

CORRECTED VERSION

ENVIRONMENT AND NATURAL RESOURCES COMMITTEE

Inquiry into impacts and trends in soil acidity

Colac – 4 September 2003

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Mr D. Forsyth, Chief Executive Officer;

Mr P. Greig, Chairman, Corangamite Catchment Management Authority; and

Mr D. Crawford, Research Officer (soil science), State Chemistry Laboratory, Research and Development Division, Department of Primary Industries.

The CHAIR — Thank you very much for coming today. We do appreciate the time that you are giving us. As you know, we are an all-party parliamentary committee with members from the government and both opposition parties. We have Mr Geoff Hilton, a member for Western Port Province; Andrea Coote, who is the Deputy Chair for the committee and a member for Monash Province; Jo Duncan, the member for Macedon; and my electorate is Carrum.

All evidence taken by the committee is taken under the provisions of the Parliamentary Committees Act and is protected from judicial review. However, if you make comments outside the precincts of this hearing they are not protected by parliamentary privilege. All evidence is being recorded by Hansard, and you will receive a proof version of the transcript within the next week or so. I will hand over to you for the presentation and then we will have some questions.

Mr GREIG — Thanks, Madam Chair, honourable members and ladies of the staff, colleagues. Thank you for the opportunity to present on behalf of Corangamite Catchment Management Authority. My name is Peter Greig. I am a farmer, and as new chairman of this authority I am reasonably typical of the 13 board members who guide the fortunes and misfortunes of the Corangamite Catchment Management Authority.

I have three main points to make: firstly, about our region; secondly, about our strategies for the region, and thirdly, about some of our aspirations for implementation. After that I will hand over to my chief executive, Mr Forsyth.

Firstly, our region is a diverse one. It covers 1.3 million hectares, and it covers the cities of Geelong and Ballarat. It goes as far west as Peterborough and includes the Great Ocean Road, the Otway Ranges, the lakes and plains district of the Western District, and the Central Highlands around Ballarat. It is a remarkably diverse landscape, and that diversity presents quite big challenges for the health management of the catchment that is our charter.

Secondly, we have something like 330 000 people in our region, and yet 72 per cent of the land which is critical to the health of our catchment and the health of our region is managed by farmers who comprise just 6 per cent of the work force. That is an imbalance which is a major challenge for us. We have developed, with an enormous amount of help from our community, a regional catchment strategy and it is in the process of being accredited by state and federal committees, which will lead to the freeing up of funds that will go for catchment health in our region.

In that strategy we have six goals that have been developed, as I said, with the help of our community. Mainly they want to have a healthy catchment, a vibrant economy, a smaller ecological footprint, cohesive communities and good solid partnerships with the other departments and the many different sorts of people who are involved in the catchment health program. They want to have what is called a planned landscape, meaning that the planning authorities are a critical part of that future. That is our catchment strategy.

My third point is really about the challenges that face us as implementers of this catchment strategy. I have mentioned two of the critical ones. We have a large urban population; 90 per cent of our people live in major urban towns. They have expectations of our landscape and catchment health but they do not have a big understanding, by and large, of what it is like to be a farmer having to try to manage the 72 per cent of our landscape which they own; so our job is to straddle that disparity and to try to bring those two important parts of our community together in a joint effort to make our catchments a healthier place.

Finally, in dealing with the farmers as we are we have discovered that they are becoming increasingly aware of soil health in addition to the other elements of the environment which are critical to catchment health. I do not think I want to say any more than that, except to say that it is now rising on the agenda. I need to say that as part of our regional catchment strategy review process we discovered that the strategies that were developed back in 1997 were for the most part acted upon with one exception, and that was the improvement in soil health. So it is very timely that you will be having discussions about soil acidity here, but I do want to leave you with the firm impression that our farmers are beginning to see soil health as a critical part of our natural resources management agenda. With those comments I will pass over to Don Forsyth, our chief executive.

Mr FORSYTH — Thank you very much, and thank you for the opportunity to make a presentation today. We have made presentations to other inquiries, and I trust this one will be as rewarding as the others have been for everyone who has been involved.

Peter has given a broad overview of the region, and we call it a region of diversity because of the sorts of things Peter mentioned with soils and climate. Our soils range from the sandy coastal soils to the tertiary sediments in the Otways, the basalt plains and the granitic uplands, and the rainfall ranges from 17 inches — I am a bit older, I am sorry about that — to 90 inches in the Otways. That range gives an enormously different variety of land uses and

pressures on the land in this region. We have everything from forestry — both state forestry and commercial forestry — to farm forestry, intensive market gardening, some extensive gardening and cropping with potatoes and the like and a very strong dairy industry which is largely unirrigated. About 25 per cent of land-holders have supplementary irrigation. We have strong beef and wool-grazing industries and of course, a cropping industry. I see Scott Chirside from Southern Farming Systems is on your agenda for this afternoon. He will expand on the advent of the raised bed cropping program in this area which potentially can have some implications from a soil acidity point of view.

With all this activity, soil and soil degradation issues are seen as a priority for the catchment management authority. Soil degradation issues can largely be defined by factors affecting the chemistry and fertility of the soil and that flows on from acidity, salinity, soil structure decline and soil loss. However, acid soils are one of the important degrading processes that we recognise in the region. That is probably accentuated by high rainfall and potential leaching, particularly of nitrates into the soil. So we are pretty susceptible to acidification problems. From a statewide perspective, we have some high-risk areas of acidity.

Overheads shown.

Mr FORSYTH — I am sorry to ask you to strain your necks. You will not have to shift — there are only a couple of slides in my presentation. The areas marked in red are the very strongly acid soils in the region. They are from Geelong, north to Ballarat and then down just to the east of Warrnambool — that is where our region runs. Our high-risk areas are just south of Ballarat, the foothills and some of the ridges of the Otways, a little bit around Heytesbury and on the Bellarine Peninsula. They are the areas of most concern.

The other interesting area in the region is associated with acid sulphate soils and those soils are the green areas on the map to the north-east of Geelong and again down towards the peninsula. Acid sulfate soils can be a real problem with urban developments and associated infrastructure. Within our region those are areas where we are getting a lot of urban migration and sea change, so we really do have to keep our eye on what is happening there. There is a report on the acid sulfate soils from the Centre for Land Protection Research project dated March 2003, which talks about the acid sulfate soil problem on a statewide basis, and I will leave a copy of that here for you. It is on the web site too, so it may be of some assistance.

