come to their own conclusions on the matter. Scientists are particularly encouraged to be objective and open minded. The ball must be the focus always and not just a traditionally held view.

This first issue will focus mainly on farmer articles as many of these talks were presented at Morawa in late July of 1993.

WANTFA GENERAL MEETING AT ESPERANCE ON 14-15 OCTOBER

Ken de Grussa (Esperance)

At 10.30 am on the 14-15th October at the Esperance Civic Centre there will be a Seminar which will be followed by two field trips (Registration 10.00am). The focus of the Seminar will be on soil microorganisms. Dr Gupta from the CRC for soil and land management in South Australia will be flying over especially for the occasion (thanks to GRDC) to give the keynote address. Dr Gupta has spent four years in Canberra and six in Canada researching soil microbiology. He is perhaps Australia's most experienced person to talk on the subject of how No-Tillage and stubble retention affect microbial dynamics in the soil.

There will be two half day field trips where we will demonstrate what's been done with No-Till in Esperance this year. Several quite exciting developments will be shown, including:

- * narrow points No-Tilled into tough grey clays,
 - * several cheap machines that can seed through stubble and reduce Rhizoctonia,
 - * a large farmer demonstration trial where 7 machines have been compared,
 - * tramlining,
 - * good tillage trials at Esperance Downs Research Station,
 - * Rhizoctonia at its worst and
 - * farmer feedback and machine performance and
- If planning on attending please RSVP to myself on 782026 or Bill Crabtree on 090 761333 or facs 090 761227 before 7 October, thanks. These two days follow the **Wellstead Research Group** field day which will be held on the **13th October**.

There will be ample good quality Motels/Caravan Parks and Chalets to stay in. For more specific information the Tourist Bureau can be contacted on (090) 712330.

STUDY TOUR TO NORTH AMERICA

Kevin Bligh, Adviser (Perth)

It has been suggested that I might renew my North American contacts with a view to a possible WANTFA No-Till study tour in September-October 1994. I would think that viewing winter wheat seeding in North Dakota and Washington State, and the beginning of spring wheat seeding in California, and detailed study of Canadian No-Till results in Manitoba and Saskatchewan would be a very worthwhile tour.

Some members believe that a study tour of the North American No-Till systems could be useful to get pointers as to where we could be going with our research.

A 3-week trip may cost about \$5,000 each. Written advice has been sought from the Tax Department confirming Tax deductibility of a formal WANTFA study tour. Such a possible study tour will be discussed at the Esperance meeting on 14-15 October. Please let me know if you are interested in such a tour and can't make it to Esperance. My phone numbers are (W) 09 368 3893 or (H) 09 332 7003.

DEFINITION OF TILLAGE TERMS

Bill Crabtree, Adviser (Esperance)

As Ray has already said in the first story we need to define our No-Till terms a bit better. There is also a need to ensure that we use the same terms consistently when we refer to various tillage terms. I would like to suggest that we adopt the following terminology, which in Western Australia seems to pretty well agree on anyway. The following three terms are: **traditional cropping** is working a soil at least twice before seeding the crop, **reduced or minimum tillage** is working once before seeding and **direct drilling** is only working the paddock at or immediately before sowing (perhaps same day seeding fits in here). Then the more specific term of No-Till is perhaps 2-20% of the surface disturbed or rearranged. We need the WANTFA body to decide on this one exactly.

RYEGRASS RESISTANCE AND NO-TILL

Don Stirling (Esperance)

I have often heard the comment that ryegrass resistance is encouraged with No-Till, however, this may not fit with my experience this year. I use a Janke machine which, in one situation, was not getting through a thick wheat stubble so I burnt the stubble after several frustrating laps. Where I burnt the stubble I had to apply a selective in-crop herbicide whereas where I did not burn the stubble no ryegrass plants emerged. Of the 1200 acres of lupins that I sowed this year only this burnt section required a selective herbicide use.

