BSES Limited

FINAL REPORT – ENVIRONMENTAL PROTECTION AGENCY PROJECT

INNOVATIVE FARMERS IN THE HERBERT

by

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PR07001

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SUMMARY

Farming systems innovation has been taking place in the Herbert region since the early days of the sugar industry. During the 1960s and 1970s a complete change in the farming system took place with the implementation of mechanical harvesting. During the 1980s another change took place with the introduction of green-cane trash blanketing. From the 1990s the greatest change taking place is the tackling of yield-decline issues, based on improvements to soil health using a whole-farm system centred on reduced tillage, legume fallows and controlled traffic.

This project was developed to create a 'snapshot' of three different groups of growers at varying stages of implementation of the whole-farm system. It was considered that this would aid the adoption process through peer learning and group extension processes.

Eight growers committed themselves to trial various components of farming systems on their own farms and to give other growers in the district access to their properties to see the progress of these farming systems. The eight growers were divided into three groups depending on their level of adoption: Current Adopters, Mid Adopters and New Adopters.

All but one grower involved in the project reduced nitrogen inputs considerably. The one-year term of the project made it difficult to see changes in pesticide application, water quality or soil health, but the philosophy of the project has encouraged these to take place.

This project has served as useful extension tool in showing growers the different levels of adoption and the economic analysis done has further added weight to the argument that less is more in terms of cultivation and fertiliser inputs following a well-managed fallow legume crop.

What this project has proven is that each grower must decide for himself what components will work and what won't work, while all the time striving for a productive, profitable and sustainable future.

1.0 INTRODUCTION

Farming systems innovation has been taking place in the Herbert region since the early days of the sugar industry. During the 1960s and 1970s a complete change in the farming system took place with the implementation of mechanical harvesting. During the 1980s another change took place with the introduction of green-cane trash blanketing. From the 1990s the greatest change taking place is the tackling of yield-decline issues, based on improvements to soil health using a whole-farm system centred on reduced tillage, legume fallows and controlled traffic.

This project was developed to create a 'snapshot' of three different groups of growers at varying stages of implementation of the whole-farm system. It was considered that this would aid the adoption process through peer learning and group extension processes.

2.0 PROJECT OUTLINE

This particular project was designed to capture a snapshot of a small group of the industry's growers who are implementing, at various levels, the recommended whole-farm systems, incorporating the best practice of fallow cropping with modern-day principles of pre-formed beds, double-disc planters and controlled traffic on 1.8 m centres. The project was designed to increase the focus of cane farmers on practices that provide both environmental and economical benefits and to monitor the attitudinal changes taking place during the process.

A one-year project such as this is not enough time to fully implement the system, so this project was designed to fit in with the farming system work already being undertaken for the Herbert and provide a boost for adoption as well as a snapshot of the change process taking place. The feedback provided provides guidance on how further adoption of innovative best-management practices for farming systems can be improved into the future.

The five basic components of the farming system being implemented are:

- Fallow spray out;
- Well-managed legume fallow;
- Preformed beds for planting;
- Using a double-disc-opener cane planter;
- Controlled traffic (1.8-1.9 m preformed beds).

Growers were categorised into groups according to the number of the above processes they used.

3.0 NUMBER AND DETAILS OF GROWER GROUPS

Eight growers committed themselves to trial various components of farming systems on their own farms and to give other growers in the district access to their properties to see the progress of these farming systems. The eight growers were divided into three groups depending on their level of adoption:

- **Current Adopters**: Two growers adopting 5 of the farming-systems components;
- **Mid Adopters** - Three growers adopting 2 or 3 of the farming systems components;
- **New Adopters** – Three growers adopting 1 or 2 of the farming systems components.

For this project, the growers agreed to a set number of processes, including allowing their activities to be published, and also agreed to attend various training courses such as the 'Six Easy Steps' nutrition program, ProGro (farm productivity assessment) and the COMPASS workshops. A formal sign-off process was also used prior to the start of this project. Table 1 lists the eight growers involved in the project and their participation in the various programs that were required for this project.

Table 1 Growers' involvement for the project

Grower	Group	Signed Letter	Paddock Book	Completed Survey	Nutrient Management Course	ProGro	COMPASS
Alan Poggio	Current Adopter	✓	✓	✓	✓		✓
Norm Reid	Current Adopter	✓	✓	✓	✓	✓	✓
Fred Gangemi	Mid Adopter	✓	✓	✓		✓	✓
Vince Russo	Mid Adopter	✓	✓	✓		✓	✓
Michael Waring	Mid Adopter	✓	✓	✓	✓		✓
David Carr	New Adopter	✓	✓	✓	✓	✓	✓
Ross Gangemi	New Adopter	✓	✓	✓		✓	
Matti Kangas	New Adopter	✓	✓	✓	✓	✓	✓

Seven of the eight growers attended a meeting on 16 of March 2006, at which time they participated in a group discussion on various aspects of new farming systems. Their feedback was recorded so that it could be used for the publication of draft best-practice booklets. They were contacted by the agricultural economist and made aware of the kinds of records they needed to keep in their Paddock Journals in order to make valid comparisons with the various farming systems they were trialling.

3.1 Group 1 - Current Adopters – adopted 5 components

This group consisted of two growers - Norm Reid and Alan Poggio.

Norm Reid has adopted all five components of the system, a process that began in 1999. It, therefore, became important for Norm to seek a new level of work within this project and the decision was made to establish a trash-management trial on his farm. This was to assist in the setting up of preformed beds, where excess trash residue made them difficult to prepare at times.