We spent quite a long time developing the regional catchment strategy and an enormous amount of time with the community identifying what the region's assets were, the threats to those assets and the trends, and what actions we should take to try to address some of the problems that the community saw. We identified some real changing forces within the region. I mentioned urban migration but also the increase in the intensification of agricultural industry. That is a real threat for this region, and it has been accentuated in the last few years with the dry conditions in the north of the state and reliance on irrigation water which has been less readily available than in the past. And yet we have a good, rain-fed, reliable climate in the Otway and Corangamite regions.

There are increasing land prices and increasing pressures and intensification, with more feed lots, intensive piggeries and more intensive agriculture to make the maximum use of the natural resources of the soil and climate. But that applies additional pressure, and we have some concerns in respect to the sustainability of our natural resources in that sort of situation. In the next 10 years we will see those pressures increasing quite considerably and of course, the asset that they are affecting most is the soil, whether it is through compaction, soil structure or chemical imbalance. That is something that we have to watch very closely.

Through the development of the regional catchment strategy we have recognised that there is limited soil data in the region. We do not know enough about it and from the data we have, we are not able to adequately identify clearly what management techniques or land use changes we should be promoting or implementing to ensure that there is no further degradation of the soil. We do need a lot more information. We have only in the last week or two signed a contract using the national action plan for salinity and water quality funding with the Department of Primary Industries to develop a regional soil strategy that identifies and integrates the various soil problems into a strategy to move forward. That is quite a big consultancy which is due to be completed by the end of January 2004, so we look forward to the results of that and believe that will help us considerably in setting future directions — whether it is for more research or remedial action or for influencing the way land is managed and what is done with the land. We look forward to that.

Peter mentioned the vision for the Corangamite region and the fact that there were six principles within that vision: a healthy environment, sustainable economic use of natural resources, a smaller footprint, a planned landscape, cohesive innovative communities, and partnerships between the community and government. I have tried to attempt — or not attempt because it was pretty easy, actually — to link the issues of soil acidity to the principles of

that vision. In respect to a healthy environment the term 'healthy' is used in a similar fashion to soil health. The general functions of the biophysical environment with regard to supporting vegetation, harvesting and maintaining water supplies and absorbing wastes without degradation of the primary resource correspond very well to a healthy soil and a healthy environment.

Sustainable economic use of natural resources and soil health is basic to sustainable production, and achievement of that objective requires an understanding of the science of the soil, the variability of the soil in the region's landscape, which is quite complex in our case, and the capacity of that soil to support different land uses. We must have a better understanding of its vulnerability to degradation. The smaller footprint refers to the maximal and optimal use of the soil resources of the land. We must ensure that soil and land is used in a capable way, that it is used in the most productive and sustainable and suitable way for productive objectives. So there are needs for farming improvement. We believe there is opportunity within this region, as demonstrated by Southern Farming Systems; and because of our diversity, we have the flexibility to change and adapt to the environment that we have.

The planned landscape is vitally important because we do not want to limit our choices of land use as we move into the future; so we must very carefully plan what we do and where we do it in the longer term, particularly where change is predicted. In this region — I think you were in Hamilton yesterday and people probably spoke about the blue gums over there — there is increasing pressure now within 100 kilometres of the port of Geelong to increase blue gum plantations in this area. That is a land use which is probably better as a longer-term land use, but we want to make sure that blue gum establishment is done in the right areas from a natural resource management plan point of view, whether it be in protection of our water resources or whether it be something associated with our soil health.

Cohesive and innovative communities: we in the catchment management authority have a principal responsibility to involve the community and bring the community along with everything we do. Otherwise we will never get acceptance and change of attitude. So this study that we are doing is going to have quite extensive involvement with the community on which it may impact. The same goes for partnerships. We must have partnerships and share the knowledge, share the input and share the results and the outcomes. So the soil acidity issues very much link in with the objectives and principles of our catchment management strategy.

The key areas from the acidity point of view that we will be talking to will be those associated both with our broad acre cropping areas and the groups like Southern Farming Systems, our horticulture areas, dairying, particularly in the irrigated parts of the dairy industry, forestry and, of course, in the areas that are subject to the urban development along the coast from an acid soil point of view. I would like to now introduce Doug Crawford from the State Chemistry Laboratory, who will give you a bit more in-depth understanding of the extent of the acidity problem within the region relative to the state so that you can see it in that perspective. So I introduce Doug to carry on.

Overheads shown.

Mr CRAWFORD — I have handouts as well as the slides. The State Chemistry Laboratory for quite some time was one of the main two soil testing laboratories in the state. I have collated our data together in a project we had and present here the mean pH of samples coming out of various locations around the state to give you an overall picture of what soil pHs there are. Looking at a broad scale, notice the high rainfall areas tend to have low pHs and the low rainfall areas tend to have high pHs; and you can see in the Corangamite catchment that that relationship is repeated where you have a rainfall shadow effect here, which is low, and the Otways and Ballarat, which are very acidic.

Before I go any further I have to backtrack a bit. Notice the pH is in water. Most of the data you will get from people will be in calcium chloride, but historically that is a new test and we have many more soil test results in water; there are about 70 000 results out of 82 000 results, farmer samples, in that data set shown there. Over the next 10 minutes I will basically be talking about converting all of these yellow dots which are moderately acidic and these green dots which are slightly acidic into orange dots.

This is a different version of the pH map that Don was showing before. You can see that map on the department's web site I have a handout for it as well. I want you to look at the statistically interpreted version just to get a picture of what Corangamite is like. We have strongly acid soils in the high rainfall areas. The soils are mostly used for pastures and cropping. We would normally recommend lime for pastures where the surface soil pH is below 5.3, so those soils already need lime; the acidity is probably already having an impact on production. Up to the 5.5 range a lot of acid-tolerant crops will have problems, so if you are putting in something like canola you would probably be looking at adding lime. Most of the mid-section probably shows slightly and moderately acidic soils — the blue

and the green — and, as I will show, they are the most prone to acidification in the pastures. Pastures are probably the main land use.

The slides show the impact of acidity across the catchment. I would like to make a comment or two about what we have seen of the impact of acidification, which is a different kettle of fish. Acidification is about processes, whereas acidity tells you where you are — it is a status-type thing. I want to look at the impact of acidification. I got all the research that I could find in the literature and plotted it. The research shows where people have gone to a fence line and on one side of the fence line is native soil and bush, usually, and on the other side of the fence line is a farmer's pasture or paddock. I tried to plot one against the other. So on this side you can see the pasture soil pH of around 4 and more or less the same on the forest side. If there is no acidification all the points should be on the one line, which they are not. In fact if you look at it, a lot of the points at the starting soil pH range on the forest side of the fence have acidified.

