

Government's attitude to product development - development protocols

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INTRODUCTION

There are few people who would seriously challenge government's responsibility to be involved in the development of pesticides. Those who do in this environmentally conscious age, are not attuned to modern trends. They could be potentially dangerous to their own industry and the community generally. It is a fact of modern day life that "caveat emptor" is a rapidly fading philosophy and that of "big brother" looms larger and larger. The real problem is to approach the pesticide development problem in a spirit of mutual responsibility and trust. Thus government can protect both the community and the manufacturer by acting as a referee. This, of course, assumes the manufacturer is sincere in his desire to sell a crop protection service at a profit rather than sell a product just for profit.

Several areas of product development are considered to be of interest to government. These are, safety to users of the pesticide, safety to the consumer of the end product on which the pesticide is used, safety to the environment and to non-target species. It seems inevitable that as the community develops the concept of a total environment, our consideration of pesticides will become more complex. As well as all these it is most important to consider efficacy. It is with this last aspect that I am concerned in this paper.

No matter how acceptable a chemical is on grounds of safety it is of no use unless efficacious. Somewhere there is a need for selectivity and some compromises between safety and efficacy. We must always tend to sacrifice some efficacy for improved safety. I would suggest the reverse (i.e. sacrificing some safety) will decline as an option.

PURPOSE OF TESTING

I am indebted to Unterstenhofer (1976) for a sound summary of objectives of field trials with pesticides.

"Field testing is an integral part of a pesticide development program. It is conducted by laying down exact experiments which must produce reliable and meaningful results and hence are carried out at different locations under varying soil, climatic and farming conditions in different years, in order to be able to prepare and issue generally valid recommendations for the commercial use of the pesticide concerned.

The development of pesticides takes place in the laboratory and in the field. As a rule, the laboratory experiment is the actual research medium whilst the field trial serves the purpose of

determining the efficacy and side effects of a pesticide under field conditions of commercial application. Field trials must be carried out under uniform infestation conditions with several replications. The following preliminary requirements must be satisfied: provision of suitable test site, trained personnel, efficient applicators, and the personal interest of the experimenter".

ROLES OF GOVERNMENT IN PRODUCT DEVELOPMENT

I consider government to have several roles:

- (a) to define and/or co-operate in defining objectives
- (b) to undertake some complementary and/or co-operative testing
- (c) to lay down and/or assist companies in developing suitable testing programs (protocol)
- (d) to monitor and judge results of company trials, and
- (e) to undertake work for uses that can be clearly defined as not offering a reasonable reward for a company's efforts, e.g. small crops without much prospect of increase in a medium to long term.

I do not think government should become independently and deeply involved in testing new herbicides for large use areas. This often leads to misunderstanding and the chance of undesirable compromises, often it is just a waste of time. It is not the job of government to direct the marketing policy of companies.

WHAT TESTING IS REQUIRED

Over the last two years or so many people in this country have been thinking about this problem. In the main they have been using the "Guidelines for Testing Herbicides", of the European Weed Research Council as a possible basis to develop methods suitable for Australia. I have read some of the guidelines produced. These seem to be too detailed for use in Australia.

PROBLEMS ARISING FROM THE USE OF EUROPEAN GUIDELINES

I consider the European guidelines have two main problems. Firstly the detailed set of guidelines is devoid of flexibility and imagination and becomes simply a check list of things to be done. This ignores the fact that those producing the results are scientists. These people require that their work has fundamental qualities of uniqueness and imagination so necessary to research. If we lose this we lose much more than we can gain.

Secondly, the grouping of crops may suit European conditions but will cause serious problems and ultimately lead to either complete confusion, or an unwieldy set of check lists, in this country.

Obviously the European system is fairly unconcerned with irrigated summer cereals and certainly not with irrigated wheat. To use its approach we should have categories for winter cereals, summer cereals, dryland summer cereals, irrigated summer cereals in wide and narrow rows. In these categories, season of growth, cultural techniques used, weeds encountered and irrigation practise can all differ. Fibre and oil crops have similar variations. In N.S.W. commercial cotton crops are grown under irrigation in inland areas.

Sunflowers are grown in many areas, with or without irrigation, in narrow and wide rows, with flood or furrow irrigation. Some winter oil crops, rape, safflower, linseed are more akin to wheat in terms of weeds, culture and machinery.

The European system is inappropriate to the mixture of winter and summer crops which are grown using a number of quite different cultural operations.

THE NEED FOR GUIDELINES

The concept of producing a set of guidelines, or, if you wish, protocols for herbicide development for Australia is laudable because it is necessary. However, we must first define what we want and design our guidelines on those bases. I can suggest several needs for registration.

