TO MEMBERS

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Western Australian No Tillage Farmers Association (Inc) WANTFA

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Topical Section

CONFERENCE AND AGM AT DARKAN 10-11 MARCH 1994

Our Second Annual Conference will be held on Thursday 10 March 1994. Tea or coffee will be available at 9.30 am and the Conference will commence with an introduction by Ray Harrington (Chairman) with hopefully Professor Tim Reeves (of Roseworthy Campus of Adelaide University) giving the keynote address. The focus for the conference will be on the use appropriate legumes. Consequently, Dr Kadambot Siddique (Department of Agriculture, Perth) will speak on alternative Grain Legumes.

There will be 2 concurrent Sessions in the afternoon, these being: hints for first-timers (including machinery agents) and refining No-Till systems and techniques. As well we will have a session on "your input on No-Till needs" followed by a Barbecue. Billeting for accommodation is available, to be requested through Ray Harrington on Phone and Fax: (097) 363030 before 6 March. Hotel/motel accommodation is available at Darkan, Collie and other adjacent towns

WANTFA's second Annual General Meeting will be held at the Darkan Sporting Complex at 7.30 am on Friday 11 March 1994. The business of the meeting will be to:

1. Receive the committee's report, treasurers report and financial budget,
2. Elect committee members to replace or re-elect those whose term will have run out, being: Ray Harrington, Ken de Grussa (Esperance) and Lindsay Chappel (Morawa),
3. Consider a constitutional change foreshadowed at the first AGM that the President and Vice President shall be elected annually from among in-coming committee members "by the Annual General Meeting," deleting "by the out-going and in-coming committee members" and
4. Conduct any other business placed on the agenda before the commencement of the meeting.

After the AGM we will adjourn to Wagin Woolarama for a No-Till seeder Expo by major manufacturers (11 and 12 March 1994).

ESPERANCE REPORT FOR 14-15 OCTOBER 1993

Kevin Bligh, Adviser (South Perth)

More than 100 people attended the Seminar and Field trip on the first day of the WANTFA meeting at Esperance. Copies of the proceedings are available from Bill Crabtree - on 090 761333 and facs 090 761227. The keynote speaker was Dr V Gupta who comes from the Cooperative Research Centre for Soil and Land Management in Adelaide. Gupta described the complex activity of life in the soil in terms that we could understand, and answered many questions over the two days (see inside for Gupta's talk and also Gordon MacNish's).

Then, it was into the buses, to view the large farmer No-Till trial north-east of Esperance (at Alan Jones'). Here 7 machines are compared and there appeared to be little difference between them. We then saw Ewin Stewart's No-Till versus direct drill versus Min-Till with barley after pasture which showed, yet again, that No-Till into pasture has some vigour problems. Mice damage was also viewed in a wheat and lupin crop, and they were asked to keep them there!

After a WANTFA general meeting early on the second day, about 60 people inspected Ross Whittall's canola which went 3.8 t/ha - sown with his Biomax. We then saw plots sown with various No-till seeders and points at Esperance Downs Research Station, where the wavy coulter appears to have improved vigour and decreased Rhizoctonia. Further stops on farms north-west of Esperance included wide row spacings in wheat of 25 versus 50 cm. Then we saw the Marshall/Raszyk twin angled (3-7o) disc coulters which impressed all and are proving effective for getting tines through heavy stubble. We finished the 2 days viewing No-Till sown wheat into problem clay soil, barley in Rhizo country and faba beans and canola - all successfully No-Tilled.

Questioners were enthusiastic and direct at every stop. The tour was keenly M.C.'d by the good natured Bill Crabtree. Thanks to WANTFA vice-president Ken de Grussa (and Audrey) who made it all happen, especially with the Seminar preparation and for the assistance from many other locals. Financial assistance from the Grains Research and Development Corporation (for Dr Gupta's fare) and SBS Rural IAMA was greatly appreciated. Thanks also to the CRC, Adelaide for allowing Gupta the time to come.

Also in early October WANTFA president Ray Harrington, committee member Jim Baily (Wellstead) and Harry Williams (Nungarin) wrote papers on their No-Till systems for the 1993 Landcare Conference in Perth (published in this and the last Newsletter). About 20-30 farmers attended each of two workshop sessions No-Till with Alan Fisher (of Primary Sales Australia) standing in for Harry Williams. Grains Research and Development Corporations Official and Professor Tim Reeves from Adelaide made a strong plea for farmers to give No-Till a go in his keynote address (see Science Section for excerpt). About 350 people attended the Conference, at which WANTFA nominee (and Newsletter Editor) Bill Crabtree made the finals for the Individual Landcarer Award.

