

Liebe Group Spring Field Day survey report 2010

*Grower attitude and practices regarding climate
variability and soil health*

**Nadine Hollamby (Liebe Group)
Roy Murray-Prior (Curtin University)**

**Report to GRDC as part of the 'Improved stubble and soil management practices for
sustainable farming systems in the Liebe area' project
March 2011**

Executive summary

This report contains the findings of a survey of growers' attitudes and practices towards climate change, soil amelioration, soil organic carbon and fallow options. The survey was of 80 farmers attending the Liebe Group Spring Field Day on 9th September 2010. The results, in conjunction with previously collected data, has formed a baseline from which the GRDC funded and Liebe Group administered project '*Improved stubble and soil management practices for sustainable farming systems*' in the Liebe area will be evaluated. A concluding survey will be conducted in September 2012 to evaluate how successful the project was at increasing grower knowledge of soil health and adoption of associated practices.

Forty percent of growers believe climate change is occurring, but fewer (30%) believe that human activity is the cause. Soil acidity and non wetting soils are of major concern to Liebe growers. Three quarters of the growers surveyed have sub soil acidity and 50% of growers have non wetting soils. Methods for effectively ameliorating non wetting soils are unclear and growers have trialled techniques such as spading, furrow sowing and claying over a third of effected land. Thus it was concluded that more research, development and extension is needed in this area. Seventy-five percent of growers surveyed think farm management practices can influence soil organic carbon, however only 20% of growers have a soil organic carbon target they are aiming to achieve. Fallowing - leaving paddocks for grazing, a tactical winter fallow or a strategic winter fallow - is undertaken by 75% of surveyed recipients.

Contents

Executive summary	iii
Contents	iv
List of tables	iv
List of figures	iv
Introduction.....	1
Methods	1
Results	1
Use of fallow.....	1
Soil organic carbon	2
Climate change/ seasonal variability	2
Soil amelioration	3
Gypsum.....	3
Lime	4
Non wetting soils.....	4
Implications for Research, development and extension	5
Conclusion	5
Acknowledgments.....	6
Appendix A:	7
Appendix B: Spring Field day 2010 Questionnaire.....	8

List of tables

Table 1: Fallow practices in the Liebe district	2
Table 2: Farm management practise that growers believe increases soil organic carbon	2
Table 3: Methods growers use to diagnose a paddocks gypsum requirement.....	4
Table 4. Comparison of liming rates for farmers with and without sub soil acidity (\pm Standard deviation).....	4
Table 5: Techniques used by growers in their attempt to overcome non wetting soils ..	5
Table 6: Grower's rating of the importance of overcoming sub soil acidity and non wetting sands in order to improve the farming system	7
Table 7: Management practices used by growers to combat seasonal variability.....	7

List of figures

Figure 1: Liebe grower beliefs about climate change, September 2010	3
---	---

Introduction

This study was undertaken to help identify the research, development and extension priorities of the Liebe groups' members with regard to soil amelioration, soil moisture conservation and climate change. These agronomic topics are the focus of the GRDC funded project '*Improved stubble and soil management practices for sustainable farming systems in the Liebe area*' and this survey (in collaboration with other data) will form the baseline from which the project is evaluated. This survey was primarily designed to fill in the gaps in data from a survey the Liebe group conducted in 2008.

The growers surveyed are predominantly mixed crop and livestock producers in the Northern Agricultural area of Western Australia. A majority of the respondents are from the Coorow, Dalwallinu, Perenjori and Wongan-Ballidu shires.

This survey will be repeated at the forthcoming 2012 Liebe Spring field day so that the comparisons can be made and progress monitored.

Methods

Surveys were handed out to farmers attending the 2010 Spring Field Day which was held East of Maya on 9th September 2010. Eighty surveys were returned, but because in some cases multiple members of the same business answered the survey, so subsequently only one response was counted and not all of these questionnaires were complete. In all, usable responses ranged from 81 to 35 depending on the question. The survey consisted of 11 questions on two pages with the first 5 questions being demographic and other questions relating to purposes of this report (see Appendix B).