- (1) To produce results on which to examine the performance of candidate herbicides.
- (2) To test one or more commercial herbicides under different cultural conditions, geographical areas or over a number of crop varieties.
- (3) To test a herbicide for a particular use in different situations, such as total vegetation control or aquatic weed control.

We need different approaches in each case but we must leave weed researchers to design the trials. I am tempted to assume that a basic premise of tight rigid "guidelines" is that no-one does a literature survey.

The primary objective of testing for registration must be to produce sufficient evidence about the herbicide's performance to allow it to be marketed in as short a time as possible commensurate with safety. At best, evidence produced for registration can only allow a good estimate of probable broad acre performance. Very specific guidelines will almost surely lead to:

- (a) greatly increased cost of testing without necessarily giving more reliable evidence. This may deny farmers the use of desirable herbicides, or
- (b) companies will tend to ignore the guidelines to avoid increased costs and force government to accept a greater commitment, or
- (c) results produced using the guidelines would be relatively unchallengeable and if there are omissions in them or new factors emerge, a serious situation could arise, or
- (d) most people trying to work in the system will become frustrated and confused and a very effective and productive liaison built up over years destroyed.

One could be excused for concluding that if we really tried we could write a set of guidelines which would delight the heart of any bureaucrat, but prohibit the registration of any new herbicides.

WHAT IS THE ALTERNATIVE?

Some years ago in N.S.W. we began using a set of guidelines for testing herbicides. These guidelines are completely non-specific in terms of crop and situation. They draw attention to several important plant-climate-soil-herbicide relationships and can be used as a base on which to prepare protocols for most situations.

Research needed to support claims for registration should cover a number of aspects. The details of trials undertaken will vary from crop to crop and on the performance characteristics of the herbicide under consideration. Attention should be given to the aspects enumerated below.

It is important that an experimenter knows two things:

- (1) the agronomy of the crop with which he is working, and
- (2) the behaviour of the herbicide being used in terms of soil, plant (crop and weeds), and other factors.

Without that knowledge I would predict troubles ahead no matter how detailed the guidelines. With the knowledge, the worker can avoid unnecessarily complicated trials to obtain the necessary information.

ASPECTS OF PARTICULAR ATTENTION

A set of guidelines, which is available to company personnel, and which includes a number of important aspects for consideration in producing data is used in N.S.W. These guidelines do not attempt to provide recipes for testing, but rather recognize that company workers are competent to interpret the issues involved so allowing desirable flexibility in research design. The guidelines recognize the widely different conditions and herbicide performance throughout Australia (and within the State). The guidelines include such obvious aspects as crop tolerance, efficiency of weed control and method of application, but also cover other important aspects.

Climate - The great variation in climate requires that testing should be in enough situations to represent the range in which the herbicide will be used. Rationale in this is based on the premise that a wide screen throughout the State is likely to reflect many climatic variations.

Soil - Conditions to be satisfied in this regard include soil persistence, adsorption characteristics, soil movement, cultural practices normally used for the crop, effect on following crops and, of course, soil type. Obviously this is most important in the use of pre-emergence herbicides.

Weed control - Serious attention must be given to the control or inhibition of important crop weeds and a demonstration of a yield benefit. An issue of some consequence is the level of weed control achieved. Normally an 85% level of control is a sound rule of thumb, but individual circumstances may alter this.

Crop tolerance - Crop reaction to higher than recommended rates, at different growth stages and of transient application effects on yields are important.

Method of application - Consideration is given to crop safety and weed control with all methods and rates of application. Factors include spray volume, incorporation method, spray pattern effects, and applicability of the research method to normal farmer situations.

Other - The guidelines also include aspects not in major categories. These include, use of weed free controls in early plot testing, replicated plot and commercial testing, varietal testing, range of cultural practice used, effect on other desirable plants, sufficient weed populations to show economic benefit, testing against currently used herbicides and particular information pertinent to the particular herbicide.

Our opinion is that the use of these guidelines has significantly reduced the risk of ineffective herbicides reaching the market and reduced the cost of damage to target and non-target crops. They also have allowed confident recommendations to be made earlier by both companies and government.

CONCLUSION

If experimenters are properly trained and know their resources and use the knowledge of others to guide them, (and I can't agree they should be any less equipped), then we do not need to establish detailed expensive-to-undertake protocols. We should make use of the information we already have and use it in a truly professional way.

REFERENCE

Unterstenhofer, G. (1976).- Pflanzenschutz Nachrichten Bayer 2.

