

Some of the problems facing agriculture in Australia

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* A review based on information provided by the States and the Northern Territory in the six previous papers.

Introduction

Political decisions in Australia and overseas have more influence on the profitability of agriculture than research findings. Nevertheless, research is essential if Australian agriculture is to remain viable and competitive. Many problems are regional in nature, some are listed in the State papers and most are receiving attention. There are, however, a number of wider issues which will need additional inputs in the future. They are complex and inter-related but can be grouped under three broad headings:

- The development of management systems to maintain or increase agricultural productivity while preserving soil and water resources.
- The need for plant improvement programmes for current and potential crops.
- Socially-related factors like the cost of labour and the consumer's demand for a quality product.

Management Systems

The increasing awareness by the urban and rural communities of the need to protect the productive potential and stability of the environment has already had a profound effect on agriculture. The term environment is used to include soil degradation through cropping or erosion, water quality and related problems, as well as the more emotive issue of pesticide use. Suitable long-term management systems must be developed.

Water Use Efficiency

One of the most pressing problems is to make better use of increasingly scarce and costly water supplies. More should be known about the physiological basis of water use efficiency and salt tolerance in order to maximise returns from irrigation and rainfall. On the assumption that sunlight is rarely limiting and nutrients can be supplied, water is the critical factor in most Australian agriculture.

Agriculture has, to a degree, squandered irrigation water in the past and this has contributed to rising water tables and increasing salinity. Little is known about the long term assurance of ground water supplies or the effects of pumping deep water to the surface. The problem of efficient water use is Australia wide and extends to removing excess water from the farm or region. Many irrigation layouts need to be redesigned.

Water Quality

There is a need to develop strategies and systems to cater for poor-quality water and restricted allocations. Changing land use patterns, particularly in Western Australia, southern NSW and parts of Queensland, are aggravating salinity problems. It will be necessary to breed varieties of crops and

pastures that have greater salt tolerance to permit some production from salt affected areas. Co-ordinated action between the States on the Murray/Darling Basin is essential. A number of proposals to this end were developed at the workshop at Tatura earlier this year.

Soil Stability

All States are experiencing problems with soil fertility, structure and stability. This also affects water intake and retention. The question is often related to the expansion and greater intensity of cropping and emphasises the instability of present farming systems. Only now are the effects of previous poor rangeland management practices and over-stocking being recognised. More work at the plant/animal interface is needed to get to grips with this very complex situation.

Acid Soils

Crop and pasture yields have been adversely affected by acid soils, particularly in higher rainfall areas of NSW and Victoria. This is associated with minor elements. Further information is needed on the relative tolerances between and within crop species to acid soils and factors such as aluminium toxicity. More data are required on management practices to prevent or reduce the rate of acidification.

Minimum Tillage

Rising costs of machinery and energy and the increasing need to preserve soil structure have resulted in a rapid adoption of minimum tillage techniques. Western Australia leads, with perhaps 25% of the crop in some areas being sown without traditional cultivation. The Northern Territory is looking at the technique to develop a cropping industry.

Satisfactory machinery needs to be developed to cope with a range of situations and the subject clearly lends itself to a multi-disciplinary approach.

Insufficient is known about the effect of stubble retention and monoculture on pest and disease incidence and whether the practice will lead to undesirable changes in the weed spectrum. Under minimum tillage in Western Australia, for example, annual brome seems to be replacing annual ryegrass. The effects of extensive use of herbicides must be monitored.

There is a need to learn more about how and why minimum tillage affects yields. This would include studies of fertilizer requirements and water use efficiency. A simple, reliable means of describing soil structure to explain germination and emergence problems would be valuable. Models of tillage/yield/erosion relationships might help in the longer term.

Use of Grain Legumes

As an aid to maintaining fertility most States see a place for dryland grain legume crops. Chickpeas, guar, lupins, soybeans and field peas are among those being assessed.

Plant improvement

There will never be enough plant breeding to meet the demand for higher- yielding, disease-resistant varieties with desirable agronomic characteristics. Many breeders are largely occupied with maintaining yield and quality standards to meet new disease strains and new market requirements.

Tissue culture seems to offer great potential for breakthroughs in breeding and more resources should be allocated to it.

Preparedness for Exotic Pests and Diseases

It must be expected that additional exotic pests and diseases will be inadvertently introduced to Australia in spite of strict quarantine provisions. Authorities have a responsibility to anticipate potential new pest threats and to develop contingency plans to overcome them. This includes introducing resistant materials to breeding programmes wherever possible. An urgent problem at present is the need for improved varieties of medics and sub- clovers resistant to exotic aphids.

Horticultural Crops

There is a continuing need for virus-tested planting material and often for further introduction and evaluation of overseas strains. This applies to established crops like stone fruits, which are facing market changes, as well as to crops not at present being grown commercially in Australia. There is enormous scope for genetic improvement in tropical and sub-tropical crops, which have received less attention in the past than temperate crops.

Breeders must play a greater role in developing plants that suit production systems and harvesting methods.

New Crops

Energy crops are no longer in the limelight but the attraction of a renewable energy source is still there. A number of hydrocarbon crops, such as guayule and buffalo gourd, are being assessed and some work continues on crops like jojoba. These must be seen as possibilities in the long term only. Information on feasible alternatives to wheat is required in case a world oversupply situation arises again. More work on developing Australian native plants as ornamentals or for cut flowers is justified.

Genetic Resources

Access to local seed collections and budwood repositories is essential for successful breeding and improvement schemes. In July, Standing Committee on Agriculture will consider recommendations on the establishment of eight genetic resource centres in Australia. Several are already operating to varying degrees but others must be started from scratch.

Labour costs

With rising labour costs new plant types and management techniques must be developed to suit mechanical harvesting. The need is greatest in the horticultural area.

Postharvest Technology

As Queensland and the Northern Territory recognise their seasonal marketing and production advantages, a better understanding is required of postharvest problems associated with high field temperatures and long distances to markets. Picking, packing and handling constitute a major cost. Consumers are demanding access to a full range of quality fruit and vegetables throughout the year and further improvements in storage and production in new areas is required. There is a need to improve the presentation and quality of fruit and vegetables, not only for the home market, but to take advantage of export opportunities.

Pest Management

Consumers in Australia have been educated to expect higher standards in the produce they buy. This increases pressures on growers to adopt spray programmes that minimise the effects of pests and diseases. At the same time pesticide residues must be reduced.

There is a place for greater development of integrated pest management programmes and disease forecasting systems. Biological control is one answer, to reduce the amount of pesticide applied, but it is a complex problem and requires thorough studies of the control agent and target species.

Summary

Agriculture is going to get more complex, there will be more controls, more community pressures and higher costs. Farmers will be better educated and will be asking for detailed technical information on a

wider range of subjects. In such a climate it is essential at least to maintain the research and advisory effort.