NO-TILL CONFERENCES AND TOUR

Kevin Bligh, Adviser, South Perth

January 11-13, 1994; Second U.S. National No-Till Conference, Adams Mark Hotel, St. Louis, Missouri. Contact: No-Till Farmer, P O Box 624, Brookfield WI 53008-0624, U.S.A. Phone 414 782-4480. **January 31 - February 2, 1994;** the 16th Annual Manitoba-North Dakota Zero Tillage Workshop, Minot, North Dakota, Contact: Lyle Samson, 2012 Westfield Avenue, Minot, ND 58701. Phone/Fax 701 852-8895. **March 10, 1994;** Wimmera Conservation Farming Association 9th Annual Seminar; "Doing It Better with No-Till: Top Management for Profit" Longerenong. Contact: Peter Berg, PO Box 487, Horsham, Victoria. 3402. Phone 053 811255, Fax 053 829388. **April;** Proposed Narrow Points Workshop at CSIRO and the Cooperative Research Centre for Sustainable Agriculture, Adelaide. Contact Bob Hannam, Private Mail Bag 2, Glen Osmond, S.A. 5064. Phone 08 303 8670 Fax 08 3038699.

September 5 - October 13 or part thereof; The WANTFA General Meeting at Esperance in October decided to investigate the feasibility of the No-Till study tour proposed in the September Newsletter. People could join or leave the following draft itinerary at any point mentioned; Monday 5 September 1994; depart Los Angeles for Paso Robles (halfway to San Francisco) to meet Californian No-Till farmers. Monday 12 September 1994; visit Tye Implements factory and see results of No-Till winter-wheat seeding at Lockney, Texas. Wednesday 14 September 1994; visit Great Plains Manufacturing (Inc.) factory at Salina Kansas and possibly the Land Institute researching futuristic polycultures of perennial crops. Friday-Monday, 16-19 September 1994; possible visit to an Amish community in Ohio through the Society for Holistic Resource Management (Amish farm with draft animals only because of strong religious beliefs). Tuesday-Wednesday 20-21 September 1994; visit the Corn Belt's "Mr No-Till", Jim Kinsella's farm about 200 km south of Chicago.

Monday 26 September 1994; visit Concord Manufacturing (Inc.) at Fargo, North Dakota, and inspect results of No-Till winter-wheat seeding. Thursday 29 September 1994; visit Manitoba - North Dakota Zero Tillage Farmers Association members finishing harvest near Brandon, Manitoba, Canada. Saturday 1 October 1994; Discuss No-Till systems with farmers and scientists in Saskatchewan. Monday-Tuesday, 3-4 October 1994; further visits at Swift Current Saskatchewan and Lethbridge, Alberta. Wednesday 5 October 1994; possible visit seeing winter wheat seeding near Pullman, Washington State. (People joining on 26 September for only two weeks for example could drive back to Fargo to fly out). Monday 10 October; visit Santa Cruz and Californian No-Till seeding in progress. Thursday 13 October; return to Los Angeles to fly out.

Economy class Air fares from Perth and medical insurance will cost about $2,000 per person, and twin share accommodation, hire cars and meals approximately $100/person/day. (Hire cars cost about double if you don't return them to the hiring point.) The Taxation Department have advised that all such expenses would normally be fully tax-deductible. It's hard to know what is going to be best, though I'd suggest that the Manitoba - North Dakota group are not to be missed! So far a half-dozen members and one spouse have expressed a general interest in this tour. Please let me know before the AGM on 11 March if you are interested in joining any part of the study tour on 3683893 (w) or 3327003 (h) or during January on 097 524215. Thanks!

NO-TILL IN WET YEAR

Bill Crabtree, Adviser (Esperance)

In mid-August about 60 of us toured the wet Jerramungup and Wellstead areas. Thanks to those farmers who allowed us to see their farms in, for most, a very despairing year. Several farmers said 'it just didn't matter what you did, it was just too wet'. However, there were glimpses of helpful tips that came through which are worth mentioning.

With No-Till there is an improved trafficability which may entice farmers to sow too quickly after a rain. With conventional cropping, farmers know that if you have already worked the paddock and it then floods that you can't go near the paddock for

4-6 weeks. However, with the No-Till approach these paddocks can be trafficable within 10-14 days of being saturated, and if sown then, then these paddocks may saturate again with only 5 mm of rain. This false confidence has led to a high level of seed bursting, which I gather is a newish phenomenon on these sandy soils?