The remaining questions covered 3 main topic areas:

- Fallow and soil carbon
- Soil amelioration, in particular soil acidity, gypsum application and non wetting soils
- Attitudes to climate change.

The questions were open ended, yes/no and rating scale questions. Results were compiled and analysed in Microsoft Excel 2007.

Results

Use of fallow

Of the farmers surveyed 75% said they undertook fallowing. Of the growers who fallowed, 46% are using tactical spring fallowing and 22% are using strategic winter fallowing. While tactical Spring fallow is undertaken by more farmers in terms of numbers, the total area of tactical spring fallow (14,300 ha) is less than the area for strategic winter fallow (20,500ha) (Table1).

Table 1: Fallow practices in the Liebe district

Fallow practice	Total Ha	% of respondents	% responses
Grazing	35,070	67	49
Tactical Spring fallow	14,340	46	34
Strategic Winter bare fallow	20,500	22	16
Total	69,910		

% of Respondents: % of the number of people interviewed n=54. Participants were able to give more than one response therefore % of responses: represents how many times that response was given. n=73.

Soil organic carbon

Seventy-two percent of growers surveyed believe farm management practices can increase soil organic carbon, while 9% of growers said farm management practices couldn't influence soil carbon and 19% are unsure. Some of the most common methods growers use to increase soil carbon are retaining stubble and other biomass, minimum tillage and growing pasture legumes (Table 2). Only 20% of growers have a soil organic carbon target they are aiming for. Targets ranged from 0.8% to 3%, with most growers aiming for 2% organic carbon.

Table 2: Farm management practise that growers believe increases soil organic carbon

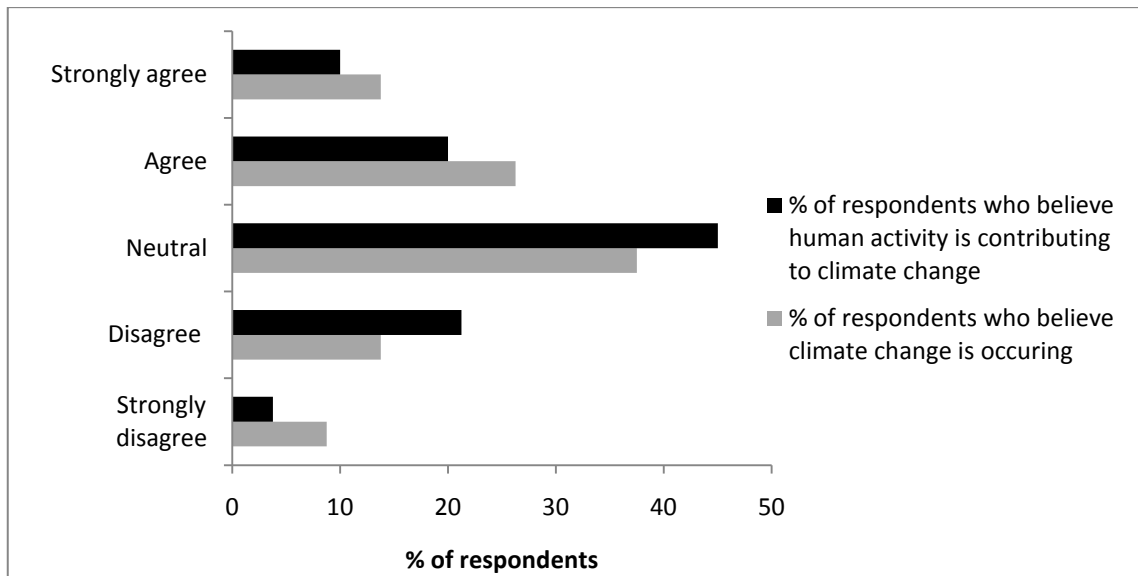
Farm management practice	% of respondents	% of responses
Stubble retention (keep biomass/cover)	63	43
Minimum tillage	23	16
Pasture legumes	17	12
Soil amelioration (includes lime, gypsum, deep ripping)	8	6
Less or No burning	8	6
Incorporate stubble or biomass	6	4
Promote soil biology	4	3
No livestock	4	3
Appropriate fertiliser use	4	3
Green manure	2	1
Fallow	2	1
Crop rotations	2	1