The sequence of events was as follows. I sprayed with 2.5 L/ha of Simazine on 30 April and burnt the stubble 19 days later and on the day of seeding (19 May). There were 3 or 4 rain events in between these occasions with the largest rain being 6 mm. Then 4 weeks later, again after 25 mm of rain, I topped up with another 1.5 L/ha of Simazine. The ryegrass numbers were perhaps less than 0.1 per square metre when stubble was retained versus at least 5 per square metre where the straw was burnt.

There are several possible explanations for this difference, including:

1. There was more soil scattered over the surface by the seeding process in the absence of stubble, as retained stubble muffled the soil from being scattered, this soil that was thrown, in the absence of stubble, may have stimulated extra ryegrass to germinate.
2. The stubble mulch may have aided the rotting or inhibited the germination of some of the seeds that were left on the surface, similar to poor pasture densities that occur after thick wheat crops and
3. A large amount of the Simazine may have been tied up in the stubble and burnt as 25 mm of rain may not have been

COMMITTEE

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Science Section

SOILS ALIVE!

Bill Crabtree, Adviser (Esperance)

Many south coast farmers are seeing increased earthworm activity in paddocks where stubble retention is being practised. Earthworm numbers are a good indicator of the activity of the biological food web (not chain) of a soil. When we provide earthworms with an abundance of a carbon and nitrogen food source (see Andrew's article), due to crop rotations and establishment techniques, then we see an increase in their activity.

For a long time Professor Alan Robson (of the University of WA) has encouraged us to think of soil fertility as a function of 3 things. These being chemical (which includes the inorganic nutrients like copper, zinc and rock or super phosphate), physical (soil structure, compaction etc) and biological (soil bugs which recycle nutrients). The latter aspect of soil fertility being the least well understood. It is true that while research into the chemical and physical aspects of soil fertility has been keenly done and rewarded there has been comparatively little research into biological soil fertility. Perhaps this is one reason why the organic and biodynamic groups have gained some momentum recently as they have seen this omission.

The main problem with understanding soil biology is that it is complex and difficult to research. This makes soil biology a less attractive career path for young graduates compared to the other chemical and physical aspects of soil fertility. There is also the possibility that this type of research may not get funded. This may be due, in part, to the view that this type of research has a lower probability of immediate dollar returns.

Interestingly when people with limited biological education attempt to understand this complex system they can come to some wrong conclusions despite their best intentions and observations. For example, some farmers that I have spoken to believe that there is little microbial life left in our sandy soils. This thought is not quite right. Dr Margaret Roper from CSIRO, Perth, was telling me that in a 'gutless' sandy soil there is likely to be a million soil microbes in a teaspoon of sand and that these bugs may be 2,000 different types. Also some of these bugs have a life span of only one hour while others may survive several weeks or even years, in desert type conditions.

The current No-Till revolution that is occurring along the south coast is highlighting how little we all know about soil biological fertility. Alan Robson has often said that biological soil fertility does need to be better understood and therefore researched. It is possible now that the grass roots of agriculture are seeing system benefits of retaining stubble that we might see an increase in funding in this area.

SOIL MICROBES NEED A BALANCED (CARBON:NITROGEN) DIET

Andrew Heinrich, Tillage Research Officer (Esperance)

People are asking "What happens to soil organic matter and soil nitrogen when we retain our stubble?" We all know that higher levels of organic matter (OM) in the soil or % carbon is a good measure of the health of the soil. However, long term trials have shown that it is very difficult to lift the soils OM levels under continuous cropping situations. Now we are questioning exactly how good is OM as an indicator of soil fertility. The level of microbial activity appears to be a better indicator of 'soil health'. Unfortunately we do not know a great deal about soil microbiology and what happens within the 'living layer' of the soil. Our knowledge is improving and we are slowly getting closer to understanding the micro fauna and micro flora.

Retaining stubbles may not increase soil OM appreciably but it will increase the level of microbial activity as microbes require food to live just like any other living thing. A higher level of microbial activity increases the biological fertility of the soil and the nutrient cycling for the crops we grow. We all know that wheat stubble is not the best tucker for sheep - the same goes for the soil microbes. So lets have a look at some of the reasons.