It was expected that Norm Reid's trash-management trial would demonstrate to growers that there are alternatives to the practice of burning trash prior to establishing preformed mounds. By using a small amount of urea fertiliser to speed up the natural breakdown of cane trash, growers can avoid the dangers associated with cane trash fires and gain the benefits of the lower soil-erosion risks that occur when trash is left on sloping soils over the wet season.

Alan Poggio is a relatively new grower and had developed his farming systems along the lines of the whole-farm system with all 5 components. One of the key drivers for Alan is his off-farm work as a medical practitioner - this allows him limited time to operate the farm with his brother who is also a full-time professional and works off farm. The farming system used needed to be set up for the most efficient allocation of resources and the use of contractors is heavily relied upon. Alan wished to see the economic advantages of a double-disc-opener billet cane planter, drilling directly into preformed mounds. This was the first time that Alan has established preformed mounds prior to the wet season.

The farming system being trialled by Alan Poggio was expected to demonstrate the long-term advantages of establishing and maintaining preformed mounds on a controlled-traffic system. Growers would see that it is possible to improve the timeliness of farming operations, such as planting, harvesting, fertilising and weed control, where there is always a highly trafficable area of the field for machinery to drive on.

3.2 Group 2 - Mid Adopters - adopted 2-3 components

This group consisted of three growers:

- Fred Gangemi set about establishing a preformed-mound trial;
- Michael Waring compared strategic tillage with conventional planting - planting on preformed mounds with a double-disc planter;
- Vince Russo assessed the merits of minimum tillage.

Fred Gangemi's preformed-mound trial was set up to demonstrate to growers and sceptical harvester contractors that there are both economical and environmental long-term benefits to be gained from a controlled-traffic farming system. Some growers are not committed to planting cane on a 1.8 m row spacing, so a compromise mound-planted treatment with row spacing of 1.65 m was part of this trial – it also compared 1.8 m mounds with 1.65 m conventional planting. Fred utilised preformed beds, and a double-disc planter on 1.8 m.

Michael Waring and Vince Russo also set out to demonstrate the economic and environmental advantages of strategic or minimal tillage. The aim of these trials was to prove to growers that it is not necessary to make multiple passes with machinery over every part of their cane field in order to prepare land for planting. Both used pre-formed beds with a double-disc planter.

3.3 Group 3 – New Adopters – adopted 1-2 components

This group also consists of three growers - David Carr, Ross Gangemi and Matt Kangas. The New Adopters represented the type of growers that are the target group for future extension work to promote industry best-management practices.

David Carr established a trial to compare conventional fallow management with a legume fallow. It is anticipated that this trial will demonstrate the economic and environmental advantages of spraying-out cane with herbicide and then using the existing preformed mounds to grow both a fallow legume crop and the next new cane crop.

Ross Gangemi was to compare conventional planting at 1.63 m with mound planting at 1.63 m. Ross was unable to continue in the project due to commitments in his harvesting business.

Matti Kangas set out to demonstrate to growers that after growing a good legume fallow crop it is possible to employ minimum-tillage techniques that have economic and environmental advantages. Matti grew peanuts commercially for 4 years, so he understood the benefit of a well-managed legume crop.

4.0 INNOVATIVE BEST PRACTICES ADOPTED

The project focused on the five farming practices that in the Herbert make up the whole-farm system:

- Fallow spray out;
- Well-managed legume fallow;
- Preformed beds for planting;
- Using a double-disc-opener cane planter;
- Controlled traffic (1.8-1.9 m preformed beds).

Table 2 shows which practices have been adopted by the growers.

Table 2 Summary of growers' practices

Grower	Fallow spray out	Fallow legume	Pre-formed beds	Double-disc planter	Controlled traffic	Group
Alan Poggio	*	*	*	*	*	Current
Norm Reid	*	*	*	*	*	Current
Fred Gangemi	*		*	*	*	Mid
Vince Russo	*	*				Mid
Michael Waring	*					Mid
David Carr	*	*	*	*	*	New*
Matti Kangas	*	*				New

David Carr adopted all 5 components in the first year, so was classed as a New Adopter.

4.1 Fallow spray-out

Traditionally, the old sugarcane crop at the end of its crop cycle would be ploughed out. This all changed in the late 1990s when the price of diesel rose and the price of broad-spectrum knockdown glyphosate-based herbicides dropped. For many years the glyphosate products were known to be effective in destroying old, unwanted cane crops, but the cost was prohibitive. Since 2000, considerable work has been done on the rate and timing of glyphosate product application to remove old cane crops. The advantages of spraying out over ploughing are:

- Reduced fuel usage;
- Reduced chance of soil erosion during wet season as the old crop stubble remains in paddock to bind soil;
- Glyphosate products remove germinated weed plants, reducing the seed bank of weeds of the subsequent crop - this leads to potential reductions in use of herbicides during the next crop's lifecycle.

4.2 Well-managed legume fallow

Legume fallows are very well established in the Herbert, and since the 1930s a selection of legumes has been unavailable for fallow cropping. However, the concept of a 'well-managed' legume fallow differs from traditional methods. Traditionally, growers have tended to put a crop of Meringa cowpeas in after the cane has been removed. Meringa cowpeas are a low-maintenance crop, but the incidence of weeds through the crop and also the chance of root disease destroying the crop in heavy rainfall are common occurrences. Well-managed refers to the practice of planting the legume in rows or beds, and/or using pre-emergent herbicides to manage weeds, and making sure the soil pH is at an appropriate level for legume growth (above 6.0).

Meringa cowpeas are being replaced by Leichhardt soybeans, a proven performer in wet condition, but best established on preformed beds with a predetermined and consistent planting depth to aid germination.

