

## Changes in agricultural systems of southern Australia

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When assessing the need for change in agricultural systems, we need to consider not only the consequences in the short term but also in the long term. This applies particularly to our soil resources, the conservation of which is vital to the continued productivity of our farms.

The exploitation of our soil resources by intensive cropping and the use of long (bare) fallows in the 1930's led to massive erosion problems (wind and water) in much of southern Australia. The wool boom of the 1950's and the associated increase in areas under legume-based pastures, and the decrease in the use of long fallows, helped to stabilise these cropping soils. The increase in cropping intensity since the 1960's, together with the continued widespread use of cultivated bare seed beds, and reduction in the area under vigorous legume pastures, is again increasing the incidence of soil erosion.

One of the main reasons for tillage is to control weeds before sowing a crop. There is increasing evidence in Australia that the use of appropriate herbicides can eliminate or substantially reduce the need for cultivation in crop production. These reduced tillage and no-till systems have considerable potential for conserving our soil resources and hence maintaining productivity in both the short and long term. Stubble retention will also help in this regard, although careful management will be needed to retain adequate amounts of surface cover, especially after poor seasons, during grazing by sheep, or following grain legume and oilseed crops.

The effectiveness of herbicides can be influenced by the amount of surface stubble, soil and environmental factors. The period for which residual herbicides can remain biologically active in soil also needs to be determined if damage to future crops and pastures is to be avoided. While herbicides (and other chemicals) have considerable potential for increasing farm production, the overall advantages and disadvantages need careful assessment by all concerned with their use.

Present trends indicate that sheep will continue to be an important component of our farming systems in cropping areas of southern Australia for the next 10-12 years at least. The role of stock therefore has to be considered when assessing needs for change.

Grain legume crops, provided they are kept weed-free, can help maintain current levels of soil nitrogen and reduce the incidence of some cereal root diseases. However, as the area sown to grain legumes in southern Australia is less than 2% of the total area under crop, such legumes will have little influence on our cropping land as a whole for some time to come. Legume based pastures are therefore our primary source of symbiotically-fixed nitrogen. Legume pastures also reduce the incidence of some cereal root diseases.

The present increased cropping intensity, coupled with reduced seed reserves of pasture legumes, unfavourable seasons, weed competition and reduced applications of superphosphate to pastures, has resulted in more difficulty in establishing legume dominant-pastures. If we wish to utilize the potential of legume pastures as a source of nitrogen and in the maintenance of soil fertility, we need to develop as a matter of urgency viable management practices that ensure legume-dominant pastures in the non-cropping years.

The adaptation and use by farmers of agricultural systems or their components is a dynamic process. The need by farmers for flexibility in decision making, both within the farm and between seasons, must therefore be kept in mind when assessing the need for change.