Some of the pH changes have been quite significant. This site, which is in the south-west region, has dropped about 2 pH units since it was cleared. Acidification has had a tremendous impact on soil acidity across the state. Many of the samples coming to our laboratories are from pastures that are already acidified and it may be that the area of strongly acid soils is bigger than it was before the land was cleared. As far as researchers are concerned, the causes of acidification are theoretically explained using a particular model. Based on that model several experiments have figured out that in pastures one of the main causes of acidification is nitrate leaching from the pasture. In cropping situations you have the added problem of nitrogen application as nitrogen fertiliser, and that can have an acidifying effect. But generally speaking, these are pastures which have not had any N fertiliser applied to them.

The previous slide focused just on surface soil, and I want to bring this site to your attention; it looks at the subsoil as well. You can see that the surface soil samples have acidified quite considerably at this particular site. Unfortunately, I did not have one that I could use for Corangamite. Because Corangamite is such a diverse place anyway, it is hard to say that this is typical. The point I want to make with the particular site is how much the subsoil has changed. This is one of the big problems we have with acidification because once we acidify the subsoil, it is very difficult both technically and economically to rectify it and that is what we want to avoid.

Acidification is a very complicated process and I have a theoretical explanation; I do not have evidence to tell you why the subsoil pH has increased, but we see that sometimes. This gives you a picture of what pH changes have occurred since land was cleared on many of those pasture sites, many of which may have been cleared more than 20 years before we did the survey. Now I want to look at a survey I conducted of old experimental sites where we went back to sites that were sampled in the early 1970s and sampled again in 1993. Most of these are pasture soils and you can see that in the last 20 years they have acidified, so acidification has been ongoing since land was cleared. Some of the sites do not show up much pH change because they have been limed. Because of the way the processes are working, others have not changed much. Unfortunately I have not got a big spread of sites in Corangamite to show you, so I will go through a couple of the individual sites that are just over the border and still fairly representative.

Next slide please. Just to give you a picture of acidification in the last 20 years, this is a dairy pasture down at Glenormiston. You can see that soil pH has changed right down through the soil profile, which is a bit of a worry. If you just mentioned surface soil pH it would look a bit hidden. This particular site is at the back of the property and the farmer has probably been cutting it for hay and the hay has possibly been fed out in a different part of the farm and that is probably why it has acidified.

Next slide please. According to the records I was able to obtain, this site is only lightly grazed and there has not been much pH change in the last 20 years. It is quite possible, of course, that most of the acidification occurred beforehand, but I was not there when the land was first cleared or first utilised for production, so I cannot know that. Next slide please. This site does not seem to have changed much, but that is not the reason I have put this slide up. I am putting it up as an example of a site from the northern part of the catchment and to point out that with some sites, even though acidification is not necessarily a problem, acidity is now such that it will be a big problem for other things. Unfortunately I do not have a slide that best demonstrates what I am trying to say. This particular site is in a ridge; it is the kind of site you would put trees on to prevent recharge. Perhaps you would put in a lucerne crop. They will not be putting a lucerne crop into that kind of site because it is far too acid and the subsoil is far too acid. On its own it would have to be limed to do that. So this is how acidity and acidification can tie in with other soil degradation issues.

Next slide please. This is a site that has been used for potato cropping. I looked at this site and the history that I have from the farmer who owns the site. He told me some of the things that we normally expect to cause

acidification, but he also told me that the site had been irrigated with nitrate-contaminated ground water. When plants absorb nitrate it tends to bring the soil pH up a bit. If soil gets waterlogged, you lose the nitrate from the soil and through a chemical process I cannot explain in 10 minutes; it tends to bring up the soil pH. So you can have processes that are hiding the acidification of the landscape at some sites because of they are overriding processes. This slide shows another typical site. It is from a sample at Beeac, where the site is in a drainage depression. The subsoils are really alkaline; there are also very heavily textured soils, clays, so they are very strongly buffered. Acidification in this kind of site, even though there is not a lot here, may be very much restricted because of the buffering you can get down in the subsoils, whereas the surface soil is not too good. That was the main point.

Dealing with the future, a lot of my research was done in the 1980s and 1990s, and I have not been able to do as much research as I would have liked in the last decade. The thing about this last decade is that we are having tremendous changes in the way people practice agriculture. New techniques are being used and there are different attitudes. These changed practices will change the rates of acidification and how it will impact on the landscape and therefore how acidity will impact on the landscape.

When I was asked to give this talk I was thinking I would be asked how can I predict the impacts of acidification in the future. Scientists in acidification research have come up with the years you need to apply lime, or how often you need to reapply lime, and I thought, 'You can do those sorts of estimates, but that presumes that practices are staying the same, and they are not staying the same'. Nowadays dairy farmers are putting on a lot more nitrogen, and there is plenty of nitrogen going into cropping, so these situations could mean that dairy pastures and cropping areas are going to acidify faster. The importation of stock feed in the dairy industry is increasing, and that may have a countervailing effect. I am not sure.

Raised-bed technology and some of these other things that improve soil structure and improve drainage could have an impact because nitrate leaching is a very important part of soil acidification; it is one of the main contributors to soil acidification. The advent of soil conditions that improve drainage may produce a condition that has great potential for nitrate to leach and therefore greater potential for soil acidification to occur. These two last points — I am not sure how they are going to have impacts, but changes of ownership and attitudes and what they do with land will also change how the landscape is going to respond to acidification. Thank you.

Mr FORSYTH — Thank you, Doug. I think Doug's presentation emphasised that not a lot of sites have been tested in Corangamite. We have not got enough raw data on the extent of the problem within the region at a local level to influence land management and make wise land-use decisions, so we look forward to your support in that area in the future.

In concluding, on behalf of catchment management health, I would like to re-emphasise that soil health is a priority within this region — a very high priority within our catchment strategy. Acidity is part of that soil health problem that we must look at. We are committed to developing this soil health strategy. As I indicated, we are already under way, and I hope that will help us fill a lot of the knowledge gaps and also set future directions both in respect to management and ongoing research. We have made a commitment to work very closely with the community but also with industry-based groups to get their support and input to research and improve land management practices to address some of the soil health issues that we do know are there at the moment. So we again look forward to the outcomes of this inquiry and your report and trust that that will be in line with our directions, as I am sure it will be. Thank you very much for the opportunity to speak to you today.

The CHAIR — Thank you very much, Don.

Mrs COOTE — I would like to thank Doug, Peter and Don for a very informative outline from each perspective, particularly Doug. I found that extremely interesting. Thank you. Although this is not a contentious inquiry I do have a property in this catchment area, a tiny property, so I want to get that on the record, not that I think it will cause any problems!