We also learnt that stubble can have a negative effect on crop establishment in a wet year. Dr Margaret Roper (CSIRO), who was with us on tour, said that acetic acid and 'associates' can cause emergence problems, particularly where thick straw is associated with the waterlogging. This confirms one farmers thoughts, who said, "if he had the year over again I would burn all my stubbles". Another alternative to this might be to leave as much stubble standing as possible (the Esperance, no-sheep, fraternity say that this helps to solve several problems - except mice, though). Standing stubble would allow for some evaporation, ensure a slower acetic acid release and lessen the seed to stubble contact.

A few other little tricks of seed placement were discussed. Like keep the seeding rate up (perhaps 50% more than usual), try to have a range of depths of seed placement (to cover a range of possible soil conditions - if the soil stays wet then surface placed seed might work best) and the last one is, perhaps just a wish: to develop a machine that makes little mounds and puts the seed in them above ground level with the furrows collecting the flood water.

WIRE WEED PROBLEMS? - SURVEY

Andrew Heinrich, Research Officer (Esperance)

There has been some discussion around the traps this year about summer growing wire weed affecting the germination of the next crop. Have you ever had any problems like this? We need to know if you have ever had any problems, or experienced wire weed affecting your crops emergence or growth. This information allows us to quantify the extent of the problem and then we can assess whether the problem warrants further research. Without your help we can't get the ball rolling!

If you can help, then please send me as much of the following information as possible, including: name, postal address, farm location (eg road name), the year of the crop, the type of crop and variety, the type of machine used to sow the crop, the number of cultivations prior to seeding, sowing depth, fertilisers used (rates, top dressed or drilled), sprays applied to crop (herbicide), seed dressings used and the crop yield. The information that I am requesting for the wire weed is: how much was there (approx % cover on ground), when it started growing, what control methods you used and how did you eventually kill it.

Any comparisons between similar crops with and without wire weed would be appreciated. I realise this list is quite extensive but we need to know as much as possible. Please supply any other information that you feel is relevant and send to me at the Esperance Agricultural Centre, PMB 50, ESPERANCE WA 6450 or fax it on 090 76 1227.

THE PERFECT SEEDING MACHINE?

Bill Crabtree, Adviser (Esperance)

Eureka! We've found it!..... or have we? We think we may have, but it needs more testing in a range of conditions over summer, and then we'll have a field day to show you. We will advertise this field day on the ABC radio and in the press. It will be held at Esperance and possibly Jerramungup. The idea is cheap, simple and should solve most of our stubble blockage and tillage problems. In essence, the "Perfect Seeding Machine" - for the 90's might be "an angled scalloped coulter, gently shifting the stubble for a tine to follow at any depth" (see Marshall's article Sep 93). Considering the potential importance of this simple and practical idea it seems right to give a brief history of it's development.

In July 1992, our water repellence research officer from Geraldton, Paul Blackwell was searching for and developing a machine that could furrow sow while maintaining stubble cover (with GRDC assistance). Paul brought to Esperance a single disc which had a tine fixed behind. Several ideas were tested, including: a scalloped disc to ensure it would turn when going straight and angling the disc (along with others). Paul settled for just angling the disc and dropping the seed and fertiliser behind the disc as this was effective in creating both furrow sowing and stubble handling.

In late June this year, near the end of seeding, the Marshall's put a single-plain-flat disc in front of a tine on their 6 row combine. They played with the angle - in all directions, using an oxy, and became very excited with the potential of the disc moving just enough stubble to allow a tine to follow without blocking. At the same time I was observing how effective Paul's scalloped discs were working (for Tony Webster). Then we chatted on the phone (along with Peter Burgess and the Raszyk brothers) and decided to test the idea further.

In late July, with Andrew Heinrich now on board, we (the Marshall's, de Grussa's, Tony Webster, Andrew and myself) set up Tony and Paul's machine, and tested these ideas further, as well as videoing the result. We played with angles and spacings and were greatly encouraged with the result. The Marshall's and the Raszyk's then developed a twin, in and outwards, set of discs using cheap Holden hubs and some scalloped discs which they are now setting up their machines in earnest. We, at the Department, are doing likewise with Kevin Blighs a 30-row experimental seeder. Again as a team, we plan to show you these ideas straight after harvest and before you go on holidays so that you can plan your modifications for next year while going fishing!