Microbes have a Carbon/Nitrogen ratio (C:N) of about 8:1. To achieve that balance without fixing mineral N from the soil, the microbes require a diet that has a C:N ratio of about 20:1. The microbes respire (breathe) off the difference in C as carbon dioxide (CO₂). Wheat stubble has a C:N ratio of about 60:1. Therefore, when microbes digest wheat stubble they fix mineral N from the soil and it becomes unavailable to the crop. This highlights the reason why N fertilisers have to be applied to second and subsequent cereal crops to maintain production at a reasonable level. When the microbes have disposed of most of the stubble and die, the N in their cells is released back into the soil and is available for the crop but much later in the growing season, that is why it is called nutrient cycling.

In contrast to wheat stubble, legume stubbles have C:N ratios lower than 20:1. The actual C:N ratio of the stubble depends upon the species, the total dry matter production of the crop and the harvested grain yield. When legume stubbles are retained and microbes digest them, N is immediately released into the soil as mineral N which is available to the crop. The N is released over an extended period during the growing season so the stubble acts as a slow release fertiliser for the crop. These are a couple of the many valuable inputs of a legume crop in the crop rotation.

Increased C input into the soil and maintenance of the N levels in the soil (in a legume rotation) leads to greatly increased levels of microbial activity. This in turn leads to a more stable level of soil organic matter and 'healthier' soil.

MICROORGANISMS CHANGE WITH STUBBLE RETENTION

Margaret M Roper, CSIRO (Perth)

Soils contain a wide variety of microorganisms which are invisible to the eye but are responsible for helping maintain the fertility and structure of our soils. Microorganisms include bacteria, fungi, algae and protozoa and in a fertile soil there may be more than 2 tonnes per hectare of them in the top 10 cm of soil.

Microorganisms in the soil are responsible for most nutrient transformations making them available to plants for growth. For example, bacteria in the soil can fix nitrogen from the atmosphere into the soil. Others transform nitrogen to forms that plants can use. Organic matter such as plant and animal residues are all decomposed by a whole range of different microorganisms. Many minerals are converted by microorganisms to forms that plants can use, eg phosphorus, sulphur and potassium to mention just a few.

Often times, the activities of microorganisms in the soil are limited by the availability of a food source such as sugars or carbohydrates. Stubbles remaining after harvest contain large amounts of carbohydrates in the form of celluloses and simpler compounds and microbial activity can be greatly increased if stubbles are left on or in the soil. For example, in experiments in NSW and Queensland, I have shown that atmospheric nitrogen fixation by free-living bacteria (not associated with legumes) is greatly increased where stubble has been retained compared with soils where stubble has been burnt.

Also, Gupta VVSR (CSIRO Canberra, now Adelaide CRC for Soil and Land Management) has looked at the size of the microbial population (called microbial biomass). He found that microbial biomass in soils where stubble was retained was significantly greater than in soils where stubble was burnt even after only one year. Furthermore, he found that there was a tendency for the microbial biomass to be higher in undisturbed soils with stubble than in soils where the stubble was incorporated into the soil. The reason for this second observation is likely to be related to the soil structure.

Microorganisms not only transform nutrients for plant use, but live and interact with each other. Some have very specific requirements eg oxygen, moisture and temperature and the structure of the soil can contribute by providing specific sites which meet these needs. For example, a bacterium that prefers little or no oxygen will locate itself in the middle of a crumb or soil aggregate. Microorganisms produce slimes and fungi produce

hyphae, all of which bind the soil into aggregates. Other organisms, such as earthworms, provide aeration by making pores in the soil. All of these functions contribute to a large and varied microbial population with a large range of activities. Clearly, cultivation of the soil can break up this structure and alter microbial activity.

Coupled with the practice of no-tillage is a heavier use of knockdown herbicides for weed control. Some herbicides are readily decomposed by microorganisms whereas others are not.