I would like to ask a question of Doug. We have heard various people say to us that they can see the results of soil acidification in shorter or longer periods of time. From the research you have done — and believe me, no-one is doing much more from what we can gather; there seems to be a dearth of information that people have been able to give us on research and collection of data in this inquiry — it would seem it is a long time for soil to present itself as being acidic soil, in that it is changing. Obviously, if you start with acidic soil, it is different, but for a change to happen, it is incremental. Is that right?

Mr CRAWFORD — It depends on how the soil is managed and the circumstances at hand. In the horticultural industries where they are putting on large amounts of nitrogen fertiliser, acidification can be quite rapid and very localised.

Mrs COOTE — Could you give me some time on this as in years, or how long would that be?

Mr CRAWFORD — In the fence line survey, to give you a picture, the oldest pasture I think was about 100 years old, and that is relying on the current landowner's records, and the youngest pastures are about 10 or so years. We sort of tried to think about, 'Let's calculate units of pH change per year' and we thought, 'Well, perhaps we do could do that', but we declined to do it.

We talk in terms of acidification rates when we are talking about rates of change, and I think Troy is going to present a slide in the next presentation which gives some acidification rates. The horticultural industries and more intensive industries — higher fertiliser end industries — change quite rapidly. You have quite high rates. The average change since the land was cleared was 0.2 of a unit, but that is a statistic like global temperature changes, where we have a 1 degree change. When you think about 1 degree, you think, 'One degree average, 1 degree increase, whoop de doo!', but it is quite considerable, because a whole range of things would change.

I am not trying to squib out of the answer, but when you are a scientist you are thinking it is pH per year, really, that is important, or is it? It is not something I can immediately answer. Different industries will have the change come up as a problem very quickly. For instance, soils that are, say, in the 650 milligrams rainfall or thereabouts are borderline soils. They are probably going to be borderline soils in terms of the pH that they have, and you are trying to establish subclover or phalaris or something or other, and it will not take long for them to acidify and become a problem. Whereas when you go out into say the Mallee, you have soils that are fairly alkaline and have lots of carbonate in them, it could be 1000 years before you have a problem. But if your next-door neighbour's soil has a different situation, he might experience a change quite quickly.

Mrs COOTE — So conversely, the same thing: if you put the lime on it, you see an improvement, which is reflective of what you have just said. Is that right?

Mr CRAWFORD — Well, lime is taking it straight back up, and then the lime will run out as the acidification takes it back down again, and this is where you are getting towards our — the response we have to farmers to this kind of question is: 'You go out and test your soil and you see what sort of soil pH you have, and if it needs lime, you put lime on. Then you come back within 10 years if it is a pasture situation, and you test it again', or it might be that five years might be better. You certainly do not need to go out, put your lime on and check your pH every year to see how it is running down and when you need to put your lime on again. Having said that, there has not been a lot of research on how often you need to lime in different situations, and that would certainly be an area that we would like to investigate.

Mrs COOTE — There was a suggestion from someone that we have seen that lime may be masking a real issue and that the application of lime over a long period may be inadvertently causing problems. Is that something that is a concern or is it perhaps just anecdotal?

Mr CRAWFORD — It might be anecdotal. I have not heard of the application of lime causing problems unless the person has been far too zealous and put way too much on and caused trace element deficiency problems by getting the pH so high that you get iron deficiency or zinc deficiency problems, for example. Most of the problems we have with lime are that farmers will not put enough on — for example, in potato soils. I admit that they are generally not putting lime on to grow potatoes because they are fairly tolerant, but quite often they are in rotation with other crops which are not tolerant. A lot of the potato soils, which are the red kraznozems, need considerable amounts of lime to get them from their usual state up to about pH 6.0. You might need 15 to 20 tonnes of lime, depending on how well it is buffered.

That is generally the problem we have: getting people to test their soils often enough to monitor what they are doing, and getting them to put on adequate amounts of lime. We have a soil test at the laboratories that will recommend the rate of lime you need. Unfortunately, it is a rather expensive and slow test to do, so it is not offered on a routine basis. We approximate it from other tests. I do not know what some of the private laboratories like Incitec Pivot do in that respect.

Mr HILTON — Don, I understand your draft strategy plan does not specifically address acid soils, and I was wondering if there was a reason for that.

Mr FORSYTH — Acid soils are mentioned in the RCS as part of the general, broader soil health program that is going to be developed. The RCS is an overarching document, and there are companion documents to the RCS, whether it is our salinity plan, our water quality plan, our pest animal plan or various other plans. They are all documents that accompany the RCS. We are developing a soil health plan which will include acidity. I have checked, and acidity is specifically mentioned in the RCS as a potential issue and is certainly in the draft terms of reference for the project we have just signed off for the soil health program.

Mr HILTON — The awareness of farmers of the issue of soil acidity. How knowledgeable do you think the average farmer is, and do you see the CMA having a role in the education process?

Mr FORSYTH — I certainly do. Generally there is not an awareness of soil acidity because it creeps up slowly and is an incremental change thing, a bit like salinity south of the Divide. North of the Divide you can see bare, scalded areas which are very obvious and dramatic. We have some patches of salinity in our area south of the Divide, but generally it is a matter of grass that is this high instead of that high, so it is not so obvious. And the same goes for the acidity problem, only it is worse because it is less obvious, but it is there, and I do not think there is adequate awareness of the issue, both among agencies and among the rural community, and it would be a major role for us to help get that message out.

Mr GREIG — Could I add to that? Don has answered the question about increases in acidity — or acidification as Doug called it. But as a farmer in a high rainfall part of the region, I can tell you that I and most of my neighbours are aware that we have acid soils. We do not know whether the acidity level is increasing, that is for sure, but we are highly aware of the need to put on lime for crops, and I expect that other parts of the region would be equally aware of the agronomic requirements of acidity in that local way.

Ms DUNCAN — Doug, you would be aware of the work that DPI is doing at the Hamilton site in regard to the wool industry or its research — —

Mr CRAWFORD — Is that the long-term phosphate trial?

Ms DUNCAN — Twenty-five years, yes.

Mr CRAWFORD — I am aware of it, but I am not familiar with the design or the objectives.

Ms DUNCAN — Are you familiar with the information that is coming out of that?

Mr CRAWFORD — Not recently. I have not been doing acid soil work recently, but I have been to the site I think.

Ms DUNCAN — Would that information normally be shared fairly extensively?

Mr CRAWFORD — Yes.

Ms DUNCAN — The department already has some good understanding about long-term grazing and impacts and getting various things right. Is that information that would normally be shared with you guys for example, and the CMAs?

