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ECONOMICS AND THE LAW RELATING TO FLEXIBILITY OF CHEMICAL RATES

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ECONOMICS AND THE LAW RELATING TO FLEXIBILITY OF CHEMICAL RATES

Summary

In New South Wales, farmers are legally prohibited from applying chemical rates less than specified on chemical labels. In some Australian states, advisors and consultants are prohibited from advising farmers to apply chemical rates which are below label rates. It is argued that these laws are not just environmentally unsound but that they can also reduce farmers' profits. Arguments in favour of chemical rate flexibility are presented. Current legislation in Australia is reviewed to identify areas in need of reform.

Introduction

The rates at which farmers use inputs such as fertilizers vary from year to year and from paddock to paddock. However agricultural chemicals such as pesticides, herbicides and fungicides are often considered to be inputs which must be used only at officially recommended rates or not at all. In some Australian states this attitude is embodied in law. In this note I argue that while there are good reasons for imposing maximum limits on usage of many of these chemicals, there are a number of very good reasons why, in many circumstances, use of sub-label rates should be facilitated. The current legislation in each Australian state is reviewed and areas in need of reform are identified.

Reasons for Downward Flexibility in Chemical Use

Upper limits on chemical rates reduce the probability of high levels of chemical residues accumulating in agricultural produce. Preventing use of sub-label rates does not serve this purpose. Low rates result in even less risk of chemical residues so if this is the prime concern in legislation, low rates should be encouraged.

Jensen and Kudsk (1988) showed that the efficacy of herbicides can be substantially affected by temperature and humidity. They proposed that rates be adjusted in response to these climatic variables. However, label rates are generally specified at levels sufficient to kill almost all of the target organisms almost all of the time. There is no direct consideration of economic or local environmental factors in the determination of label rates. Many farmers are more concerned with maximising profits rather than with minimising weed or pest survival. These farmers may be receptive to advice about economically optimal chemical dosages. The optimal dose will depend on many factors. The effects of temperature and humidity mentioned above are obvious examples. However the optimal dose can also be affected by variables which have no effect on herbicide efficacy. For example, the lower the pre-treatment pest density, the lower will be the optimal dosage (Moffitt 1988). Even variables outside the biological system, such as chemical costs and output price, can influence the optimal dose, with lower rates favoured by high chemical costs or low output prices (Talpaz et al 1978, Rawat et al 1987).

Optimal treatment rates can also be influenced by the type of rotation practised. For example, Abadi Ghadim and Pannell (1989) showed that reductions in herbicide rates in the crop phase of crop-pasture rotations may be beneficial. The loss of crop yield can be more than

offset by the gain from higher subsequent pasture production and lower herbicide costs.

Resistance development is another consideration. For all types of pests, higher chemical treatment rates increase selection pressure and result in faster development of resistance to the chemical (Georghiou and Taylor 1977a 1977b, Gressel and Segel 1982). It has been shown that it can be economically sensible to maintain chemical effectiveness for longer by reducing treatment rates (Hueth and Regev 1974) and farmers should be given the opportunity to do so if they wish.

Finally, many farmers are concerned not just with profits but also with avoiding risk and uncertainty (Anderson et al 1977). The degree of risk aversion varies widely between individual farmers (Bond and Wonder 1980). If, as is often claimed, lower treatment rates increase uncertainty about the level of final profits (Feder 1979, Robison and Barry 1987) different farmers will be more or less inclined to take the risk of cutting rates. It is illogical that farmers who are less averse to risk are forced to adopt very risk averse control strategies by being restricted to label rates.

For all these reasons, legislation which restricts farmers to using only label rates not only results in unnecessarily high usage of toxic chemicals, it can also make farmers worse off.

On the other hand there may be circumstances in which the level of control selected by individual farmers is less than would be optimal for society as a whole. This may occur, for example, where lower levels of control by one farmer will increase pest levels for neighbouring farmers. In this circumstance legislation to ensure adequate control may be warranted. However such legislation should be targeted at particular pests for which it is appropriate.

Agricultural Chemicals Legislation in Australia

Being a state responsibility, there is variation in the legislation governing use of agricultural chemicals throughout Australia. Relevant bodies in each state and territory were approached with the following questions:

(a) Is there a maximum legal rate at which each chemical may be applied? If so what are the penalties faced by producers who exceed this rate?