MICE AND NO-TILL

Bill Crabtree, Adviser (Esperance)

Several No-Till farmers around Esperance are experiencing some mice problems, mainly in lupins, but also in wheat. It is clear that No-Till does allow mice numbers to build up, as the mice burrows are not destroyed, like with a deep and full cultivation of conventional tillage. The cultivation rips the soil and buries young mice which obviously slows their population growth.

However, there is more causing the mice problem than just No-Till. The poor harvest weather and bad septoria in most wheat crops last year meant that a lot of grain fell to the ground. This grain was a perfect food source for the mice to breed up on. In most faming enterprises sheep would have eaten most of the grain that fell. However, several farmers in Esperance have excluded sheep from their farms which left the grain solely for the mice to eat. The No-Till seeding techniques used obviously has not killed as many mice as a full-cut tillage would. Therefore, No-Till would have helped the mice numbers to build up during winter and they are now causing some concern at harvest.

Most of these No-Till farmers are philosophical about the problem saying that 'it only occurs once in 15 years or so and that it is not a major concern'. However, those who have been stung more severely have said that they "should have burnt the stubble". However, burning stubble on this very sandy and wind-prone soil, would invite a wind erosion problem. Obviously sheep could have had a beneficial role to play on these stubbles, as a nearby No-Tiller testifies. This farmer grazed some stubbles and not on others, and No-Till was used in both cases, where sheep grazed the mice are of little concern but are a problem where no grazing occurred.

What now? Well lets hope for, and plan where possible, an efficient harvest (little grain left behind), good hygiene around the sheds - with perhaps some Tallon, wax blocks. Then followed with perhaps sheep and a modified No-Till approach.

Where mice are thought likely to be a problem at seeding time then a different No-Till machine might be an option - ask your neighbour for a loan of his (or swap for a day). A machine that cultivates deep (10 cm) but is narrow, like a knife point or wavy coulter, should do some damage to mice burrows. Obviously wide row spacings would do less damage to burrows and any No-Till working at only 3-4 cm deep would have little affect on burrow destruction.

Science Section

MIN & NO-TILL REFLECTIONS

Tim Reeves, Professor, Unl. of Adelaide SA

Introductory Comments - Editor: *Last month, this highly regarded Professor from the University of Adelaide, gave the keynote address in Perth at the National Landcare Conference titled " Sustainable Land Management - Can We Act Quickly Enough?" Below is a section on tillage taken from that address. South Australian farmers cultivate even more than Western Australian farmers and minimum tillage (generally working once before seeding) is still not yet broadly adopted. Often they cultivate several times before sowing.*

"Minimum tillage systems are essential for crop and pasture establishment in most of our soils. It is no longer appropriate to accept the arguments that it won't work on these soils, or my farm. The challenge for research and extension workers is to help farmers to make it work. Often, existing soil problems such as compaction, or hard-setting must be overcome before minimum tillage or direct-drilling can be successfully introduced. The systems must be given time to work.

Many studies, throughout Australia, have shown the damage caused to soil by cultivation, and the benefits of minimum tillage to soil properties such as erodibility, infiltration, porosity, sorptivity, structure and biological activity. It is also now evident in most situations that stubble retention is necessary to gain full benefits from minimum tillage. The use of narrow-points, with or without modification, is facilitating soil penetration and plant establishment in direct-drilling systems.

Rhizoctonia - particularly in lighter soils - is a potential hazard to further expansion of minimum tillage systems. Research to overcome the problem is continuing with GRDC funding but "best-bet" technology should be used to minimise the impact of this disease in the short-term. This package includes grass-removal by June 30 in the year before cereal cropping , a 3-4 week chemical fallow prior to sowing in the cropping year (not deemed effective in W.A.- Editor) and the use of "cultivate deep, sow shallow" points on the seeder.

For sustainable crop production minimum tillage (or arguably No-Till - Editor) is a prerequisite. Whilst it generally requires the use of knockdown herbicides, the benefits obtained far outweigh the costs, both financial and environmental."

STUBBLE RETENTION MODIFIES POPULATIONS OF MICROORGANISMS

Vadakattu Gupta, CRC, Adelaide, SA

Traditional soil and crop management practices such as stubble burning and repeated cultivation have, in many Australian soils, reduced organic matter levels, decreased soil structure and increased soil erosion. With a recent shift towards low-input and sustainable agriculture, retention of crop residues and reduced tillage practices have gained considerable attention as a means of improving organic matter levels and soil fertility of our soils. A vast amount of organic carbon is produced as crop residues in Australia (>15 million t/yr). In this paper I will discuss what impact stubble retention and reduced tillage systems have on the dynamics (size, composition and activity) of soil microorganisms.