Mr CRAWFORD — I have probably confused myself in that there are two trials. One is a long-term trial run by Paul Quigley and another is run by John Cayley. In the John Cayley one — which may be the one that you are referring to — I think he has published some research from it, and from memory I do not think the pH changed much. The long-term field trials where they are monitoring pH — or they might be monitoring something else — are very rare beasts; there are not many around. Some of them have shown not much pH change and some have shown quite considerable decreases. For instance, the trials at Rutherglen have certainly shown acidification.

Ms DUNCAN — With increased use of nitrate fertilisers?

Mr CRAWFORD — No, just pastures sitting there being grazed and managed in the normal way. Researchers would have explained the nitrogen cycle to you and how it can be involved in acidification.

Ms DUNCAN — In great detail! But I know there are very different responses to nitrate and to say, phosphate, fertilisers in terms of pH. But it was more just a general question about the extent of knowledge of the data that is coming out. But that is okay, you have answered that. Peter, in terms of farmers liming. Is that something they do routinely and would they always test their soils before they lime?

Mr GREIG — The best ones test.

Ms DUNCAN — How many best ones are there?

Mr GREIG — Somewhere between 10 per cent and 30 per cent of all farmers is my guess. In our discussions with farmers around the region there are various ways of classifying them, but something like 10 per cent have a gross turnover in excess of \$500 000 a year, and we would probably class those as the top 10 per cent. That is an average across the country, and we expect that applies here. We do not have good figures on this region I am sorry to say, but it does not sound too out of whack to me. Then there are the next 20 per cent of farmers, who would be aware of the soil conditions and would be paying agronomists and others to test their soils and to give recommendations on their cropping or pasture decisions and their fertilising decisions.

It is harder to pick exactly what is happening with the rest. I would say that it is a big challenge for us in the catchment management authority to better understand those farmer clients and to help with the education and information projects that are already happening through the Department of Primary Industries and the Department of Sustainability and Environment. But we see ourselves as playing a role in helping that process.

Ms DUNCAN — Do you have any anecdotal evidence, or does anyone have any evidence at all, that there is an increase in the use of lime? Increased sales or application?

Mr CRAWFORD — Yes, there has been a substantial increase in the sales of lime in the last 10, 15 years.

Ms DUNCAN — And do we make of that an increased awareness, or an increased need for it?

Mr CRAWFORD — As Peter says, I cannot give numbers but I would say there has been increased awareness. The Australian Fertiliser Services Association has had a program of talk nights with farmers, and I have presented to a few of them, where they present a video on soil acidification and then the invited guest speaker, which might be myself or a different researcher, talks about acidification and acidity in the area, so the best farmers are in quite common attendance at that type of talk night.

The CHAIR — I suppose one of the things that we constantly hear is, 'We do not have enough evidence; not enough soil tests have been taken; we have not got the testing collated', et cetera. Then you hear that farmers do not put the fertiliser on, they do not put the lime on until they have had soil tests. They say, 'Pivot has done hundreds of thousands and Incitec do thousands' and 'Oh, it is the same company now' and, 'But we have all these private companies that have done all these' and, 'The State Chemistry Laboratory has done all these tests' or 'The information is there if we can collate it altogether'.

So in our minds we are all formulating our response to everything that we are being told, and then we get to the people who sit in front of us and tell us that the tests are never the same, that if you test in that corner of the paddock this year and this corner up here in five years time you cannot then say that these tests are the same and they are not going to show you anything anyway unless you have the GPS and the exact same site. As a chemist, what do you think? Is there any point in us trying to get all the soil tests that have been done and trying to get it all collated to see if we can get a better picture of the rates of acidification? Or is that just something that theoretically sounds terrific but in practice would not give us anything at all?

Mr CRAWFORD — That will demand a fair bit of an answer! I will give some historical perspective. This diagram is a collation of all our test results — 82 640-odd soil samples delivered over 20 years to our labs — and we got money to do that project as part of an NSCP program. Soon after we completed that a senior research person at CSIRO — he must have been inspired, I hope — went to another funding body and got a project funded to collate all of the soil test data they could get their hands on from private and government labs across Australia, and it became part of a program called the national land and water resources audit. We sent our data to them and Pivot sent their data.

I should backtrack a little bit there. At one stage during the 1980s we were subcontracted by Pivot to provide all its agencies, so we were the main contact at that laboratory at that point in time. After then Pivot decided it would go its own way and build new labs and now it is Incitec Pivot. Getting back to the national land and water resource audit, it got results from Pivot staff and so on, and they got all the data together. The thing is with that audit, I think CSIRO got \$80 000 to do the audit so really it is only talking about computerised data that is already logged on computers as data sets, so the data is the last decade of the century. It covers samples submitted to various crowds over that last decade.

Most of the data you see on our spotty map was on handwritten pieces of paper, and we had somebody sitting there for 15 months typing them in. So that gives you a picture, but I have told you only half of the picture. Our web site has a link to the national land and water resource audit, so I will give you this as a handout and you can find it in the *Australian Natural Resource Atlas*, and that is how they have put that data together. You can download it and look at answers to your questions, because they have sat down and calculated how long soils will take to acidify before you need to put lime on and that sort of stuff, which, because of the changes to the way we practice agriculture, I did not want to do. So they have put that together and you can look at some maps they have.

Because it is only a short time period you cannot tell how fast the pHs are changing. There is only a little window in time. We have been practising agriculture for 100 years so we have had 100 years to acidify our soils. They have put that data together and given themselves a national picture of what is going on, so that gives you a good broad-scale map. That is my little effort of what I did with my data on my broad-scale map, but that is as big a magnification as I like to go to at a regional kind of level. This is not the kind of map where you can go to a farmer's paddock and say, 'Oh, he has that pH; he should put lime on if he wanted to do such and such'.

Your question asks do we have enough information. In a broad-scale picture I suppose we could answer yes, we do, but when you get down to smaller and smaller scales you find that your dots get further and further apart. This map, which shows what soils have acidified, is a different kind of map. You are talking about rates of change anyway, and I have only 50 dots and it covers mainly pastures that are not fertilised with nitrogen. It covers a few crops and a few cropping situations. It has nothing up at the top so I cannot say what is happening up there. I have no dots that are in tomatoes, cauliflowers, broccoli, lettuce, bok choy — all those sort of things. I have no dots for fruit crops. I have no dots for forestry.

I have no dots that tell you what is going to happen when all those trees are chopped down in the forestry plots out on the western plains and what sort of effect that will have on soil pH; and I have no data to say what sort of effects the growing of those trees will have or harvesting the wood. The Americans and Europeans probably have information on that but bringing in overseas data is not good, considering they have acid rain problems messing the whole thing up anyway.