(b) Is it legal for producers to apply rates of chemicals less than the recommended or label rate? If not what are the penalties faced by producers who do cut rates?

(c) Are agricultural consultants and advisers (private and government) legally prohibited from advising producers to use chemical rates other than those specified on chemical labels? If so what penalties are faced by advisors who breech this law?

No replies were received from the Australian Capital Territory or the Northern Territory. Summaries of the responses from each of the states are shown in Table 1. At present, producers can legally choose to cut rates at their own risk in Victoria, Western Australia, South Australia, Tasmania and Queensland. In South Australia, there is currently no legislation in force. According to a 1987 amendment to the South Australian legislation, chemicals must be used according to label instructions unless authorised by the Minister of Agriculture. However this amendment has not yet been proclaimed and, even when it is proclaimed, use of sub-label rates will not be deemed a breach of the law (M. Hirsch, personal communication).

Table 1: Laws relating to rate flexibility in each state

	Vic	WA	NSW	Tas	SA	Qld
Maximum legal rate?	No	Yes	Yes	No	No	Yes
Maximum penalty		$2500	$20000			$2400
Minimum legal rate?	No	No	Yes	No	No	No
Maximum penalty			$20000			
Private advisors flexible?	Yes	Yes	No	Yes	Yes	Yes
Govt advisors flexible?	No	Yes	No	Yes	Yes	Yes
Maximum penalty			$5000			

Maximum residue limits apply.

Sources: see acknowledgements section.

The state with the most restrictive laws is New South Wales where legislation prohibits all rates other than the label rate. In view of my earlier discussion, this is most unfortunate and, given the professed attitude of the current New South Wales government toward over-regulation of the private sector, somewhat ironic. It might be argued that, although irrational, the law is relatively benign. No producer has yet been prosecuted for using sub-label rates and, given the difficulty of policing the law, such a prosecution seems unlikely. Despite the lack of prosecutions, however, the law is widely known to exist and I would argue that it still has an undesirable impact. It affects the thinking and behaviour of farmers, advisors and administrators. While many farmers might be willing to break the law to make profits, others will not. Even farmers who do not feel constrained by the law may believe that it is based on impartial scientific evidence and choose to follow it on this basis. Others may see the law as an indicator of what is and is not socially acceptable behaviour. Another impact of the law is the constraints it places on the activities of researchers. It is bound to discourage research into use of alternative chemical dosages. Indeed it has been argued to me that, because of the law, my research into the determination of economically optimal herbicide rates is not relevant to New South Wales.

At least as important as allowing producers to cut rates is allowing their consultants and advisors to advise on rate cutting. Without this, there is no point in conducting field experiments or economic analyses to provide the managerial information farmers need to make decisions on optimal chemical rates. In New South Wales off-label advice cannot lawfully be given by government or private sector advisors. In Victoria, only private sector advisors can do so. Like the law which directly relates to farmers, these laws have an influence on the type of research which is conducted and, thus, on the type of advice which can can be given. To the extent that herbicide research is relevant to other states, these restrictive laws have ramifications beyond the states in which they directly apply.

A discussion of off-label advice needs to recognise the issue of legal liability under civil law. In Western Australia, when off-label advice is given, the liability for lack of efficacy passes from the chemical company to the person giving the advice. However the risk can be partly or wholly passed to the farmer if he or she is sufficiently warned (M.L. Poole, personal communication). If advice given is based on professionally conducted research and farmers are made aware that lower

rates do lead to lower pest mortality and greater variability of pesticide efficacy, and that any rate which may be optimal in the long run will not necessarily be so in any particular year, there should be little need for concern about legal liability. In short, legal liability need not be a reason for avoiding giving advice on sub-label chemical rates.

Concluding Comments

A recent survey shows that at least some farmers in Western Australia are using sub-label herbicide rates (Dolin et al 1988). My experience is that many farmers are doing so. At present they are determining the optimal rates on a trial-and-error basis. Their subjective estimates of optimal rates could be improved by relatively objective advice based on field trials and economic analyses.

In 1978, the United States Federal Insecticide, Fungicide and Rodenticide Act of 1947 (Public Law 95-396) was amended to make lawful "applying a pesticide at any dosage, concentration or frequency less than that specified on the labelling" [7 USC 136, (ee)] (Moffitt 1988). Similar amendments should be made in all Australian states where producers and/or their advisors do not enjoy this degree of flexibility.

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