Farmers Section

JOINT MEETING WITH KOOLANOOKA-BOWGADA LANDCARE

Kevin Bligh (Secretary WANTFA)

About 200 farmers attended a very enthusiastic joint Landcare/WANTFA meeting which was organised by the Koolanooka-Bowgada Landcare Group on 29-30 July 1993. The meeting was chaired by their president, Graeme Malcolm.

Farmers, scientists and engineers spoke at an all-day seminar on the first day. Under beautiful sunny conditions it was into the paddock on the second day, looking at alternative crops, and wheat sown using narrow points and press wheel seeders. Thanks to all who came from near and far to make the meeting such a great success.

The following six stories are farmer talks that were delivered at this meeting.

MY NO-TILLAGE APPROACH

Ray Harrington (Darkan)

No-tillage is not a mystery way of cropping but I have found some basic ground rules very helpful. The first one being, one step at a time. You may find it best to introduce No-Till slowly into your program and this will allow you to learn the new skills required in adopting the new practice. I suggest you complete your main program as you normally would and then proceed with about 5-10% of the cropping program with No-Till. However, remember to compare this with the last sown conventionally, also, these latter sown crops are likely to yield less.

Which machine you choose will depend on soil and rotation types. The options are tined, disc or a combination of the two. There is enough Department of Agriculture information available to help you with this decision.

My No-Till experience is with a tined machine and on a Jarrah gravel type loam in the Darkan district. My machine needs a minimum of 80-95 kg breakout strength at the bolt hole of the tine. This ensures that I can penetrate up to 12 cm deep with a tine that is 1.20 cm wide (12 mm). I feel that the point is the most important part of the machine as you have to cut a "knife slot" up to 12 cm deep to ensure good cereal vigour. However, it is absolutely imperative that the "slot" is then closed to allow a seeding depth of approximately 3 cm then followed by finger harrows or a chain to cover the seed.

Once seeding, we get down on hands and knees and dig up the rows to make sure our seed placement is correct. Obviously different soil types have a marked effect on sowing depth. Seeds are initially hard to find and for a trial run we lift the seeding rate up 3-4 times and this makes it easier to find the seed. Speed of sowing needs to be kept down to 10 km or less to ensure accurate seed placement. Power requirement seems to be in the order of 3 Engine H P per tine when cutting 12 cm deep.

The weed control program with No-Till is entirely different to conventional sowing. In my opinion it is imperative that you either manipulate or Spraytop prior to sowing with No-Till. Remember that weeds are not killed at all with the narrow tines used in the sowing operation. My brother, David, uses a "tickle" on the break. He uses the same "knife points" at 5-6 cm deep. This gives about a few millimetres deep coverage of soil over all the weed seeds. The soil running up the front of the "knives" is spread evenly over the soil surface. He then waits 3-10 days and uses a knockdown".

Our knockdown rates with No-Till are approximately 60%

We do not know all the effects of such chemicals on microbial survival and activity (particularly specific groups of microbes). Research in this area is underway but it will be some time before we have many answers. Whilst it is recognised that herbicides and pesticides in general are necessary, we need to be careful with their use.

Microorganisms in the soil are the key to good plant nutrition and soil structure. We need to learn how to nurture and protect them in order to sustain our agriculture.

higher than when we relied on a second knock effect of tines giving a full cut. We usually add another chemical to glyphosate in order to broaden the weeds control spectrum. Typically I use between 650-800 mls/ha of glyphosate plus a spike of either Ester or Dicamba at 300 mls/ha, or Goal to control geranium and importantly clover.

I commonly use Parquat or SpraySeed at 600-1000 mls/ha just prior to crop emergence which is a very cheap and effective way of controlling grass weeds. Since weeds are not buried deep with the tickle they generally all germinate before the crop emerges. This makes them very vulnerable to the spray. I've found that by brushing the ground with my hand and then blowing off the surface soil, reveals how many white hairy weeds are present. They usually have a green tip, which means that they are mostly showing through. You must spray at the correct time. Too early is no good as you won't get most of the weeds and too late will damage the crop. It is important to do this before say the half leaf stage and not under moisture stress. I have been using the system for 12 years, and you will find it excellent too. I have almost eliminated the use of grass selective herbicides.