In terms of getting a broad picture of soil acidity, we have a good idea. In terms of getting smaller scale or closer into the map type stuff, things are not so good. When it is talking about acidification, it is pretty thin. Most of the acidification research has been my kind of survey work, which is not cause and effect; it is association. The cause and effect-type research is being mainly done at Rutherglen in those kinds of agricultural systems, not down here. Does that go some way to answering the questions?

The CHAIR — Yes, that is fine, thank you.

Mr FORSYTH — Just to add to that perhaps, some of the soil testing for fertiliser application really only concentrates on the surface root zone, so it is less likely to give you trends, which is a problem. Also most of that testing is done in areas that are known to be acid, as Peter said, but it is not usually tested in areas where there could be an increase in the acidity problem.

The CHAIR — Do you have pine plantations in the catchment, or is it mainly red gums?

Mr FORSYTH — We have had extensive pine plantations in the catchment. The majority of those have been converted to blue gums.

The CHAIR — Has any work been done on the pine plantations looking at — —

Mr CRAWFORD — How fast they are acidifying or how acid they are?

The CHAIR — Yes.

Mr CRAWFORD — I do not think they have actually focused on the soil acidity. I am not an expert — you need to ask a researcher like Tom Baker or Phil Hopmans at the Forest Science Centre at Creswick and Heidelberg — but I think most of their research into soil has involved the nutrition of the plantations. Soil loss is another area they have looked at; I am not so sure about pH changes. They are in the process of completing a program where they are going around a lot of the forestry areas and describing the soils, which has not been done before. We had a general idea from a 1-in-1-million scale map, but I do not think there are too many soil profiles. Again the owner of the particular web site is keen to get that in there as well. Mark Imhof is the scientist and my boss, who runs that.

The CHAIR — Thank you very much for your time. It has been terrific.

Witnesses withdrew.

CORRECTED VERSION

ENVIRONMENT AND NATURAL RESOURCES COMMITTEE

Inquiry into impacts and trends in soil acidity

Colac – 4 September 2003

Members

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Witnesses

Mr T. Clarkson, Soil Project Manager; and

Mr P. Whinney, Soils Extension Officer, Department of Primary Industries.

The CHAIR — Thank you very much, Troy and Paul, for your time this afternoon. Can I just remind you that all evidence taken by the committee is taken under the provisions of the Parliamentary Committees Act and is protected from judicial review. However, any comments made outside the precincts of the hearing are not protected by parliamentary privilege. All evidence is being recorded by Hansard, and you will receive a proof version of the transcript next week or the week after.

Is the format that we used for our previous witnesses okay with you, Troy? If you give us the presentation, we will then ask you some questions.

Mr CLARKSON — Yes, that is fine. Paul and I are going to cover a bit of the acidification problem across Corangamite, and then we will go into more detail about our role as extension people getting the message out to the community and also how in the future we will get our messages out to the community through the development of our soil strategy and its implementation.

Slides shown.

Mr CLARKSON — The first slide shows what we have seen before. Basically the slides are looking at the different acid trends throughout the whole Corangamite area. As Doug mentioned, the stronger acidity problems are around the Ballarat area where the high rainfall areas are and also down the Otways near Colac.

This is a bit more of a close-up. This is the average surface soil pHs from 1973 to 1994, and this is very similar to what Doug showed as well. Again it shows the distribution of the major acidity problems across the south-west. These are stats. They show the surface soil pH in south-west Victoria: 3 per cent is between 5.3 and 5.5, 18 per cent is between 5.3 and 5.5, and obviously a high proportion is between 5.5 and 6. As you can see there is very little alkaline soil across the south-west.

As Doug explained, the sources of acidification are nitrogen. Nitrate leaches through annual systems, often through crops and pastures and so forth. Nitrate leaching is from animal waste, ammonium-based fertilisers, urea-based fertilisers and nitrate in irrigation water. In the Corangamite most irrigation occurs with the potato farming area around Ballarat. The next slide shows the acidification rates of various eco or agricultural types not only in Victoria but also in other parts of Australia, such as Western Australia and New South Wales. You can see here the acidification rates. Pasture crop rotation here is quite large; there are annual pastures here with lupin and cereals.

This next slide shows the changes in south-west Victoria when it comes to pastures. Here we can see the different depths of acidification. With the annual grasses and subclover the acidification rate is quite high in the first top 10 centimetres, which drops down from 10 to 20 centimetres. With perennial grasses and subclover the trends are similar. The NS stands for 'not significant', which means the data is not detailed so the database is not very good. but the few data points that we have indicate these trends. Perennials under white clover — there is no acidification or unimproved pastures.

Here we have an example of the changes in pH between 1939 and 1970. Basically this particular paddock is at Brewster. It is sheep with subclover. The acidification rate is 0.1, so it is quite low. However, acidification is happening. In comparison to this particular one where the acidification rate is 6.9, nitrogen fertilisers are included, and also there is a high percentage of subclover ground cover, which obviously will contribute to the acidification rates. What can we do with acidification problems? Through our extension work we try to promote soil testing. As we have discussed today, the number of farmers conducting soil tests is quite low. Through Paul's and my experiences we are probably looking at from 5 to 10 per cent in Corangamite who are doing soil testing. As a result some people are not putting in the lime needed or in some areas they are putting too much on their paddocks, which contributes to the acidification problem.

Another thing is applying lime, trying to encourage lime applications through our extension programs, and also encouraging hay silage, cuttings and so forth to be conducted in farming practices to try to increase that pH level. Response at a macro scale — regular soil testing; again, we do that through extension. We promote selection of value for money when it comes to lime, so working out whether there is value for money to add lime or whether acid-tolerant pasture species might be more applicable, and basically establishing the cause of lime responses. Each soil type has different lime responses depending on how much clay content is in there and exchange of cations, so working out what quantity of lime has to get a response specific to that soil type.

Also obviously at a macro scale, recognising that soil acidification has an impact on the soils and productivity and also increasing awareness that acidification has an impact on water quality, the environment and biodiversity.

Stronger partnerships with industry groups to deliver those messages is very important. Different extension programs are improving knowledge, attitude and skills in the maintenance of soil acidification.

Now I am going to talk a bit more about what has happened with extension in the past. From 2000 to 2002 the Natural Heritage Trust fund provided money through the CMA to put people on the ground to deliver extension activities and to improve the understanding of soil health in the Corangamite catchment, and over the two-year period we had over 1700 clients. Through the programs we talked not only about acidification as a major soil health issue but other issues such as waterlogging, soil structural decline, organic matter management, soil biota, fertiliser applications and so forth.

