

AGRICULTURE AND SUSTAINABLE RESOURCE MANAGEMENT IN NEW ZEALAND: A CASE STUDY OF AGRICHEMICAL USE

David R. Penman and Rosalind D. Buick
Department of Entomology and Animal Ecology
Lincoln University, Canterbury
New Zealand

INTRODUCTION

Definitions of sustainability will vary depending on the circumstances, but it seems that we should view sustainability as a goal rather than a specified set of practices. The concept of sustainability generally involves one or more of the following:

- A focus on economic food sufficiency, community development, and careful maintenance of the ecosystem.
- Improvement of the productivity of natural resources to ensure that food supplies are adequate for any growth of the population or the economy.
- The production of safe, wholesome and nutritious food which promotes human well-being.
- A long-term view, to avoid negative consequences of agriculture.
- Economic returns to farmers to ensure the continuation of the family farm and rural communities.
- Compliance with community norms and social expectations.

In New Zealand, the philosophy of sustainability is now widely accepted but the debate remains as to what decisions and practices enhance sustainable resource use, and what indicators of sustainability are appropriate. Sustainability is much more than financial viability, although this has been a primary indicator in the past (Australian Agricultural Council 1993). Environmental, ecological and social factors are now also key indicators, but there is difficulty in determining specific indicators and their relative balance, particularly when there is a wide variety of land uses.

THE RESOURCE MANAGEMENT ACT

New Zealand has recently enacted legislation (the Resource Management Act) to promote the improved management of natural resources. To achieve this, the Act focuses on sustainable management rather than sustainability. It is 'process' driven rather than being directed at a particular 'state'.

The Act defines sustainable management as: "... managing the use, development and protection of natural and physical resources in a way, or at a rate, which enables people and communities to provide for their social, economic, and cultural wellbeing, and for their health and safety while:

- (a) sustaining the potential of natural and physical resources (excluding minerals) to meet the reasonably foreseeable needs of future generations; and
- (b) safeguarding the life-supporting capacity of air, water, soil, and ecosystems; and
- (c) avoiding, remedying, or mitigating any adverse effects of activities on the environment".

Agriculture is a subset of resource management, although a very important one, especially in New Zealand. A definition of sustainable agriculture for New Zealand has been proposed by the New Zealand Ministry of Agriculture and Fisheries (MAF 1993) as "the use of practices and systems which maintain or enhance:

- the ability of people and communities to provide for their social and cultural well-being;
- the economic viability of agriculture;
- other ecosystems influenced by agricultural activities; and
- the quality and safety of food and

fiber.”

Agriculture must direct its approach to sustainable management within the confines of the Act, which allows for regional variations provided the principles of the Act are followed. Agriculture has many practices which may contradict the principles of sustainable management, such as the use of agricultural chemicals, waste disposal and land development. Where agricultural activity may have a significant environmental impact, Resource Consents are required. These involve an assessment of impacts, and possibly some comparison with alternatives. An example of a Resource Consent may be effluent disposal from a pig farm, where wastes applied to pasture may have a significant impact on groundwater quality.

Since the Act does not prescribe particular standards, many acceptable practices will be established only through case law. Establishing Resource Consents will set benchmarks for standards, and monitoring will be required to assess any significant adverse environmental impacts. If these are detected, standards could then be modified.

Of real concern to agriculture is the possibility that standards may restrict common agriculture practices and so limit financial sustainability. The availability and use of agricultural chemicals (pesticides) is a case in point. Originally, the processes for managing these chemicals and other hazardous substances were to be covered by the Act. However instead, agricultural chemicals have now become the subject of separate legislation, the Hazardous Substances and New Organisms Bill (HAZNO).

The HAZNO Bill has the following purpose: “To manage the harmful effects of hazardous substances and new organisms to protect the environment, the health and safety, and the economic, social and cultural well being of people and communities so as to enable the optimum net benefit to be achieved”.

The Bill provides for the establishment of an Environmental Risk Management Agency (ERMA), which will be responsible for regulating a wide range of hazardous materials, including agricultural chemicals, and new organisms including introductions for biological control and genetically modified organisms. The RMA and HAZNO legislation will, therefore, have a significant impact on agricultural practices.

IMPACT ON AGRICULTURE

Use of Agricultural Chemicals

There is little data on the use of agricultural chemicals in New Zealand. As part of the 1989 report (MacIntyre *et al.* 1989) sales data were obtained. The key elements were:

- Herbicides were the most common pesticide, particularly in pastoral agriculture.
- Little use is made of insecticides or fungicides in pastoral agriculture.
- The removal of the government subsidy reduced herbicide use.
- There has been an increase in fungicide use, and to a lesser extent insecticide use, with the expansion of horticulture.