The greatest advantage of the No-Till system is the ability to cover up to a 3 times bigger program with 1 boomspray, 1 tractor, 1 seeder, 1 truck and a 5 in 1 bin. This year I sowed 1780 acres from 21 May to 11 June even with a Boomspray hiccup for 3 days at the start. The other big advantage is the moisture retention by not cultivating. It is recorded that with each cultivation you lose equivalent to 70 points of rain. You can also bring your sowing time forward slightly but remember to let weeds germinate before using a knockdown. Another advantage I perceive is that the return to pasture is enabling me to run as many sheep on my stubble as on my old pasture at the break of the season.

The worry that follows from having all your country "Ripped up and Worked Back" is eliminated and it doesn't matter so much if the weather comes in too wet or too dry. If you have to come back with an in-crop herbicide, then the soil surface is far more trafficable. I trust you have success in adopting No-Till in your program!

DIRECT DRILLING UP NORTH

Tony & Judy Critch (Mullewa)

We farm a mixture of mainly yellow sandplain and some red loam. The rainfall is about 325 mm and the rain falls mainly May to September. A big proportion of the crop is direct drilled. However, we still use quite a bit of conventional seeding on occasions, such as, cultivate or plow on the break, then work back and seed. We were really led into direct drilling rather than making a conscious decision to adopt it. Reasons for this include:

1. lupins for various reasons have demanded this system firstly to get the crop established early,
2. we needed to create a minimum soil disturbance and thus ensure against wind erosion and
3. to assist in protecting against disease spread by leaving as much cover as possible.

Also in wheat and barley a big part of seeding is done with direct drilling and minimum tillage in order to save the crops from wind erosion. Apart from the negative economic effect of wind erosion it also causes much emotional stress as you can only sit, wait and hope that the land heats - a helplessness feeling. At least in a bush fire you can attempt to bring it under control and stop its spread - not so with a wind event - just wait until the wind runs out of puff and then assess the damage.

Direct drilling, like any new concept in farming, has its

problems. I would admit that some of my worst crops have been direct drilled crops. The reasons for this are many and varied - depth, disease, grubs, fertiliser toxicity, lack of understanding of knockdown chemicals with this system and probably other reasons.

However, as long as the "beginner", if there is such a farmer as a "beginner" in No-till, direct drill, min-till these days, eases themselves into these systems carefully and thoughtfully, there should be a minimum of mistakes. There will be disasters be prepared for them and try to make them small ones. The long term plan is to perfect these systems and in so doing allow farmers to, perhaps increase their cropping areas, maintain economy of scale but importantly keep capital and running costs to a sensible level.

NO-TILL IN A WHEAT: LUPIN ROTATION

Michael Thomas (Mullewa)

My first venture into No-Till sowing began 3 years ago. We were using narrow points and a chisel plow to sow lupins into wheat stubbles. The chisel plough had a better trash handling ability than our conventional cultivator. We also wanted to try deep banding for lupins in our high fixing soils. We set the machine up to deep band in a one pass by using narrow points which placed the fertiliser in a concentrated band 10 cm below the surface with the seed was placed 5 cm above that. This allowed us to use a heavy rate of phosphate without the fear of toxicity to the seed.

Splitting the seed and super on the air seeder proved to be relatively simple. We also fitted the machine with an electronic depth control and a Woolford Prickle Chain to assist with Simazine incorporation. The first year we used 2" chisel points which were moderately successful but which had two main drawbacks. These being, high wear rates and the furrow not always closing.

The high wear rates made it difficult to achieve our objective consistently. The chisel points also wore upwards and this affected our seeding depth and meant constant monitoring of the points. Unfortunately the 2" wide points prevented the soil from flowing back into the furrow under wet conditions. However, they worked well under dry conditions. Also, speed was more critical with these points.