% of Respondents: % of the number of people interviewed n=48. Participants were able to give more than one answer therefore % of responses represents how many times that response was given. n=69.

Climate change/ seasonal variability

Forty percent of growers believe climate change is occurring however only 30% of growers believe human activity is contributing to the phenomenon (Figure 1). On a five-point scale the most common response (38%) was a neutral attitude to climate change

Figure 1: Liebe grower beliefs about climate change, September 2010



The management techniques growers use to cope with seasonal variability are wide ranging. Reducing inputs costs, particularly nitrogen fertiliser, was used by 50% of growers, making it the most widely used technique (Table 7). Flexible crop rotations and utilising different crop varieties was mentioned by 24% of farmers for combating seasonal variability, while 17% used financial tools such as decreasing fixed costs and debt reduction. Dry sowing, minimum tillage and stubble retention were also popular tools for dealing with seasonal variability. The open-ended nature of questioning allowed for more than one answer to be given, in reality more growers use a large combination of technologies to remain flexible to the season.

Sowing in the previous year’s furrow was a technique used by only 7% of growers. Two of the growers used in-furrow sowing to harvest water, another two growers admitted furrow sowing was by chance rather than a selected technique. Several growers indicated they would like to sow in furrow but are limited by the accuracy of GPS systems.

Soil amelioration

Gypsum

The most common method growers use to determine if a paddock requires gypsum is to make a visual assessment of hard setting soil or poor germination (69% of growers) (Table 3.) The use of exchangeable sodium percentage measurements in soil tests is also widely used (43% of growers). The jar dispersion test (placing an aggregate of soil in a jar full of rainwater and observing dispersion patterns) is not widely used (24% of respondents) despite the test being easy to carry out and recommended by agricultural agencies.

Table 3: Methods growers use to diagnose a paddocks gypsum requirement

Diagnostic method	% of responses	% of respondents
Jar dispersion test	14	24
Exchangeable Sodium percentage measurement on soil tests	26	43
Visual assessment of water pooling on soil surface	18	29
Visual assessment of hard setting soil or poor germination	42	69
Soil consultant	5	8
Soil test	7	12

% of Respondents: % of the number of people interviewed n=51. Participants were able to give more than one answer therefore % of responses represents how many times that response was given. n=84

Lime

Seventy-two percent of growers indicated they had paddocks with subsoil acidity, 88% of those growers reported a strong desire to overcome subsoil acidity. Fourteen percent of growers are unsure of whether they had sub soil acidity or not. The average rate at which lime is applied is 1.4 t/ha, which ranges from 1 to 3 t/ha. Other the past 3 years 2,751 tonnes of lime has been applied over 1,805 ha. The use of lime was the same for growers with and without subsoil acidity (Table 4).

Table 4. Comparison of liming rates for farmers with and without sub soil acidity (\pm Standard deviation)

	Sub soil acidity	No subsoil acidity
Number of farmers	50	9
Average lime application (t/ha)	1.4 \pm 0.5	1.5 \pm 0.5

Non wetting soils

According to the survey results about 40,000 ha of farmland in the Liebe area is non wetting. Half of the survey respondents had non wetting soils on their property ranging from 2 ha to 4,000 ha. Non wetting soils are more predominate in sandy soils of the western parts of the Liebe group area, around Miling, Marchagee and west of Coorow.