Microorganisms or microbes in the soil include microflora (bacteria, fungi, algae and actinomycetes) and microfauna such as protozoa and nematodes. They range in size from <1um in diameter to the size almost visible to naked eye and fulfil 3 main functions in soil systems. Firstly, they mediate almost all the nutrient transformation and organic matter decomposition processes in soil. Decomposition of above and below ground crop residues, nitrogen fixation (symbiotic and non-symbiotic), nitrification, mineralisation of phosphorus, oxidation and mineralisation of sulphur are some of the many important processes that are mediated by soil microbes.

Secondly microbial biomass acts as a temporary but important source and sink for essential nutrients. Thirdly, microbes have an important role in the formation of clay-organic matter complexes, the basic components of soil structure, and the formation and stabilisation of larger aggregates.

In addition, larger organisms such as microarthropods and earthworms play an important role in the decomposition of stubble and organic matter turnover. Macroorganisms such as earthworms also help transport organic materials from the surface to lower levels in the soil. Here I will discuss mainly the changes in the populations of microflora and their predators.

Stubble retention can stimulate microbial activity, since the growth and activities of soil microbes are frequently limited by the availability of an energy source and stubble is a major source of energy or carbon. In my work in 4 Australian states, I have found that long-term stubble retention increases the size of microbial biomass and activity, the increase being more evident under reduced tillage systems than with conventional systems. Unlike the changes in the total organic carbon and nitrogen levels, changes in the size and activity of microbial biomass may occur more quickly (1-2 years).

Tillage has a significant impact on the rate of decomposition of retained stubble and tillage modifies the relative distribution of microbial populations and microbial biomass in the different layers of the soil profile (0-20 cm). Under stubble-retained systems, pieces of decomposing stubble form microsites of intense microbial activity (or hotspots).

Long-term stubble retention will increase the populations of microbes involved in organic decomposition. For example, populations of cellulolytic microbes were 10-100 fold higher under stubble-retained systems compared to the stubble-burnt systems. Free-living nitrogen fixing bacteria in the soil require an abundant supply of energy (carbon) and as the stubble provides a variety of carbon compounds, stubble retention has a significant positive effect on the activity of these organisms. Other research indicates significantly higher levels of the nitrogenase enzyme (involved in nitrogen fixation) under stubble-retained systems.

Stubble retention alters the populations and activity of microbes involved in the mineralisation of organic nutrients (nitrogen, phosphorus and sulphur) into available forms. However, if the retained stubble is from a cereal crop (wide carbon to nitrogen ratio) the demand for nitrogen by the increased microbial growth can out compete plants for the essential nutrients. This is especially true during the early periods of stubble retention and may mean that additional nitrogen is needed for adequate crop growth. However, nitrogen fixation by the free-living nitrogen fixing bacteria can help alleviate this problem, provided optimal conditions for their activity exist.

Reduced tillage practices increased the proportion of fungal biomass in the surface soils. Fungi, unlike the bacteria can explore more than one place in the soil and they also help in the formation and stabilisation of aggregates and improve soil structure. A number of bacteria have been identified to produce polysaccharides and other binding agents which are essential ingredients in aggregate formation. Stubble retention especially under reduced tillage systems encourages the development of microbes which help in the aggregate formation and this in turn will result in the improved soil structure. Conventional cultivation breaks up the newly formed aggregates before they become stabilised and hence reduces soil structure.

Soil texture and pH effect the level of improvement in soil biological health as a result of stubble retention. Soil moisture status is one of the major factors controlling the size and activity of microbial populations. Although the effects of soil texture on microbial properties are usually discussed in terms of the amount of clay in the soil, the relationship between aggregates and pores determines the size and type of microbes present in a soil system. This is especially true with the microbial predators such as protozoa.

Protozoa, are one-celled animals, which kill and reduce the growth of microbes in the soil. Native soil microbes escape this by making protective coats or by living in areas inaccessible to protozoa. Introduced microbes such as Rhizobium, however, are prone to heavy grazing by protozoa and nematodes. In stubble retained systems, in particular under direct drilling, there

is more bacterial and fungal feeding protozoa. Little is known of their interactions and the magnitude of their effect.