In the second year (1992), we fitted the new type super seeder point from Primary Sales. This point is excellent for this type of No-till method. Being an extremely narrow point with a tungsten tip on the leading edge the penetration was first class and the wear factor was almost non-existent. When we finished our 1600 acres of lupins they were as good as the day we fitted them. The point also had small flared wings on the bottom which gave good soil disturbance at 4-5" deep but still allowed the soil to fall back into the furrow immediately. This eliminated two of our earlier problems. It was a good wet year and with an early start the crops grew extremely well and podded up tremendously with yields of 3 t/ha and better.

In 1993 the machine has done another good job on the lupins and, apart from on one paddock which is showing the effects of becoming salty, the growth rates on the rest are very good with lots of vigour. I feel we are on the right track. I think any modifications in the future will probably be with press wheels to help under drying soil conditions. Because the seed lies in loose soil it can affect the germination under these conditions. I don't think we will be happy until we get that 100% result which probably is not achievable anyway.

A couple of extra comments about No-till include: narrow points don't hold a lot of trash, go early on knockdowns and use higher rates than normal because there isn't any double knock as with conventional cultivators, working through trash has become easier with wider spacings, but sowing into trash can be a disaster if its done wrong and seed still must have good soil contact.

NO-TILLING ESPERANCE SANDS

Ken & Fred de Grussa (Esperance)

Since 1980 we have been seeding with two John Shearer "J Series" combines. These are 28 row machines with the

mounted on four bars of the frame which was the standard layout in 1980 which had a very limited trash handling ability.

We adopted direct drilling in 1982 after a small but successful trial in the previous year. The 1981 season brought some devastating wind erosion events which made us realise that we had to find a better way of farming, and direct drilling seemed worth a try. The initial results were encouraging, and it became the normal practice. However, in some conditions we experienced problems in achieving accurate depth of seed placement. Various ideas were tried and discarded until we fitted press wheels. These were 10 cm wide with a flat profile, and proved successful in reducing the depth of soil over the seed, as well as improving the seed to soil contact.

During this time we had also tried different point sizes and found that larger points produced larger clods and this added to the difficulties of achieving good seed placement. In 1987 the machines were fitted with the smallest points we could get - lucerne points. At the same time all cultivating tines were removed. This was our first attempt at No-Till although it was not a deliberate goal, rather the natural progression from direct drilling. Since that time part of our crop has been seeded by this method. Then in 1993 our entire crop was No-Till seeded, but we also moved into lupin growing and stubble handling became a problem.

Loxton disc coulters were fitted in 1990 in an attempt to cut trash ahead of the tines but due to limited space on the frame one disc was fitted for every second tine. Best results came from using 14" rows when seeding lupins, with a disc ahead of every tine and more space between tines on the frame this markedly improved our stubble handling capacity. By raising the combine box (other farmers have done this and say it is not difficult) we can mount the tines on three bars and using 10" spacings still achieve good clearance, at the same time allowing sufficient room on the frame to fit a coulters in front of all tines.

The aim is to create as little surface soil disturbance as possible using narrow points, and some modification to the seeding boots is necessary to place the seed in the furrow at the correct depth. For us No-Till is here to stay, and we (along with many other farmers too no doubt), will be looking for ways to further refine and improve the system.

NARROW POINTS WORK WELL

Lindsay Chappell (Morawa)

I first started experimenting with No-Till in 1985. At that time I had no idea at all of what I was doing and now I wonder if I'm any wiser now. Anyhow, in 1985 we sowed our wheat crop using a 36 foot chisel plow (Leon). We had all sorts of problems with the actual machine staying level, because of faulty seals in the hydraulic rams. That year was particularly dry, in fact we were declared drought affected. However, some of the crop turned out quite alright, though by and large it was a bad year due to the dry conditions.

We went away from this idea the following year because there were early rains and we were worried about the size of the weeds (I don't think it occurred to us to use more Roundup). We stayed with normal direct drilling (using a Shearer 4-150 cultivator until 1990).