Instead of ploughing the legume crop in, the preferred option is to spray it out with either glyphosate or paraquat, and allowing the nitrogen and organic matter to be released slowly into the system.

4.3 Preformed beds

Preformed beds arose out of the need to establish cane in wet country, above the moisture after heavy rainfall. As the farming system has developed, the beds have been adopted as a cost-saving measure, meaning the same bed the legume grows in can be used for the next sugarcane crop. This potentially reduces both the fuel usage and time taken to establish the next crop, while the nitrogen fixed by the legume crop is not distributed by cultivation. In the early years of this work, cultivation was used to remove legume crops, but it was found the nitrogen would move down the soil profile and often be out of reach of the newly established cane crop.

4.4 Double-disc planters

Double-disc platers were a feature of several BSES projects in the mid 1990s, and were adopted from the cotton industry. The double-disc planter involves slicing a thin slice of the soil, laying the cane billet in place, and shallowly covering with soil placed over the billet and pressed down by press wheels. It achieves good soil-billet contact, while still allowing enough room for soil gases. The system relies on smaller inputs of energy, therefore smaller machinery, but it is heavily reliant on a well-shaped bed formation and pre-emergent herbicides.

This is vastly different to conventional planting, which involves moving large quantities of soil, placing the billet at the base of a furrow and filling it up again in the same movement with a tyne planter. This requires far more energy and disturbance of the soil.

4.5 Controlled traffic

This has been the most difficult part of the system to have adopted, but is the simplest. It basically follows the principle of matching the machinery to the crop profile. Traditionally, cane was planted on 1.4 m, following horse-drawn implements. When the tractors became available, this was moved out to 1.5 m. The early mechanical harvesters matched the 1.5 m row profile.

However, through the 1980s as harvesters became larger and more powerful, the trend was to move out to 1.8-1.9 m machinery width. Meanwhile, the crop profile only moved out to 1.52-1.6 m. In 1997, a concerted effort was made to move the industry out to 1.8 m widths, but with the suite of varieties available at the time, one row of cane could not produce as well in the plant crop. Therefore, the use of two rows came into being - called ‘dual rows’. The move since 2004 has been to concentrate on either one to two rows on 1.8-1.9 m widths so that the crop matches the harvester and holdouts. When the crop width matches the machinery width, it is termed ‘Controlled traffic’.

5.0 OUTCOMES

5.1 Group 1 - Current Adopters

5.1.1 Trash-management trial

A trash management trial was established on Norm Reid’s property. Norm has observed that the establishment of preformed mounds prior to planting sugarcane requires a significant cultivation cost after green-cane trash-blanket harvesting. Large quantities of residual cane trash need to be incorporated into the soil prior to bed forming and planting.

A replicated trial was established to test three different trash-management strategies. Treatment one involved leaving the trash to break down naturally then using discs to cultivate the trash into the soil just prior to planting. Treatment two involved the use of a boom spray to apply a solution of urea at 6 kg/ha over the top of the trash 2 months prior to

cultivation. Treatment three was the same as treatment one, with the addition of raking the trash into windrows and burning it prior to cultivation.

It was hoped that this trial would demonstrate to growers that there is no need to burn trash prior to bed forming and planting with double-disc-opener planters. *This will reduce the risk of soil loss from erosion and improve soil health.* This site was then included in the on farm visit program as part of the projects communication strategy to demonstrate to growers that there are alternatives to the practice of burning trash prior to establishing preformed mounds. By using a small amount of urea fertiliser to speed up the natural breakdown of cane trash, growers can avoid the dangers associated with cane trash fires and gain the benefits of the lower soil erosion risks that occur when trash is left on sloping soils over the wet season.

Figure 1 **The trial site was established on a sloping cane field that was harvested late in the season and had insufficient time to allow the 16.5 t/ha of residual dry matter to break down prior to cultivation. Raking and burning would be the normal method of management.**

Figure 2 **Sub samples were collected prior to application of the urea spray treatment to assess the effectiveness of the change in farming practice in breaking down cane trash.**

Figure 3 **A second set of sub samples was collected prior to burning and cultivation to determine the level of cane trash break-down.**

Figure 4 **Part of the field was raked and burnt prior to cultivation.**

Figure 5 **The soil on the left of the picture had the trash burnt prior to cultivation. The right side shows where untreated trash was cultivated directly into the soil.**

Figure 6 **The soil on the left of the picture had the trash treated with urea 2 months prior to cultivation. The right side shows where the trash was burnt.**

Figure 7 **Cultivation of the entire block occurred on 7 June 2006 using off-set discs.**

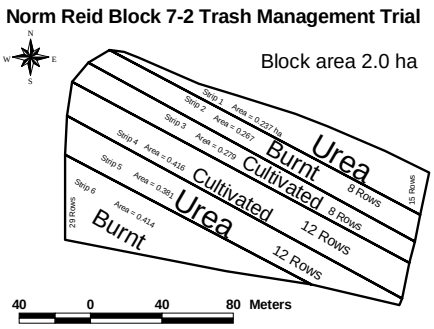

Figure 8 **The trial design was blocked to give three treatments and two replicates.**

Prior to establishing the trial an assessment was made of the level of trash in the field. Sub sampling indicated that there was 16.5 t/ha of dry matter. After 2 months this had broken down to 7.9 t/ha where the urea had been sprayed and 10.7 t/ha in the unsprayed sections

(Figure 9). Cultivation of all treatments occurred on 7 June 2006. Records of input cost were kept for economic analysis.