There are also some negative aspects of stubble retention and reduced tillage. With stubble retention there is a greater transfer of plant pathogens, both above and below ground ones, to the succeeding crop. Stubble retention coupled with reduced tillage is known to increase the incidence of root diseases such as Rhizoctonia, Take-all and Pythium. However, modified tillage practices are being developed to overcome this problem, e.g. use of modified sowing points to break the hyphae of disease-causing fungi. In addition, there are beneficial microbes in soil that control root diseases. Such biocontrol of plant diseases, is both exiting for researchers and important to all, as this could reduce our dependence on the use of agricultural chemicals.

Since the changes in microbial populations are quicker, with modified management practices, the 'soil biota budget' may be an early indicator of sustainability in agricultural systems. Recent research indicates that the size of microbial biomass is an effective early indicator of long-term changes in the soil organic matter. Such evaluations are necessary not only to find solutions to problems but also to find gaps in our knowledge.

Understanding the roles of soil micro and macro organisms is only a part of our need for knowledge. We need to develop management systems which nurture a diverse range of organisms and provide the benefits of their activities. It is essential for scientists, extension workers and farmers together find new and cost effective ways to ensure that good biological health of the soil is developed and such practices adopted.

RHIZOCTONIA - HOW TO BEAT IT

Gordon MacNish, Pathologist (Esperance)

Rhizoctonia bare patch disease of cereals, legumes and pastures is caused by Rhizoctonia solani AG-8. It's most striking symptom is the distinct edge to the patch. There is an abrupt change at the edge from diseased to healthy plants. Plants within the patch are stunted, with stiff rolled leaves and are sometimes darker green. Their roots are short, brown with pinched-off ends that are often called "spear tips". Plants outside the patch are large and apparently healthy, but may have some affected roots. Plants within the patch usually remain stunted until maturity, or they may die prematurely. The edge of the patch usually becomes less distinct towards the end of the growing season. Plants within the patch may appear to recover, but their yield is still low.

Rhizoctonia is very difficult to control as the pathogen has a very large host range meaning that cleaning crops are of no use in decreasing it and secondly we are only beginning to understand the ecology of R.solani making it difficult to design control measures to beat it. What options do No-Till farmers have to combat Rhizoctonia?

The No-till farmer could just decide to live with Rhizoctonia and put up with the losses incurred. If the disease within the patches is very severe, the yield loss will be near to the area of patches as a percentage of the total crop. The patches with less severe disease will obviously have a lower percentage of crop loss and as the area of patches rises above say 5%, the less attractive this option becomes.

Cultivation still remains the most effective method of reducing damage caused by Rhizoctonia bare patch disease. However, this cultivation does not have to be a pre-sowing cultivation. A one pass cultivation and seeding operation is an effective method of reducing Rhizoctonia damage provided the soil is disturbed to about 10 cm. Cultivation doesn't destroy the pathogen though it does reduce its impact. Cultivation sets-back Rhizoctonia by breaking up its hyphal structure.

Unfortunately, evidence suggests that farmers who use a one pass seeding with no disturbance to the soil at depth, can expect to encounter increasing problems from Rhizoctonia. This is because this system of sowing has little or no effect on the fungal hyphae in the soil and consequently the pathogen is ready to attack as soon as a seed germinates.

South Australian researchers suggest that in there environment that a 2-3 week chemical fallow will markedly reduce Rhizoctonia. However, Western Australian experiments, using both long and short chemical fallows, have failed to show any benefits from these procedures. Our experiments have included a range of grass densities followed by short chemical fallows, varying lengths of short chemical fallows, combined with different times of sowing, and short chemical fallow versus the removal of only grasses or only broad leaf species from the pasture prior to cropping. None of these treatments had any effect on Rhizoctonia. Similarly, long chemical fallows, or the removal of grasses from the pasture for the entire growing season prior to cropping failed to have any effect, but of course this provides excellent control of Take-all.

Sulfonylurea herbicides like Glean, Logran and Ally can, under some circumstances, make Rhizoctonia bare patch worse. This is probably due to an effect on the plant rather than on the pathogen. In problem Rhizoctonia areas it may be wise to avoid use of these herbicides.

There have not been any varieties bred or discovered which have resistance. However, cereals do differ in their susceptibility to Rhizoctonia bare patch. Barley is more susceptible than wheat, which in turn is more susceptible than oats. Thus in Rhizoctonia prone areas, wheat would be preferable to barley.