Growers feel strongly about the need to rectify non wetting soils, which are a significant production constraint for those growers affected. When growers at the 2010 spring field day were asked to rank on a scale of 1 to 7 how importantly the need to rectify non wetting soils was (1 being not important, 7 being very important) 73% of growers indicated the need to rectify non wetting soils as important, of those responses 34% of respondents considered it very important (Table 6).

Half of the farmers surveyed had tried to overcome non wetting soils by using one of the techniques listed in (Table 5). Nineteen percent of growers have tried furrow

sowing, 8% have tried soil wetting agents and claying. Amelioration has been tried on 12,809 ha which equates to about 30% of non wetting soil in the Liebe area.

Table 5: Techniques used by growers in their attempt to overcome non wetting soils

Technique	% of respondents	% of responses	Total area
Spading	8	6	176
Claying	12	9	230
Biological products TM21	4	3	500
Furrow sowing	27	21	7,500
Mouldboard	4	3	3
Soil wetting agents	12	9	1,400
Change agronomic practice	19	15	3,000
Do nothing	42	33	

% of Respondents: % of the number of people interviewed n=26. Participants were able to give more than one answer therefore % of responses represents how many times that response was given. n=40

Implications for Research, development and extension

Non wetting soils are a major concern for Liebe growers. Unfortunately at this time there is no clear message on the most effective method to overcome non wetting soils and 42% of those with non wetting soils are not undertaking an amelioration practices. This presents an opportunity for the Liebe group to collaborate with partners and undertake R,D&E in this area.

Sub soil acidity is still a concern, with a large percentage of Liebe growers (72%) reporting subsoil acidity. Better identification of subsoil acidity is required because 14% of growers are unsure if subsoil acidity is a constraint on their property and many growers were unclear as to the extent of the sub soil acidity. It can be inferred from the data that a increase in liming rate in response to sub soil acidity is not occurring in the Liebe area despite DAFWA recommend using high liming rates so that surface applied lime can move down the profile over time.

More R,D&E is required in the area of soil organic carbon, particularly regarding what level of soil organic carbon growers should be aiming for and how to achieve this, as there is much confusion surrounding this topic.

Currently in furrow sowing has a low adoption rate. An opportunity exists for the Liebe group to investigate the benefits of this practice for our area and if benefits exist, undertake extension activities.

Conclusion

Growers in the Coorow, Dalwallinu, Perenjori and Wongan-Ballidu shires have a neutral attitude to climate change and use flexibility in their farm management to deal with seasonal variability. The main tools used to remain flexible were, adjusting inputs, mainly nitrogen fertilisers, using different crop types and varieties and managing the farm finances.

A majority of growers believe farm management practices can influence soil organic carbon levels. However, 19% of growers are unsure of how farm management influences soil carbon and only 20% of growers actually have a target soil organic level

they are aiming for. Therefore it can be concluded that more extension regarding the upper limit of soil organic carbon could help growers to determine the optimal organic carbon level.

Subsoil acidity and non wetting soils are of some concern for 75% and 50% of growers respectively. Cost-effective amelioration technologies should be the focus of research, development and extension with in the Liebe Group.

The survey conducted to compile this report is the baseline for evaluating changes in grower knowledge, aspirations, practices and attitudes in three key areas of the GRDC funded project '*Improved stubble and soil management practices for sustainable farming systems in the Liebe area*'; Soil moisture, climate change and variability and soil amelioration. A follow up survey will be conducted in September 2012 so the success of the project can be monitored.

Acknowledgments

Thank you to all the growers who participated in this survey, your help is greatly appreciated. Funding for this study was provide by the Grains Research and Development Corporation .

