

## CHANGES IN THE SCIENCE OF WEED CONTROL

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It was March 1983 when I was visiting Geoff Pearce that he convinced me to meet with you. - I am pleased to be here today to get acquainted with all of you who are very important to Australian agriculture.

I was delighted to be able to read the papers that have been presented. It really pleased me to see the great cross-section of papers that have been presented, and also to see the wide variety of new uses that you're reporting. Alf, you've done a great job of getting a conference together that allows the sharing of many research results.

What I would like to talk about today is not particular data or particular uses but my perception of the kinds of things that have taken place and are taking place in the science of weed control.

First of all, there is no question that there have been many, many changes. The first thing I noticed in your program is a great number of papers on conservation tillage. Now, can you imagine that being in a weed control conference five or ten years ago? No way. The other thing that impressed me is the many new chemicals which you have been reporting on at this conference. There has also been a significant change in the amount of chemicals needed to control weeds. Had someone read your proceedings five years ago and seen that 10-15 grams per hectare of a product was controlling weeds, you can be sure that there would have been a letter to the editor that said there had, indeed, been a misprint. That's a real change. The changes in weed control science have been much, much greater than in any other area of crop protection chemicals. No question about it. Probably no place in the world shows that better than here in Australia. You have kept in the forefront of weed science and have really made things happen. There have been many new chemicals which have come in and performed better than those before. As a result, new practices in agriculture have been made possible. One reason for availability of more new chemicals is the increased amount of research that has been done around the world in this field. The results you're seeing now are not research that was started two or three years ago - it's the result of a greatly increased effort in the 1960s and the 1970s. If you look at the number of companies that are doing research in agricultural chemicals today, it's only about half the number that was in this business ten years ago. But, if you look at the research budgets that are being spent on agricultural chemicals, those people who have stayed in the business have increased the dollars that have gone into the research effort. And, we're seeing the results of their research effort today.

One of the things that concern me about the future of this area is what kind of pay-back will be obtained. The product "Glean", which we put on the market two years ago, cost US\$40 M - not counting the cost of building the plant - by the time we marketed the first pound. That's got to be a little scary when you are doing the kind of research where you don't find that many new products that get into the market place and make a real success. But, it is also the kind of research that makes a real contribution to agriculture.

What has been the result of some of that research? I am sure we all have a little different impression. But, let me just tick off a few that I notice in going through your proceedings:

- . New adoption of practices that we haven't had before
- . New products have resulted in a great number of cultural changes
- . The farmer in some cases had to change his/her cultural practice to take advantage of the best qualities of the new products.

In other cases, it has been possible to take the tool and use it to do a better job of producing crops. There is no question that around the world one of the greatest problems agriculture faces is soil erosion - whether it be from wind or from water. One of the things that all of you must be proud of is the fact that the new weed control tools that have been introduced give the farmer a chance to do a better job of controlling soil and water erosion and promote the conservation of moisture.

It is said there is too much food - that we already know how to produce more food than we can use. Even with this, there is no question about the fact that the farmer wherever he is, in Nebraska or in Australia, must remain competitive and must increase his productivity or we'll not be able to continue to deliver low-cost food to the market place. Your new weed control practices certainly make that possible.

The quality of the crop that the farmer is delivering to the market place has improved. In the old days when there were many weed species that could not be controlled, there was great contamination of the crops as they were delivered. There really is very little excuse for that today.

The new products are environmentally safer than those that were used before; and in many cases, they're less toxic today than those that were used in the 50s and the 60s.

Let me comment on where I think the science is going - and going it is. The new compounds that are being put on the market today are better researched than any products previously marketed. The fact that we understand the mechanism of action and the basis of selectivity of a product like "Glean" before it was ever sold in the market place is a great contrast to the fact that we still don't know why or how 2,4-D kills plants must be a step in the right direction of this ever-progressing science.

With this new information we'll be able to better design a new chemical so it will do the kind of job we know it has to do. The better understanding has made possible the more sophisticated tools available to the researcher. When I go through one of our labs, as when I went through several labs here in Australia last week, I see the great advances that have been made in the tools with which a scientist has to work. Not only such things as the radioactive chemicals which were most helpful in determining the selectivity mechanism of wheat to "Glean" but also the other analytical tools that are now available. It is amazing that you can get a fraction of a part per trillion when you're analyzing a chemical in soil or in plants.

All of these things - the money, the tools, the new science will lead to ever-improving products for the future.

Another field that is bound to influence what happens in weed control is the whole area of biotechnology. Genetic engineering, molecular biology - call it what you will. You may know that we were able to take a tobacco plant which was very susceptible to a product like "Glean" and by selecting mutants with a single gene change found plants that were very resistant to "Glean". I don't know where this will lead; but, one thing we have to believe is that it will make a great deal of difference with regard to where the science of weed control goes as we better understand why a plant is resistant and why a plant is susceptible. If we can better understand why that happens in all kinds of plants, it will give us a new tool which we can use.

We in Du Pont are encouraged with the opportunities in agriculture and have just spent \$60 M in new agriculture chemical facilities for research. In addition to that, we are just opening a new research experimental station here in Australia - in New South Wales. This is a real commitment to agriculture and to Australia.

One of the great assets to the science of weed control has been the great cooperation in many parts of the world between academia, government institutions and private industry. The thing that makes science really work is taking a new invention and quickly transferring that technology to the user. Not only the great cooperation in academia and government and industry has helped that, but also there has been a great understanding of the needs of the market place.

What other kinds of things might well influence what happens to the future of weed control? Let me just cite a couple of examples. First of all, you have to be concerned about government regulations. In the biotechnology research area in the U.S. practically every federal and state regulatory agency wants to get involved in dictating how biotechnology research can be conducted. Governments must face up to the fact that here again we are only dealing with a tool. We've got to assign that responsibility to someone in government so that it does not interfere with progress in research. I'm convinced that will happen, but it won't happen easily. It will happen if people like yourselves get involved and help guide governments in this decision-making process.

The other area that we must continue to deal with is the public perception of chemicals. The best thing we can do about that is to make certain that all of us maintain our credibility. The worst thing that can happen to any of us, whether in the government area, farmer or in industry, is if a product is misused. We must be certain that all of the data is presented so that misuse does not occur. And, we can do that today better than we have ever been able to do before because we have more data on the new products than we've ever had. It's only in this way, as we influence the public and tell them the importance of the use of crop protection chemicals to produce a lower-cost, better quality food, that real progress will continue to be made in this area. There is a great tendency around the world, particularly in the third world nations, to look at the whole issue of property rights and say - there is no need for a patent system. A job that all of us must do, and one of the chores that GIFAP has assumed is to try to make the case that one of the best things that you can do to encourage the transfer of technology is for the country to develop a good patent system which will protect the property and the millions of dollars that must be spent on delivering that new product to a particular country.

Australia to me is a good example of the cutting edge of the adoption of weed control science. There are some exciting changes that have occurred in weed control science so far. I do believe you have only seen the very tip of the iceberg. It is exciting to be in this kind of field. There is an old Chinese toast that says - "May you live in interesting times". Indeed, all of us do today, and we will continue to see great changes in the future.

It's good to be with you. Thank you.