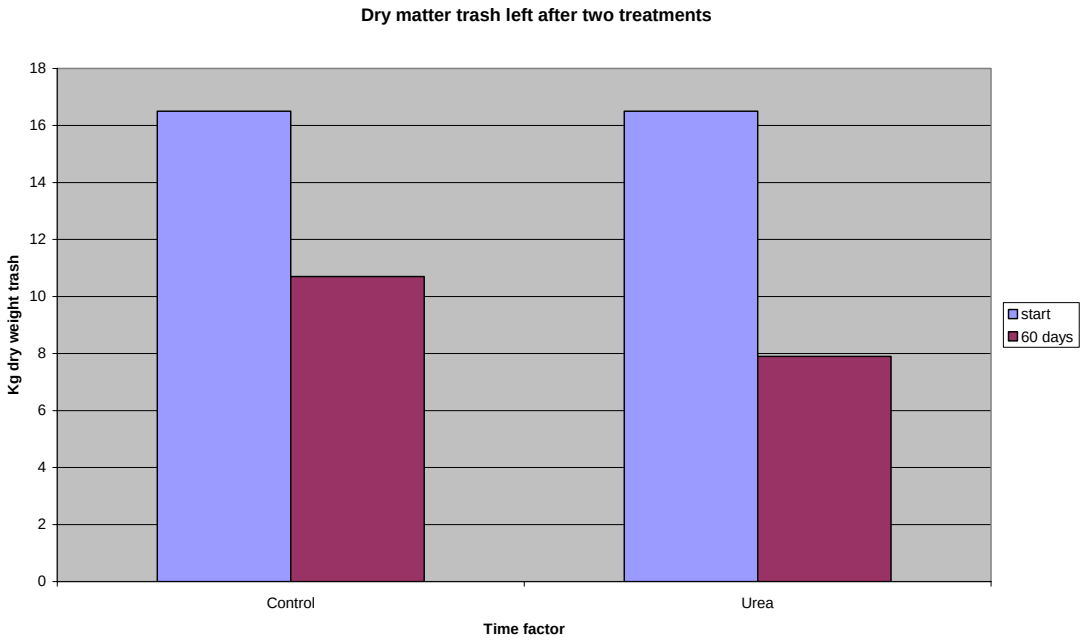

Figure 9 Amounts of trash remaining in are treated or not treated with urea.

The impact of the treatments on yield will be assessed at the 2007 harvest.

Burning trash to make laser levelling possible in the shortest possible time frame, when the window of opportunity is always small for Herbert growers with the weather patterns experienced, is a practice that is discouraged due to loss of carbon from the system. Deep ploughing is another alternative recommended but this process utilises considerable energy, ie fuel.

The use of urea sprayed over the trash to facilitate decomposition of trash has proven to be somewhat effective. It has sped up the decomposition of trash that is simply left to natural processes of decommission by approximately 30%, but in terms of the amount of trash removed, burning or deep ploughing are still the best options. Certainly from an environmental point of view, the application of urea is a far better option, but the amount of trash left after 60 days is potentially still enough to make laser levelling difficult. Further work needs to be done in this area.

5.1.2 Economic analysis of whole-farm system

Alan Poggio is a new grower to the industry, having trained as a medical doctor but always wanting to take on the family farm. He is in partnership with his brother and has adopted the whole-farm system, including the use of preformed beds on 1.83 m centres, legume fallow crop and GPS guidance for planting with a double-disc planter operated by a local contractor largely due to time factors.

For this process Alan's operation was classed as current adopter because all facets of the systems have been implemented and are being assessed.

Figure 10 shows the gross margins of Alan's farming system in comparison to conventional systems grown at the same time.

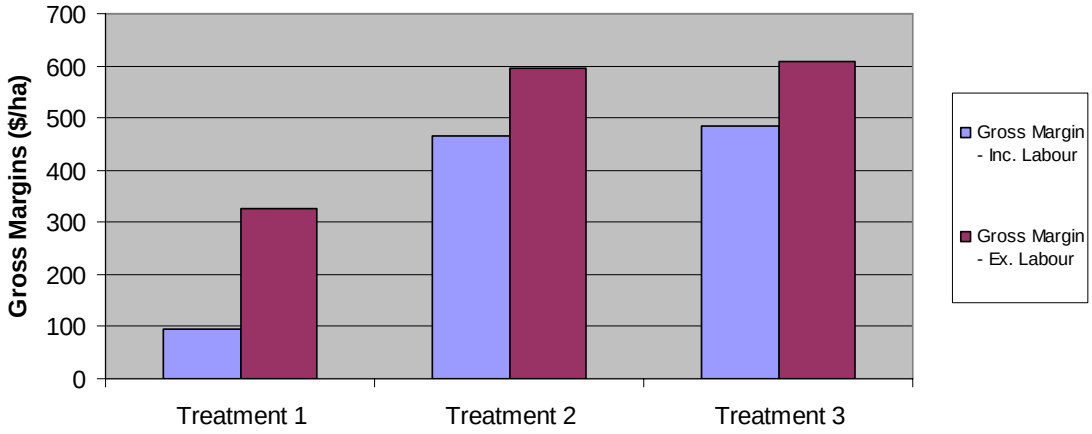

Figure 10 **Comparison of gross margins. Treatment 1= Conventional 1.5 m after fallow crop but no beds and no double-disc planter; Treatment 2 = Controlled traffic but one row of cane not two; Treatment 3 = complete use all of all five components of the new farming system.**

These comparisons show that implementation of all five components of the system have paid dividends for Alan. The other advantages of time utilisation and improved soil health will have benefits as time progresses.

This trial was also invaluable as an extension tool, with three bus tours organised over the last 12 months to look at the operation and discuss the economic factors.