Results from SA have shown that marginal deficiency in zinc will increase Rhizoctonia. This may be an effect on the pathogen as well as the host. Avoiding zinc deficiency should help reduce the effects of this disease. Anything that enhances the general health of the plant will in turn help the plant to cope with the disease. Things like adequate nitrogen and other nutrients, good weed control, and using the correct variety sown at the right time will reduce the effects of Rhizoctonia on the crop.

THE BURNING QUESTION

Bill Crabtree, Adviser (Esperance)

Do you intend to burn stubble this year? If so... why? Have you asked yourself ? You may not need to! What about changing your rotation or seeding machine or manipulating your stubble with sheep or metal? You may reply "what's wrong with burning stubble?" well, in some situations, perhaps not much. But burning stubble is an organic-fertility-option perhaps squandered. South Australians scientists, with their good understanding of biological soil fertility (as they have more researchers working in this area), have clearly demonstrated that there are many benefits of stubble retention (see Dr Gupta's article in this issue).

If you are into continuous wheat cropping, then you have no choice but to burn! Or do you? What about getting out of a very unsustainable rotation and planting a legume crop and then a wheat and a barley crop after that, or making it a legume:wheat rotation. The legume crop could change every other time for disease reasons. You would find the wheat would do far better in this rotation than as a continuous crop, your nitrogen inputs would be lower and the herbicide-resistance-risk lessened.

Stubble is a valuable organic-slow release fertiliser opportunity. Nitrogen, sulphur and phosphorus are three main nutrients that are cycled in this organic material, as well as others. Why destroy stubble for disease reasons in a wrong rotation or lack of machinery that can handle the stubble. There are other ways around this problem which make more sense to adopt than burning. I realise that few farmers would disagree with this philosophy, however, in practice together, we need to work at implementing these better systems - in some areas a suitable legume may be a challenge.

If seeding machinery is an issue then give some south coast farmers a ring and see what they have done! Also read Marshall's story in the last newsletter and mine below on 'The Perfect Seeding Machine' - lets beat these problems and avoid having to burn. It has been said that my views on the stubble handling issue are polarised - what do you think? Are they not just redressing the balance?

Farmer Section

MY MINIMUM AND NO-TILL SYSTEMS

Harry Williams (Nungarin)

My father who took up a block at Nungarin (a very dry area) in 1903. Some of his best crops were sown with a 24 disc drill, scarifying with the horses in front and seeding with a disc drill pulled by a cross-engine Case tractor, but with the advent of more weeds he changed to a new fangled combine (it seeded as it weeded).

About 30 years ago I felt that we could improve our seeding technique, so I built a 25ft seeder to pull behind a cultivator with its own light sowing tines. This was not a howling success and I spent some time working out why. The seed was often located in dry soil as mostly coarse dry soil fell around the seed. In the drought of 1969 we had trouble growing sheep feed after cropping. We lost most of our legumes and it seemed to take a year out of crop for the feed to come back.

So I built and experimented with a set of discs under our 40 ft dropper. This improved pasture growth the year after cropping, though sometimes I needed the dropper to put on urea at the same time as needing it for seeding. So I made a forty foot disc seeder which cut a slot for the seed to drop into with a flap on an angle to direct the dirt back in the groove. When I seeded after a rain the crop came up well but not so with drying topsoil. Since I was cropping mainly for sheep feed I wasn't too concerned about time of sowing and I would just sow for a day after each rain.

With our low rainfall we need to make the most of each rain and by creating a fluffy seedbed, seeding shallow and not packing it down, we are probably not making the most of our rain. So this year I fitted 2" cast iron points on tines fitting on our scarifier and sowed straight into uncultivated soil. I sprayed with a mix of Spray-Seed, Glean (6 g/ha) and trifluralin (800 ml/ha). Although the seed went a bit too deep the crops are looking good.

Considering the success of my No-Till approach and what I learnt at Morowa in July, I now intend having a high break-out tine and a 12 mm wide point digging fairly deep (like Ray and David Harrington's) and placing fertiliser. Behind will be a press wheel to help sow the seed 50 mm below ground level but only having a small amount of dirt covering the seed (like Graham Malcolm's at Morawa). The only thing that worries me is that the seed is being put onto loose and not firm soil.

When moisture is at a premium I will sow where the moisture is and apply a small amount of dirt on top of the seed. In the past we have had to seed a bit too deep so as to get the seed in moist ground, but the amount of soil on top of the seed was a problem. This new technique may prevent this depth problem.