In 1989 at a field day organised by K.B.L.C.G. I met Kevin Bligh who was giving a talk on the advantages of narrow points for improving soil structure. I think that of about the 60 people who were there 59 turned their backs on this crank and I was the one idiot that didn't. The following year of 1990 saw Kevin give me a set of these points to try and determine the wear rates of the different types of hard facing. This particular crop yielded the same as the other crop we had sown alongside however, the ground was left beautifully smooth in comparison. 1991 saw a very dry start (similar to 1985) so I thought that it would be a good idea to try some Primary Sales Super Seeders, which we did. The results were particularly pleasing, especially with the germination. With our other systems we had always had trouble with germination but here it seemed that we solved all these problems with one foul swoop.

I had always been attracted by the idea of not cultivating the soil and we had noticed (especially my father) that the more you worked the ground the harder it became. In the last 2 years we have had some big rainfall events and it became clear that the

ground that has been sown using No-Till has far less runoff than ground that has been tilled completely alongside. This has happened to the point this year where we have been forced to finish seeding very late because the ground was so wet.

We have run into many problems using No-Till to give us a few headaches to go with the benefits. Problems such as (1) stubble keeping the ground too wet to sow into. (2) Stubble harbouring lucerne flea - though this might be a pest peculiar to this year. (3) Getting rates of Roundup right. (4) Broadcasting fertiliser - not being available to the roots of the plant.

My Do's and Don'ts with No-Tillage:

1. Do use plenty of Roundup - cheaper than salvage.
2. Do spray top the previous year or control weeds in the previous crop.
3. Do spray early or the weeds become too big.
4. Don't broadcast fertiliser prior to seeding.
5. Don't leave all the straw on every acre (chickens in the basket).
6. Don't be scared to use more Roundup.
7. Do try a big of Trifluralin - you may be surprised at the results.

NO-TILL AT CHILIMONY

Digby Lee-Steere (Northampton)

We have been watching with interest the No-Till trials at Glenvar (Wongan Hills) for the last 3 years. The reasons for our interest include: wind erosion control, stubble retention, blockages with conventional bars, paddy melons, correct seed placement, a quicker seeding operation, fuel savings and soil structure maintenance or improvement.

We were fortunate to be able to buy a 15 metre John Deere experimental Bar with 70 Biomax Cultivators attached earlier this year. We added a Flexicoll 1720 air seeder box and kit and believe that we have the near perfect No-Till machine. Our farm is 3500 hectares in size and comprises mainly of Tussock Banksia deep yellow sand with some Tamma grey sands. We now continually crop to lupins and wheat with some barely.

This year the cropping program started on 1st April with all lupin stubbles being deep ripped to about 40 cm with an Agrowplow. We had just finished ripping when we were fortunate enough to get an opening rain of 45 mm in the 1-2 May. We found it very hard to sit around for 5 days to wait for a germination of blue lupins and weeds. Due to no summer rains and high soil temperatures the lupin establishment deteriorated daily. The first three paddocks were good but the last paddock was ordinary even though we planted our seed a bit deeper into the moisture.

After looking at a lot of lupin crops with Peter Nelson I believe things will be done differently next year to make full use of the No-Till system. Where there are no blue lupins we plan to spray Simazine then seed lupins dry in the middle of April. We have had trouble doing this before because of wind erosion, getting through the thick dry stubbles and accurate seed placement. It should solve the few problems we have had this year, which include:

- a) A low plant density as we only seeded 60 kg of untested seed.
- b) Suspected sulphur toxicity with double Super.
- c) Simazine damage in the press wheel groove.
- d) Stripping damage as Broadal and Simazine swirled behind spray tank and increased rollers 2m strip.

Thanks to the kind season all lupins are finishing well and yield potential looks good (7 September). The wheat and barley establishment with the No-Till can only be described in one word - excellent.