Alan will continue to operate his farm under the five farming systems principles until the end of the crop cycle and will make an assessment based on net income and the amount of time the system has saved to allow him off-farm work.

5.2 Group 2 – Mid Adopters

5.2.1 Preformed-mound trial

A trial was established on Fred Gangemi's property to assess the economic merits of using preformed mounds for planting. This involved the establishment of a replicated strip trial with three treatments. Treatment one was a single row preformed mounds at 1.8 m centres, treatment two was single rows of preformed mounds at 1.65 m centres and treatment three was conventionally planted single rows at 1.65 m centres.

Fred established the preformed mounds for half of this trial on 13 February 2006. However, heavy rainfall and the prolonged wet season delayed the completion of bed forming and the commencement of planting.

Fred was able to prove the benefit of having a preformed-bed planting in 2006 with wet unseasonal weather occurring soon after. The cane strike was very good in the preformed beds and this crop will be harvested in 2007 for yield data.

Figure 11 Land preparation for this trial commenced with cultivation with a square plough.

Figure 12 Secondary cultivation was achieved with off-set discs and a roller.

Figure 13 Preformed mounds were established using a single-row bed former.

Figure 14 Weeds and volunteer cane plants were sprayed with herbicide after the wet season

5.3 Group 3 – New Adopters

5.3.1 Fallow-management trial

David Carr established a fallow-management trial on his property to assess the benefits of growing soybeans as a break crop. The trial compares a soybean fallow with a cultivated-grass fallow.

Treatment one involved the direct drilling of soybean seeds into cane trash after the cane had been sprayed with herbicide. No trash was removed and the existing preformed beds were left undisturbed so that they could be reused for planting with a double-disc-opener planter. Treatment two involved the destruction of the existing cane plants with conventional ploughing prior to the onset of the wet season. Existing grass seeds were allowed to germinate and form a grass fallow for the duration of the wet season.

Figure 15 **This picture shows the conventional grass fallow on the left and the zero-till direct-drill soybean fallow crop on the right. No sign of the old preformed mounds can be seen in the conventional grass fallow. In addition, the grass fallow had very good control of volunteer cane plants.**

Figure 16 **This picture shows one of the challenges faced by growers wishing to reuse old preformed mounds. A significant number of volunteer cane plants were able to survive in the soybean crop. Good control of volunteer cane plants is essential for sugarcane disease-control programs.**

It is hoped that this trial will demonstrate the advantages in soil health that can be obtained from both the repeated use of existing preformed mounds, and the increased level of soil nitrogen with a fallow crop of soybeans. It is also hoped that economic advantages can be gained with the reduced cultivation costs where old preformed mound are reused for a second crop cycle.

David has immediately seen the benefits of the system due to his off farm work load meaning he has far less time to cultivate than his father had in years past. The use of fallow-spray out was widely used in this farm before David took it over, but the use of controlled traffic was not, and despite David adopting all five components in one year, he is still classed as a newly adoptee because this is the first year of his operations. David is producing a healthy crop, while working off farm because the fully implemented system allows minimum time input, while also the use of legumes allowed a lower nitrogen rate to

be used in plant cane. Further economic analysis will be done on this operation after harvest 2007 when yield date is available.

6.0 OUTCOMES

6.1 Fertiliser application improvement

In the case of Norm Reid (a Current Adopter), there was little change in fertiliser practice, as he began reducing his nitrogen inputs in 2000 following the first implementation of this system. Norm was also part of a previous BSES project that looked at reducing nitrogen rates to cane land (BSS164 Nutrition management in Queensland catchments).

In the case of Fred Gangemi (Mid Adopter), the use of a legume fallow crop has allowed him to reduce his nitrogen inputs significantly in the plant crop of 2006. In the case of David Carr, a similar use of legume crops allowed a reduction in nitrogen as top dressing in the plant-cane system.

Figure 17 shows this trend over the 2006 year.

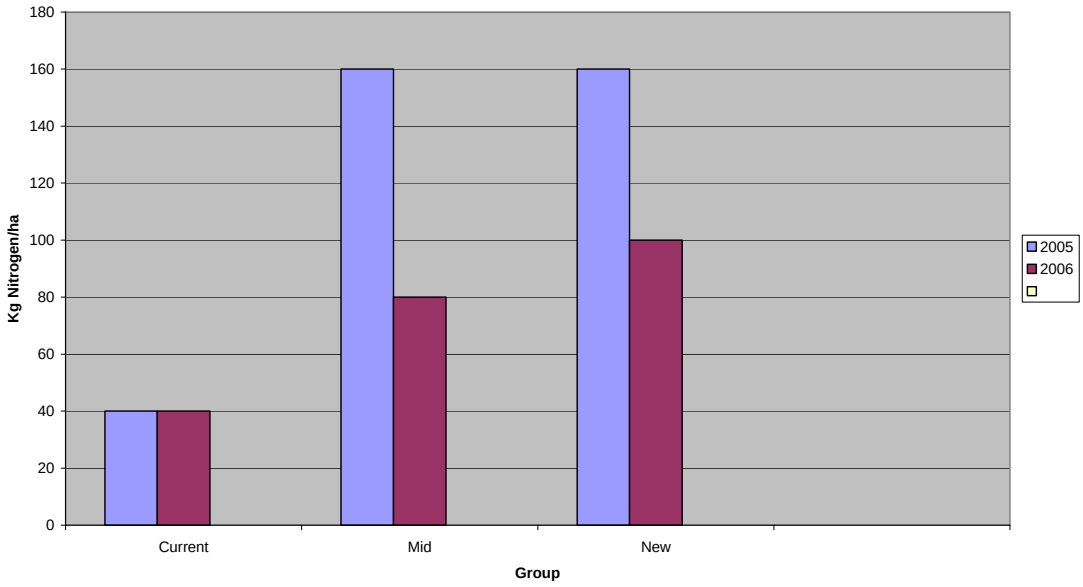

Figure 17 Reduction in nitrogen use in 2006 from the 2005 crop.