We have been told for years by our learned friends that we were not doing the soil any good by too much cultivation, but when we tried we ran into problems that cost us dearly. Direct drilling has been as close as we have got while still coming out on the right side of the ledger. But now I am really excited that we may be able to overcome the problems that we have had before;

WEED CONTROL, ... GERMINATION .... & DISEASE!

THE NO-TILL STORY ON THE SOUTH COAST

Jim Baily (Wellstead)

As a consequence of the advent of technology to hasten the development of new land on the South Coast (starting in the mid 1950's), large machinery to clear the land and the use of trace elements to develop high producing pastures, large areas of land became available for cropping and pasture production.

It was soon realised that the ancient soils were very fragile, and the continuous working for either cropping or pasture development resulted in large areas of land becoming very unstable. Consequently the drought years of the early 1980's were given much publicity as to the damage that was being done to our new farming areas on the South Coast. Farmers had realised by this time that they were going to have to act or lose their land back to nature. It was fortunate that herbicide technology developed during the 1970's so that by the early 1980's we were able to use them. Also much of the land had been cleared sufficiently by this stage to make use of the technology.

In the early days, many farmers felt their way in this field. "Knockdown" herbicides, such as Spray-Seed", and Glyphosate, became available, and at a cost which was cheaper than passing over the land with a plough, as well as providing more effective weed control. It was then only necessary to work the land perhaps once and then seed (termed minimum tillage).

At the same time, there were farmers entering into the first stage of No-Till, being direct drill, by passing over the land only once with a combine seed drill. We were finding that by adopting these practises, yields were getting higher and the soil was becoming more stable. However, there were farmers who were still not 100% happy with these practices and by the 1990's were looking for other methods to seed their crops.

By this time the No-Till seeders had arrived - such as the Great Plains, (with double disc openers and press wheels), the John Deere Biomax, (now Forward No-Till with angled disc and press wheels), the Agrisystems Cross Slot, (a combination of disc and tine) and farmers' individual developments of the above combinations, or fitting narrow points to their existing machinery.

With the advent of these machines, stubble retention has become widely practised, resulting in retention of soil moisture and reduced wind erosion on continuously cropped soils.

The disadvantages of No-Till and to a lesser extent Min-Till are: having to use chemicals, a possible build-up of certain chemicals in the system, (however, trials so far indicate that this is not a problem in our environment), problems with the individual design of some machines (with the current disc machines, the control of Rhizoctonia bare patch whereas the tined machines can overcome this problem by cultivating below the seed).

While the advantages include: a reduction of wind erosion (to nil), a preservation of the above ground cover - whether it be stubble or sprayed pasture, a build-up of soil fauna and micro-fauna, an increased water holding capacity, a quicker recovery of pasture in the pasture phase, less fuel used and increased yields (mainly through improved time of sowing).

DOUBLE DISC - LESSONS LEARNT WITH AIRSEEDER

Geoff Tidow (Scaddan)

For two years I have sown most of my annual program (1800 ha) with Great Plains, double discs fitted under an airseeder. I farm north of Esperance in 430 mm rainfall and mostly on duplex soils. Most of my cropping program is No-Tilled into the wheat:lupin rotation, with some cereals into pasture. My pastures were cultivated this year prior to sowing cereals with double discs.

To make the double-disc openers work successfully in straw, there are a few things that I have had to get right first. I spread the straw and chaff out properly behind the header. Solid rows of straw and chaff cannot be completely cut through, and they cause uneven ripening of the crop in the next harvest. The length of straw does not seem to matter as we graze our stubbles with sheep.

When seeding the press wheel must be screwed back far enough to allow the double disc to slice deep into the soil (60-70 mm). This allows plenty of pressure to come to bear when they have to cut straw. The press wheel then comes along and presses dirt down in the furrow to give a coverage of 30 mm. To get it right we stop the tractor a few times and monitor the setup depth and make adjustments until we are happy that all the straw is being cut and that the seed placement is correct. Paddocks with wireweed and straw need more monitoring of cutting depth.

For sowing cereal into pasture I have a firmer setting on the press wheels so as to press the soil harder around the seed. We keep the paddocks friable with an early spray and this keeps the weed size small. I also tine-cultivate most of my pastures paddocks prior to cropping, except on very fragile or wind erodible sandy hills.

The Great Plains, performs well with properly controlled weed burdens or where small root structure exists, as this leaves the soil friable, without clods and ensures a good germination. I have found that 10 kph is a good seeding speed.