There is as yet no requirement for comprehensive monitoring of agrichemical use, but some marketing organizations require that farmers submit records of pesticide use. Implementation of new legislation is likely to eventually lead to greater reporting requirements, and the HAZNO Bill incorporates the principle of “cradle to grave” tracking of hazardous compounds.

The use of agricultural chemicals can have long-term consequences. This can be illustrated by the widespread use of DDT in New Zealand up until 1969 for pest control in pastures. The consequence of this, a recommended agriculture practice at the time, has been contamination of some soils with the metabolites of DDT to levels that restrict dairy production from these soils today. Land use options are, therefore, constrained by past agrichemical use. The HAZNO legislation will be formulated to ensure that effects such as this in the future are minimized.

A further consequence is the disposal of old chemicals and containers. Although regional authorities are required to provide facilities for disposal of chemicals, few have yet been able to do this. Old dump sites are being investigated for evidence of environmental contamination and the possible need for “clean-up”.

Response of Farmers

For many years, it was accepted that farmers have the right to use agricultural chemicals with minimal supervision. Increasing public concern is now requiring the adoption of new attitudes and procedures. The current approach towards government in New Zealand is to minimize central authority and maximize self-regulation by the

industry, with a strong influence from market forces. Given this environment, the response of primary producers was to form a working party to develop a process for self regulation.

Programs are now being developed to ensure that farmers and growers understand, and are prepared to act on, agreed standards for the use of agricultural chemicals, and also that the use of agricultural chemicals safeguards access for New Zealand produce to domestic and international markets. The "Growsafe" courses, one of one day and an advanced course taking three days, are designed so that farmers learn the safe, responsible and effective use of agricultural chemicals.

Response of the Market

New Zealand now operates an open market economy. Given that sustainability issues have a strong "people" orientation, market opportunities are available for products that are produced within the philosophy of sustainable management. Some marketing organizations are now requiring all suppliers to be "Growsafe" trained as the first step in quality assurance. The "Growsafe" label may also be used by producers, provided they are trained and their practices audited by an independent agency.

Market opportunities are developing for products produced under "organic" principles or with "reduced chemical" use. New Zealand has

adopted a "clean and green" market strategy. Achieving this demands a partnership of producers, marketers, educationalists and government.

The use of production practices compatible with sustainability may also be of increasing importance as "non-tariff" or "technical" barriers to trade (Hillman 1991). With the conclusion of the GATT round, we should expect increasing use of non-tariff barriers to restrict trade. The use of agricultural practices that are environmentally damaging may well be used as a barrier to trade. As trade in food products becomes more widespread, the issue will need increasing attention.

Response of Educationalists

Agricultural education tends to be inherently conservative, particularly within the mainstream disciplines. The emphasis has historically been on maximizing production. In contrast, institutions focusing on natural sciences tend to study how to protect natural systems with minimal inputs. This dilemma is illustrated in Fig. 1. The challenge is to link the "two biologies". Successful attempts at integration may come from some of the peripheral disciplines such as entomology and plant pathology. The challenge is even greater at times of declining resources, when the tendency of institutions is to look inwards and to seek new paradigms (Lampkin