While this project ran for one year only, clearly it has had some impact on the fertiliser rate usage of mid and new adopters who have seen the benefit of a well-managed legume fallow. For the two Current Adopters, fertiliser practices were altered accordingly. Both Norm and Alan incorporate a well-managed soybean fallow crop that provides adequate nitrogen for them to apply only plant mixtures and no top-dressing of urea at planting. This is a practice they had established for several seasons prior to the project, hence little or no change in

their fertiliser practices. In Alan's case he has followed the fertiliser programme commenced when this system was implemented by his father three seasons before and is based on using soil and leaf analysis.

For the Mid Adopters, two of the three growers used a fallow legume crop. One used soybean (Michael Waring), whilst the other (Vince Russo) used Meringa cowpea. In both cases, a reduction in nitrogen application as top dressing was possible.

For the New Adopters, both David Carr and Matti Kangas used a fallow legume crop. Matti Kangas is a former peanut grower as well as sugarcane producer, so the concept of legume cropping was well established in his farming systems. Both growers were able to reduce nitrogen inputs considerably after a fallow legume crop.

In summary, all but one grower involved in the project reduced nitrogen inputs considerably.

6.2 Pesticide application improvements

There has been little or no chance for pesticide application trends to be studied during the life of this project, simply because the only pesticides used in plant cane are Lorsban® at planting, at a set rate of 1.5 L/ha and, if canegrubs are an issue, the controlled-release insecticide suSCon® Maxi was used.

For the growers who used the bed formation and double-disc-planter concept the application of Lorsban at planting was much the same as for conventional farming systems. However, the lack of disturbance of the soil biology is believed to eventually lead to a balanced soil fauna, which in theory should make less reliance on pesticides. This, however, is a long-term benefit yet to be proved commercially and beyond the scope of a 1-year project.

6.3 Soil-health effects

Once again, a one-year project is not long enough to validate any claims of an improvement in overall soil health through the use of reduced tillage, preformed beds, fallow cropping, etc. However, the wide-spread belief is that this will certainly occur over time. In Norm Reid's case, where the farming system has now been employed for eight seasons, there has been a marked improvement in soil structure, and a greatly reduced fertiliser input.

6.4 Water-quality effects

Reduced fertiliser input reduces any chance of off-site impacts. The use of green-cane trash blanketing has been standard in the Herbert for over 20 years now, and incidences of soil erosion are very rare.

An SRDC-funded water quality project has now been operational in the Herbert for 1 year and, as the results of this are published, greater understanding of the farming systems influence on water quality can be determined.

7.0 PLANS FOR DISTRICT-WIDE ADOPTION

The communication plan for this project follows the same principles as all extension work in the Herbert - A multi faceted approach based on:

- On-farm visits, mini field days and bus tours;
- Newsletters;
- Radio interviews;
- Email updates of results;
- Newspaper articles;
- Newsletter articles;
- Word of mouth;
- Field days;
- Other demonstrations.

All of these processes have been utilised throughout the life of this project.

The economic analyses done for the current adopters will be disseminated at the April 2007 Herbert River field day, where farming-systems work such as this project will form part of the displays for the day.

Economic drivers are now operating which are increasing the adoption of innovative best-practice farming as outlined for this project. This project has served as useful extension tool in showing growers the different levels of adoption and the economic analysis done has further added weight to the argument that less is more in terms of cultivation and fertiliser inputs following a well-managed fallow legume crop.

Plans to increase adoption of the overall farming system form part of the local BSES-HCPSL work plan as the industries continues to improve practices towards a profitable, productive, sustainable future.

8.0 FARMERS' ATTITUDINAL CHANGE

The eight growers were surveyed at the beginning and end of the project to asses their attitude to the five adopted farming practices. The survey that was taken at the beginning of the project in March 2006 asked the growers to rate their attitude to the five farming practices at the time of the survey and also rate what their attitudes would have been to these practices in 2004 and 2001. The final survey was taken in February 2007. In both, growers were asked to use a rating scale of 1-10, with 1 being very negative and 10 being very positive, to complete the two surveys.

Figure 18 shows the survey results for fallow spray-out. The results appear to be disappointing, as the average score for this practice has fallen from 8.75 in 2006 to 7.6 in 2007. Growers gave two main reasons for their slightly reduced confidence in this practice. Firstly, a late end to the crushing season and a good wet season resulted in cane blocks that were scheduled for spray-out being too wet to drive on. Secondly, one of the current

adopters has abandoned fallow spray-out on his farm to ensure that all of his preformed beds have been constructed before the wet season begins.