Appendix A:

Table 6: Grower's rating of the importance of overcoming sub soil acidity and non wetting sands in order to improve the farming system

Question	% of respondents						
	1	2	3	4	5	6	7
Importance of overcoming sub soil acidity	0	0	6	6	19	26	43
Importance of overcoming non wetting soils	4.5	9	9	4.5	23	16	34

1=least important to 7= very important

Table 7: Management practices used by growers to combat seasonal variability

Practice	% of responses	% of respondents
Input adjustment	33	50
Use of different Crop rotations and varieties	16	24
Dry sowing	14	21
Financial management and adjustments	11	17
Soil moisture conservation	10	15
Reduced tillage and stubble retention	10	15
Reduce livestock numbers	6	9

% of Respondents: % of the number of people interviewed n=66. Participants were able to give more than one answer therefore % of responses represents how many times that response was given. n=100

Appendix B: Spring Field day 2010 Questionnaire

Liebe Group Survey 2010

Are you a: (please tick a box) Member Non Member (Grower) Industry Other

Name & Phone Number* _____

(*Optional – for a chance to win a prize, all survey results remain confidential)

Age (Please tick a box) 18-25 26-35 36-45 46-55 55 & over

1) What are the biggest agronomic issue/s you are concerned about?

2) What aspects of your farm business are you concerned about?

3) What training and workshops do you think would be beneficial to your organisation?

4) What particular concept/products/practices that you would like to see demonstrated by the Liebe Group?

5) What would you like to tell us about today's Spring Field Day?

6) Would you like to join the team?

Management Committee R&D Committee Finance Committee Women's Committee

7) Do you fallow? Yes No

If yes, how many hectares of the following?

Strategic winter bare fallow ha _____

Tactical Spring Fallow/ Spray Top ha _____

Paddock left out for grazing ha _____

Other (Please specify) ha _____

8) Do you think farm management practices can change soil organic carbon?

Yes No Unsure

If yes, which practices?

9) Do you have a target soil organic carbon? Yes No

If yes what is your soil organic carbon target

10) Do you believe climate change is occurring? Please circle 1 for strongly disagree and 5 for strongly agree.

1 2 3 4 5

11) Is human activity contributing to climate change? Please circle 1 for strongly disagree and 5 for strongly agree.

1 2 3 4 5

12) What management techniques do you use to combat seasonal variability?

13) Do you sow in the previous years furrow? Yes No

If yes, why?

14) Do you use GPS guidance to sow in furrow and what is the accuracy of the GPS? If you do not use GPS guidance what do you use to ensure you sow in the previous furrow?

15) How much of your farm has been limed in the last 3 years? (Total ha) _____
How much lime has been applied in the last 3 years? (Total tonnes) _____

16) Do you have subsoil acidity? Yes No Unsure

If yes, what area (ha) of your farm has subsoil acidity? _____ ha

17) Do you know where the subsoil acidity lies in the profile. (ie a band at 20cm or acid all the way down the profile)

**18) How importantly do you rate the need to rectify subsoil acidity?
Please rate between 1 (low importance) and 7 (high importance)**

1 2 3 4 5 6 7

**18) How do you decide whether your soil requires gypsum to improve soil structure?
(Please Tick)**

Jar dispersion test

Exchangeable Sodium percentage measurement on soil tests

Visual assessment of water pooling of soil surface

Visual assessment of hard setting soils or poor germination

Other (please specify)

19) Do you have non wetting soil? Yes No

20) If yes, what area (ha) of your farm is affected by non wetting soils? _____ ha

**21) How importantly do you rate the need to rectify non wetting soils?
Please rate between 1 (low importance) and 7 (high importance)**

1 2 3 4 5 6 7

**22) Have you tried any of the following techniques to overcome non wetting soils.
How many ha did you apply the technique to?**

Rotary Spading

Mouldboard ploughing (Soil inversion)

Claying

Claying and incorporate with spader

Soil wetting agents (soil surfactants)

Furrow sowing

Change agronomy (please specify)

Nothing

Other (please specify)

Yes (tick)	Area of land (ha)

If you are interested in trying any other the above techniques to overcome non wetting soils please indicated the technique below.