A lot of the extensions were a reaction to people ringing up and making inquiries; they also came through farm visits. We conducted various workshops, whole-farm plan courses and seminars and also produced a lot of information packages to get the message out there. Through the whole-farm plan courses we tried to promote the understanding of land and soil capability and to promote an awareness that each soil has to be managed according to its capability, resulting in a reduction of acidification rates and other land degradation problems in the area. Often the seminars were conducted with Landcare groups, and again the seminars were on soil health issues.

We got a very positive response to acidification and acid problems in particular, and through my dealings I found that people are aware of what acid soils are — it impacts on their productivity — but they have not got a good understanding, and they are not very familiar with the process of acidification and how it relates to the nitrogen cycle and so forth. To support our seminars, workshops and courses we provide information packages which explain the process of acidification and acid soils and methods of managing the problems.

Right now we are looking at ways of improving the extension on the ground. One way is to make the extension approaches more strategic, and as part of that we have the contract to develop the soil health strategy for the CMA, which we will be developing over the next four to five months. We will have technical experts from various research places working on input to its development, and they are familiar with soil health issues locally. We also have a steering committee which will steer the direction of the strategy to ensure that the actions developed through the strategy will be adoptable by community members. This committee comprises mostly community members and representatives from various industry groups such as Southern Farming Systems and South West Victoria Dairy.

Soil acidification is one of the issues that will be addressed by the strategy. The other issues are soil structural decline, acid sulphate soils, reduction in soil fertility, soil organic matter and biota management — also the management of soil lost through erosion and land slips. Again, with the success of the soil health strategy we will need to develop strong partnerships with industry groups, and we are currently doing that. We are working with Southern Farming Systems to work out its needs with soil health management. From there we will develop appropriate actions to empower those members to improve their management of soil health issues and acidification.

In conclusion, acid soils are a problem in south-west Victoria and the Corangamite area. Acidification occurs at various rates. On average topsoil has dropped 0.4 over the past 20 years and occurs on well-drained soils with high subclover pastures. Finally, DPI aims to address acidification through the implementation of the soil strategy in the future.

Mr HILTON — As part of your strategy process in terms of educating farmers about the issues of acid soil and what they can do to ameliorate the effects, to what extent do you think you would go beyond the application of lime in looking at any changes to farming practices?

Mr CLARKSON — That will certainly come into it, because in some instances the cost-benefit of using lime is not there, and that will come through in the developmental strategy. Another way of promoting that is through our whole-farm plan courses, where we identify the different soil values, properties and constraints and adapt management practices to suit that environment. One of those scenarios could be using more acid-tolerant species or changing practices according to acidification rates or acidity levels.

Mr HILTON — I suppose there is a certain amount of vested interest in this process, particularly from the fertiliser companies and the lime producers, who are probably not interested in their client hearing about alternative strategies. Would you agree with that?

Mr CLARKSON — I agree with that.

Mr HILTON — What do you think the solution is so that your message gets across rather than hearing it from another source that is promoting a different solution?

Mr CLARKSON — The way we normally deal with that is through looking at the various options when it comes to acid soils, whether it be changing the management practices, changing pasture species or the cost-benefit analysis of lime. Another way is to provide soil testing through the State Chemistry Laboratory, which has no vested interest and will therefore be more reliable and give more accurate feedback to land-holders on the cost-benefit of adding lime to their particular pasture or crop.

Mr HILTON — Are the costs of these independent tests — if I could use that word — significantly higher than the tests that they could get through Incitec Pivot?

Mr CLARKSON — I think Pivot generally does it at cost price and it varies up to about \$110 a test. Doug might be able to help me here, but I think it is around \$140 or \$150.

Mr CRAWFORD — A standard pasture-type soil test is \$176 including GST.

Mr CLARKSON — So there is a bit of a difference there. I generally find that farmers, particularly recreational and hobby farmers or those without a productivity bent, are more inclined to go to the State Chemistry Laboratory rather than Pivot for that reason. They want an unbiased result.

Mr HILTON — But if a farmer is looking at a very tight margin — and farming is marginal these days — I suppose a \$50 difference could be significant in whatever decision he or she makes.

Mr CLARKSON — It could be.

Mrs COOTE — Could I ask about the whole-farm plan. I was speaking about it to Paul before and how successful it has been. I understand that there are some tax implications if people implement it. Could you explain that to us?

Mr WHINNEY — The whole-farm plan courses that we run for property owners in this area are based on an aerial photograph and planning the farm to be run in a more sustainable manner. Imagine if all the fences were burnt out and they replaced fences on specific soil types. If they complete a whole-farm planning course and the plan is signed off and certified by certain people within NRE or consultants, fencing that is carried out on that property according to land classes becomes 100 per cent deductible in the year in which it is carried out, which is a great incentive for people to fence out their different soil types. Normal fencing on a property is only deductible at 3 per cent depreciation. So there is not a lot of incentive for farmers to put up new fences. Most of their fences are called 'repairs'; most fencing materials are for repairs. If they do a farm planning course, often they can then put the fencing where it should be for the right soil types and then grow the right pastures and crop species for their soil types.

Mrs COOTE — What percentage of farmers are doing this course in this particular catchment management authority?.

Mr WHINNEY — I suppose it would be up to 15 per cent of the population.

Mrs COOTE — Is that the best way of disseminating the information? Do you think, once they have done this aerial survey and they have got the bigger picture, that this is a very good method of disseminating information and long-term understanding of what they should be doing for the future? Is this something that we should be making a recommendation about encouraging?

Mr CLARKSON — It is not a new thing, really, is it? It has been going on for what — 15 years now?

Mr WHINNEY — For 10 to 15 years, I would say. It is not new.

Mr CLARKSON — So it is not a new approach, but I think it is very effective because it sets farmers back and gives them a good look at their properties. They are looking at the way they can manage their properties not only from a soil management perspective but also from a whole-catchment management perspective. If you get people from within the whole-farm planning groups working and living in the same areas, they can start looking at subcatchment plans as well, which is also a good thing, because then they can strategically look where they put their tree belts or their fence lines or whatever, and then water quality issues and so forth can also be improved and salinity problems, and that is what we are trying to encourage.

Mrs COOTE — So you see it as a really positive thing and you would like to see more than 15 per cent taking it up, yes?

Mr CLARKSON — Yes. If not whole-farm plans, that way of thinking, even if it is delivered through some other mechanism.

Mrs COOTE — Is that something that you could do a formal partnership with someone like the Southern Farming group? Is that the sort of thing, working with this farm management plan program as well?