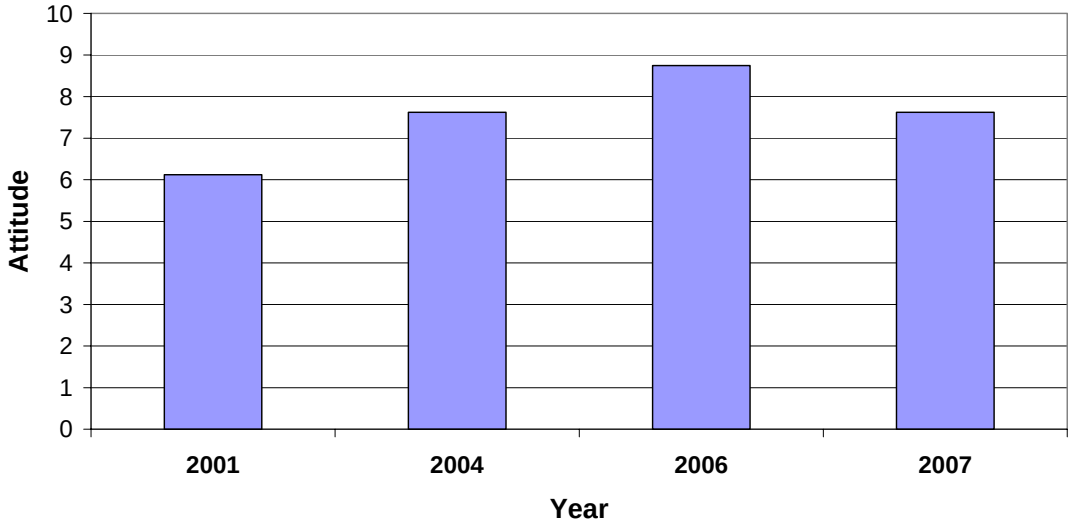

Figure 18 Attitudinal change of eight Herbert growers towards fallow spray-out.

Figure 19 shows the survey results for well-managed legume fallows. Growers continue to see the importance of breaking the monoculture of sugarcane and scored this at 8.75 in both 2006 and 2007.

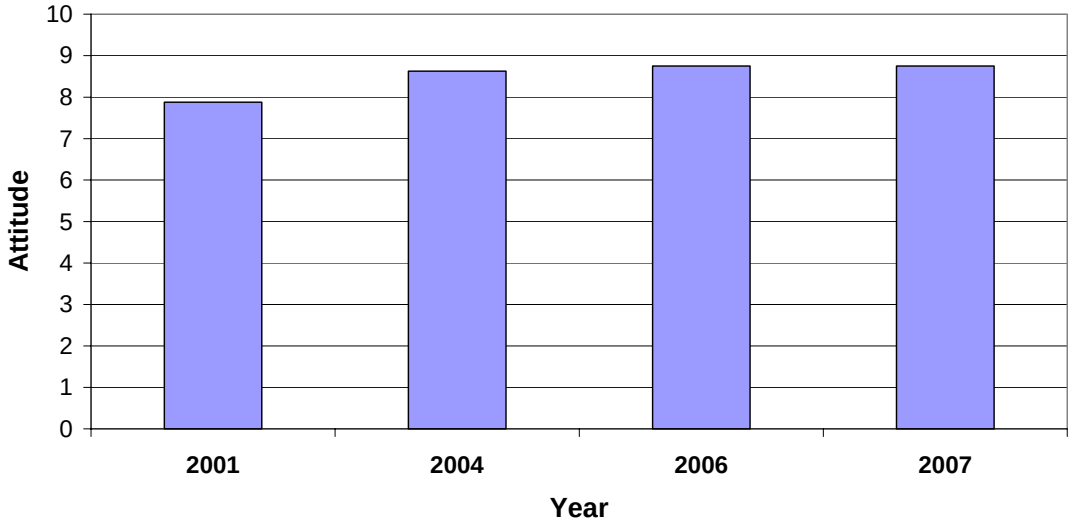

Figure 19 Attitudinal change of eight Herbert growers towards well-managed legume crops.

Figure 20 shows the survey results for preformed beds. The score for 2007 of 7.6 was slightly lower than the 2006 score of 7.75. This reflected the difficulty and frustration

experienced by one grower who initially tried to form beds before the wet season but was delayed by wet weather.

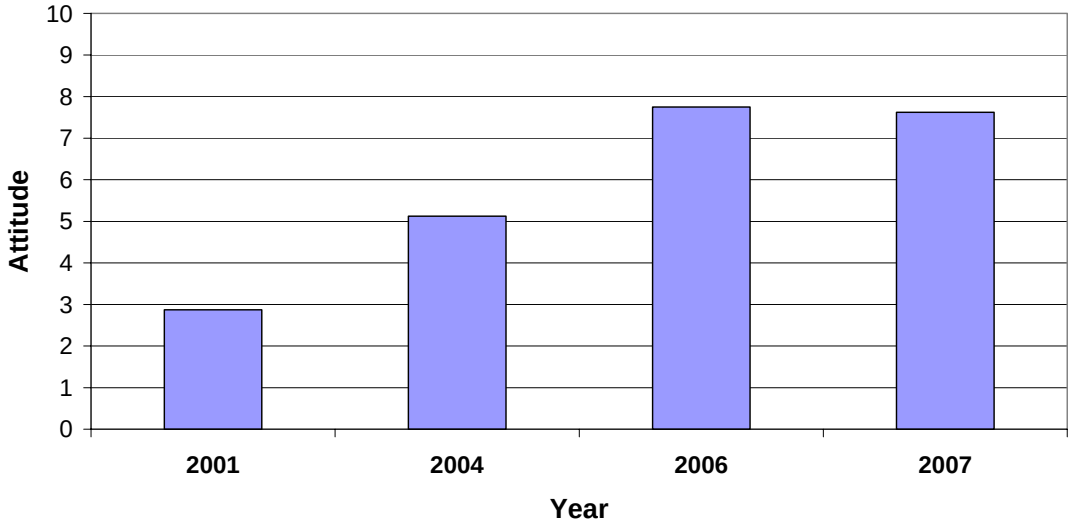

Figure 20 Attitudinal change of eight Herbert growers towards preformed beds for planting.

Figure 21 shows the results for double-disc-opener planters. Growers continued to see the benefits of changing to this new technology.