MARSHALL/RASYK MODIFIED COMBINE

Steve Marshall (Esperance)

Along with my brother David and friends Carl and Greg Rasyk we are currently developing a machine that will reduce most of our cropping problems. Our combine is being modified to help us establish our crops in a wide range of soils using the latest recommended cropping techniques. We are modifying a

John Shearer 6 row 6-90 combine to be able to:

1. handle stubble without hair-pinning,
2. reduce Rhizoctonia,
3. direct-drill into all soil types from heavy clays to non wetting sands,
4. place seed accurately with minimal soil disturbance and with maximum seed-soil contact and
5. achieve enough cultivation to give cereals the vigour they need on sandplain soils.

Stubble handling with a tined machine presented us with our biggest problem, and coulters in front of each tine seemed to be the obvious answer. Instead of trying to cut the stubble, (which seems impossible to do when the stubble is wet or in soft soil situations), we decided to make a pathway for the tines by moving to stubble sideways with minimal soil disturbance, by using angled coulters. This concept is being extensively trailed by us and Bill Crabtree (Department of Agriculture, Esperance) with encouraging results. As the new harvest season stubbles become available, the angled coulters will be tested more thoroughly in all stubble situations.

The front rows of lines on the combine are equipped with knife points for minimal soil disturbance, and are set 2 1/4" below the depth of sowing tines, for Rhizoctonia control. The rear rows of sowing tines (equipped with Super-Seeder winged knife points) are in-line with the front deep-working tines which are in-line with the angled coulters. Sowing tines are separate from working tines to achieve greater accuracy of seed placement for better crop establishment.

Press wheels are used in non wetting sandy soils and finger harrows in the heavy clays. We are still in the early stages of developing this type of coulters, but we will have a full working machine for interested farmers to see this harvest time. Information on this type of modified combine can also be obtained from Peter Burgess, Agronomist, SBS IAMA and Bill Crabtree, Adviser, Department of Agriculture, Esperance.

AGRISYSTEMS NOT AS DEAR AS FIRST THOUGHT

Kevin Bligh for the Stones (Borden)

Who would want a 15 foot seeding unit that costs in excess of \$70,000, that needs at least 170 engine horse power and costs approximately \$6.50/ha in points and discs? Yet, three West Australian owners are well satisfied with their decision to import their Agrisystems Cross-Slot no-till drills after completing their second seeding season.

Andrew and John Stone sowed 1600 ha of their 2600 ha cropping program using the Agrisystems sowing lupins, barley and canola into pastures and heavy cereal stubbles without the need to rake or burn a single hectare.

Operating 24 hours a day the Cross-Slot was able to achieve 80 hectares a day at speeds of up to 13 kph. Even with the wet and boggy conditions experienced this year the program was completed in a month.

Lupin seed rates of 90 kg/ha are typically required with double disc and press wheel or tined seeders in the area. Yet comparable plant densities were achieved at only 50-60 kg/ha with the Cross-Slot. Only 6 kg/ha of canola seed was required with the Cross-Slot compared with the usual 9 kg/ha. At \$2000/t for treated canola seed and \$200/t for treated lupin seed the savings were approx \$6-\$8/ha using the Cross-Slot.

Andrew Stone reports that ground tool wear rates averaged \$6.50/ha in 1993, \$3.75 for scalloped discs and \$2.75 for the bioblades (points) on either side of the discs. Discs and bio blades are typically replaced after sowing 300-400 ha depending on conditions. Both are quickly changed provided a separate set of disc hubs are pre-mounted on each new disc.

Stainless steel plates have been spot welded inside the fertiliser delivery area beside each disc to prevent moisture entering the area and a build up of fertiliser blocking the outlet. This would normally occur from rain, dew or even a heavy fog. Few blockages occurred after the installation of the stainless plates.

Andrew and John consider that the ability to sow at the set depth through heavy trash residues over a wide range of soil and moisture conditions is a strong point of the Cross-Slot seeder. They are now confident of seeding longer season varieties early, greatly increasing potential yields in their 375 mm rainfall zone.