Mr CLARKSON — Southern Farming Systems is actually looking at taking on that subcatchment planning process with funding as well in the future, particularly looking at the treatment of waste coming out of their crops. So that can be done. In the past a lot of it has been through *Landcare groups or it might just be a group of farmers in a particular area. The way we normally do it is that generally farmers either find out through flyers about the whole-farm plan courses or we might advertise in the local papers promoting the idea for people to attend whole-farm plan courses.

Mrs COOTE — How much are they?

Mr CLARKSON — They are only \$72.

Mrs COOTE — For how long?

Mr CLARKSON — Thirty hours, generally, of workshops; so it is a good deal. They get a big manual out of it.

Mrs COOTE — Who pays for the aerial photo?

Mr CLARKSON — They do, so that is in addition to that.

Mr WHINNEY — But they get pretty good value for it. The course is run through Melbourne University. It is an accredited unit of one of their courses — I am not sure what the course is, but it comes through Glenormiston College. We run them in partnership with the shires as well, the environmental officers and the shires — the Surf Coast Shire — and we utilise staff from the catchment management authority at times on various issues. Their biodiversity and water waste people come to deliver a session. We also use the State Chemistry Laboratory. Doug comes and gives the farmers a talk on soil testing.

Mrs COOTE — And there is action!

Mr WHINNEY — He gives it to them, and they go home enthused.

Mrs COOTE — I am sure they do. Thank you very much.

Ms DUNCAN — You were talking about the delivery of the Soil Smart program, and DPI delivered that in the format of those seminars. Who do you think are best placed to do things like that — DPI or CMAs? And you are doing the strategy for the CMAs?

Mr CLARKSON — Yes.

Ms DUNCAN — Who will deliver that?

Mr CLARKSON — This will be a combination of a lot of players, because the strategy will suggest actions for research. It will also probably recommend actions for industry groups. Hopefully DPI will have a role when it comes to extension and education. Historically DPI or NRE have been used on the ground to extend those activities, so that expertise has generally been with DPI or NRE, and I think that is probably why DPI has been responsible for that. That is its role, the implementation on the ground for those farmers.

Ms DUNCAN — The other issue is about DPI recommending the application of lime. We heard the other day that that is something the DPI has only just recently started to recommend, even though farmers have been doing it for a very long time. The answer to why it had not been done or recommended strongly — I am not sure in what form or why it was not really strongly recommended before — was something like, ‘We depend on good science. Before we will make a recommendation on something, we want to know that it is this, this and this and that it applies to this area’. Is there a change in that in terms of DPI’s attitude? Is lime seen as the remedy to soil acidity?

Mr CLARKSON — No, not at all. Again it comes down to the cost-benefit of adding lime. You know you get returns adding lime because lime does not have any soil or land degradation problems and so forth, and that

is why we recommend the soil testing. We do not recommend putting lime on anywhere without doing soil testing to work out whether it is economical to put the lime on and what are the most suitable amounts of lime you should be putting that soil.

Ms DUNCAN — When you talked about the soil testing at \$176, was that per farm or per paddock?

Mr CLARKSON — Per paddock. When you do this land classing sort of thing you put your fences according to your different soil types, so we generally recommend you do a soil test per paddock.

Ms DUNCAN — One?

Mr CLARKSON — One.

Ms DUNCAN — To what depth?

Mr CLARKSON — We do not just take one, we take replicates throughout the whole paddock to make it representative. Paddocks range in size too — sometimes they are large paddocks and sometimes they are small paddocks. It is up to the individual land-holder, obviously, how many soil tests he does, but if you are going to have regular cropping in particular paddocks you want to identify your different soil types and you want to do a soil test, and generally they recommend, particularly with cropping, that you should do a soil test every crop rotation, so that might be every five years with a paddock. With pastures it might be a bit less.

Mr WHINNEY — Five to 10 years, probably 5. If I can add something there on the cost of soil tests, the full work-up test that the State Chemistry Laboratory does for \$170 is a very comprehensive test for soil structure and a few other elements that are tested. It is very comprehensive, and it comes with an interpretation. Some of the fertiliser companies will do a cheaper test, but you get what you pay for. They do the pH, the phosphorous, maybe potash, and they do not bother doing all the other structural tests which the farmer may not need. So they can be pretty good value. If they are really only after pH and phosphorous, they do not need all the further information, so at times I recommend they run with Pivot or Incitec or whatever and get some cheaper tests done for the information they need.

Mr CLARKSON — It also sounds like a lot of money doing these soil tests, but probably in hindsight it is cheaper to do the soil test, because there are land-holders out there who are putting fertilisers on the ground which are not doing anything at all because the pH levels or nutrient levels are already at the right level or they are not making changes, so the cost-benefit of doing a soil test is probably quite high, and it is probably well worth doing..

The CHAIR — Paul, maybe you can answer this. We heard yesterday that it is actually the interpretation of the test that farmers need. Often they will get information, but they have no knowledge and get no advice or help to actually interpret what the test shows them. Sometimes their pH level might be down, and they instinctively run out and put lime on, but their aluminium levels are such that the lime will not be of any assistance anyway. Do you have any suggestions of how we get the interpretation of the tests as part of the tests?

Mr WHINNEY — The interpretation that comes from the State Chemistry Laboratory is a bit scientific for farmers. They struggle with it, and that is when I get the telephone call as an extension officer. They say, 'I have got the soil test here. It tells me that I need 13 kilograms of P' — and the farmer has no idea of what that is.

Also, the laboratory cannot recommend a particular product. It cannot say that you need superphosphate at whatever rate, because it is a registered product. So it has to stick with those numbers of kilograms of P per hectare. I really do not know how you get around that. Maybe it could give a bit more of an interpretation by saying, 'You need to spread a product such as a phosphorous fertiliser with a P content of 9 per cent'. But farmers really have trouble interpreting that.

Ms DUNCAN — They are not the only ones!

Mr WHINNEY — It is like getting a blood test or a pathology test back. We are not qualified to interpret them; we need a professional to do that. I really do not know who that next person is.

The CHAIR — There was a figure of 1700 participants in the Soilsmart Program. What is the staffing ratio? Paul, you are an extension officer — —

Mr CLARKSON — Back then it was just me.

The CHAIR — Back then it was just you?

Mr CLARKSON — Paul has just recently come into the soil program, so he has shifted into the extension role. I was in the extension role back then, and I will be looking after the development of the soil health strategy.

The CHAIR — So we have one soil extension officer?

Mr CLARKSON — At the moment, but there could be more with potentially more funding through the national action plan.

The CHAIR — Thank you for your time, gentlemen. Sorry, Paul did you want an opportunity to say anything?

Mr WHINNEY — No, I prepared this with Troy; he has done the delivery, and I am happy with that.

The CHAIR — Thank you for your time.

Committee adjourned.