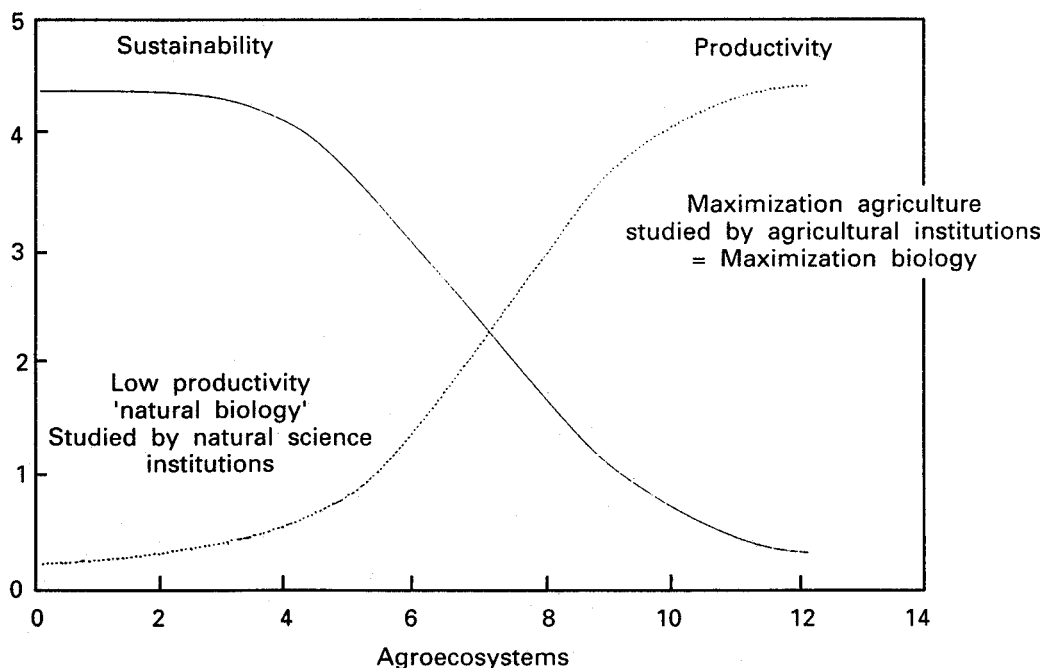


Fig. 1. The sustainability - productivity maximization dilemma faced by agriculture

Source: Whalon and Penman 1991

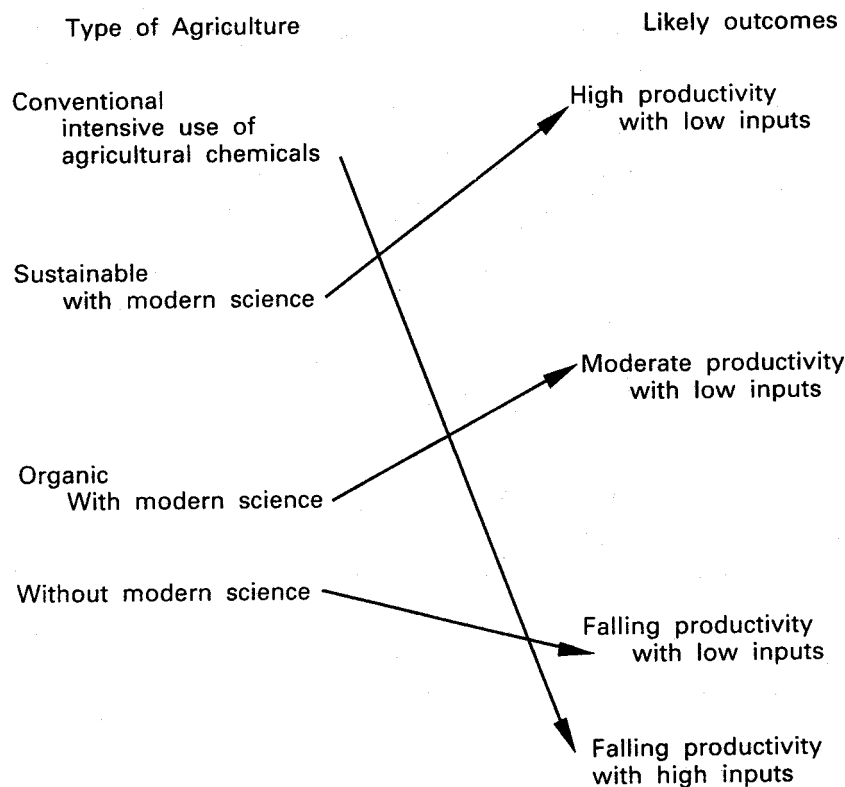


Fig. 2. Possible technological pathways for future agricultural development

Source: Whalon and Penman 1991

1991, McCrae *et al.* 1989). However, sustainability must become a key component of agricultural education.

Response of Researchers

The research community is making progress towards sustainable solutions. Solutions will not come from an emphasis on “reductionist” science, but will require teams to find interdisciplinary paradigms. Social, political, and economic issues plus technological solutions will all be important.

There are a number of future technological pathways for agriculture (Fig. 2). Many of our current practices, e.g., agrichemical use, may not be sustainable. New solutions will require a substantial investment in research and extension if productivity is not to decline.

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DISCUSSION

Dr. Saleem Ahmed of Hawaii commented that New Zealand is one of the few countries in the world where herbicide inputs for pastures are higher than for field crops. He asked whether similar information is available for fertilizers, and Dr. Penman thought it probably was but regretted that he did not have the figures immediately available. Dr. Penman pointed out that fertilizer use has been falling in New Zealand with the removal of government fertilizer subsidies.

Dr. Hong pointed out that all societies, including New Zealand, have been pressing for maximum production and forgetting about sustainability. Agriculture is now changing, as are the demands on agriculture made by society generally. He was doubtful whether agriculture would be able to change on its own initiative, without wider changes in social values and structures of society as a whole. Dr. Penman suggested that New Zealand should try to maintain productivity, but using sustainable practices. He agreed that this would be a very difficult process. Dr. Hong felt it might in fact be contradictory at times, in that an emphasis on productivity is likely to mean a loss of sustainability.