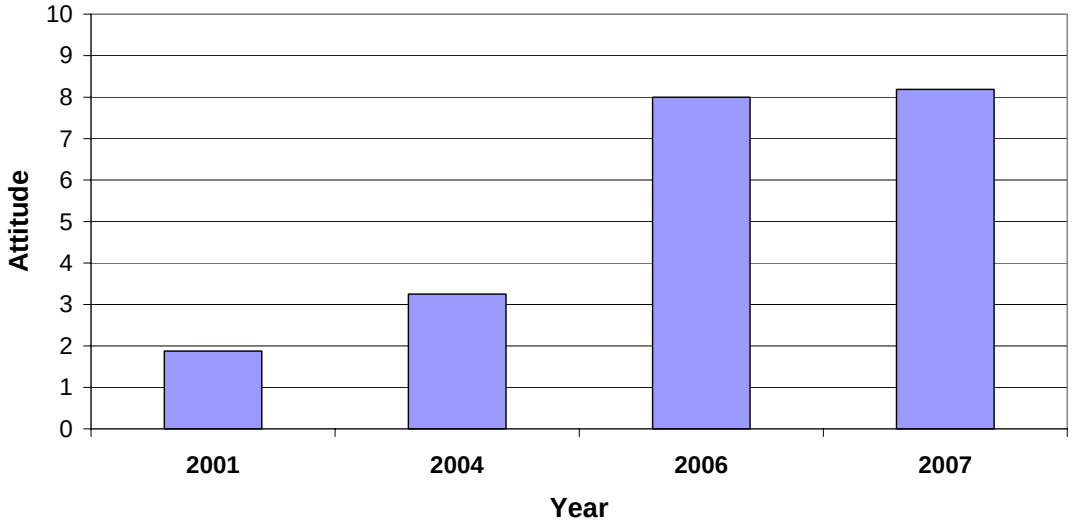

Figure 21 Attitudinal change of eight Herbert growers towards double-disc-opener planters.

Figure 22 shows the results for controlled traffic. The 2007 score of 7.625 was slightly higher than that of 7.5 for 2006. Growers see the advantages of this farming practice and are cautiously embracing it.

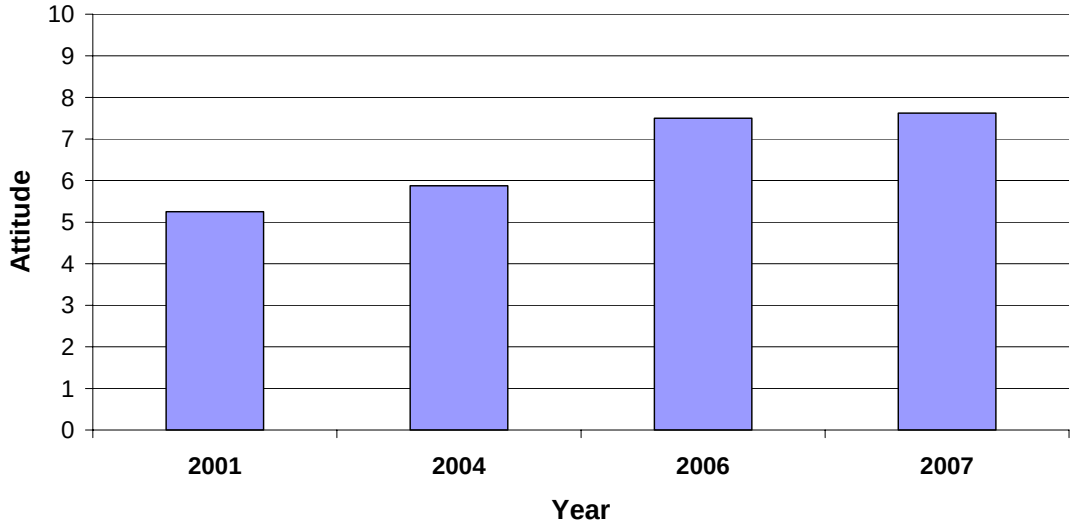

Figure 22 Attitudinal change of eight Herbert growers towards controlled traffic.

9.0 EXTENSION

Articles and case studies have been/will be prepared and published in the following industry magazines and newsletters.

BSES Bulletin

July 2006	Story on project and one of the practices being adopted.
October 2006	Case study on benefits of adopting new practice

EPA Compass magazine

August 2006	Story on project and one of the practices being adopted.
October 2006	Case study on benefits of adopting new practice.

Case study

October 2006	Case study prepared in conjunction with DPI&F-BSES FutureCane. Field day with outside growers invited.
September/October	Visit to Tully industry to view new innovations. Media story for local papers prepared.

Australian Canegrowers Magazine

December 2006 -	Story on project and outcomes- grower testimonial.

10.0 CONCLUSIONS

This project set out to define different rates of adoption of the farming system and give some analysis of its effects. This was obviously difficult to do in one year only. However, by looking at different variants of the farming system greater understanding has been gained as to the constraints to adoption and the variables of adoption possible in the Herbert.

The snap shot of adoption has proven to be a wonderful extension tool and has been widely used for farm visits and shed meetings.

The rate and type of adoption of farming systems depends on the situation each grower is faced with, as well as the climatic conditions at hand, the availability of legume crop seed and machinery use.

As more and more contractors begin to adopt the double-disc-opener system complete with guidance systems and the use of preformed beds grows in popularity, the adoption of all five components of the new farming system is expected to rise dramatically over the next few seasons.

What this project has proven is that each grower must decide for himself what components will work and what won't work, while all the time striving for a productive, profitable and sustainable future.