



Core units: Exemplars – Year 9

Illustration 2: Agricultural innovation in Australia

Recent innovations in agriculture

An example: No-till agriculture

Australian farmers have always been very resourceful in developing technologies that cope with the tough environmental conditions they find on their farms. Minimum-tillage cropping is a conservation farming system. No-till farming is a very specialised and scientific method of extracting the best yields from poor soils and dry conditions. Combined with this, research scientists have produced cereal seeds that best cope with drier conditions and have a shorter growing season.

No-till farming has many advantages. Highly specialised machinery minimises soil disturbance and retains crop residues when sowing, offering many benefits to farmers and their soils. For example, seeds are directly planted into the soil by air pressure next to stubble from the previous year's crop. Keeping the stubble helps to retain soil moisture and minimises wind erosion of the topsoil.

Traditionally, the stubble may have been burnt, then the ground ploughed several times to break up the compacted soil which was then seeded, fertilised and sprayed to prevent weed growth. As a consequence, the bare ground was exposed to the elements and dried out easily if follow-up rains did not occur.

With no-till technology, the process of direct seeding, fertilising and spraying can be carried out in one process. Using Global Positioning Systems (GPS), the seeds can be planted through the stubble of previous crops and between the rows of the last crop. This saves both time and fuel for the farmer as only one pass over the paddock has to be completed (rather than multiple passes with old equipment and technology). This also prevents compaction of the soil from tractors and equipment. Modern spray equipment with narrow wheels helps also to reduce compaction (which prevents plant growth and lowers yields). In addition, the massive booms and size of modern headers minimises the passes over the paddock.

The benefits of the no-till farming system include more efficient use of fuel, fertilisers, labour, machinery and water. This leads to more resilient crops that grow on constantly improving soils. Keeping the stubble adds nutrients and free-living bacteria to the soil previously lost during the burn-off. It reduces carbon emissions as well.

One of the issues for farmers is the expense of the machinery. Many farmers may lease machinery or contract out the work to sub-contractors.

Some machinery used in no-till farming



1

Direct drilling and seeding machinery

The machinery is drawn behind a tractor.



2

Spray equipment

This machine can be linked to the direct drilling and seeding equipment shown in the previous photograph.



3

Narrow wheeled tractor that minimises soil compaction

Contains spray equipment for pesticides and fertilisers. It has wide booms for minimising passes over paddocks.

Source: All images © Mark D Manuel.



4

Large-boom header

It reaps the crop and minimises the number of passes over the paddock.

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5

Tractors

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An example: Horticulture and commercialisation of greenhouses

Our current lifestyle demands that we have access to fresh fruit and vegetables all year round despite the season of the year. For a long time, greenhouses or glasshouses have been used to extend the growing season, particularly in colder climates or in winter. New technology using poly covers rather than glass, plus the use of hydroponics, have seen the growth of massive greenhouses or polyhouses over recent years. Their sheer size means that extensive crops can be grown on rotation, in sequence and pest-free, meaning we can have tomatoes all year round, for example.

Polyhouses of plastic are preferred options in many situations as glasshouses can be impacted on by thunderstorms and hail that can cause extensive damage. Polyhouses can be automatically climate-controlled to replicate perfect growing conditions for plants. It means that they can be adapted to the specific growing conditions of different varieties of plants. They can be controlled, pest-free and nutrient-rich from hydroponics. Water requirements can be carefully controlled to minimise waste.

Greenhouses are used for plant propagation, flower and vegetable growing, hydroponics and nursery needs. Greenhouse crops have the benefits of the latest airflow design technology. This enables the use of variable climate control that delivers fresh air into, and hot air out of, the greenhouse environment, reducing humidity in the growing environment. Greenhouses provide a reliable, efficient and labour-saving production of fruit, flowers and vegetables for many of the larger supermarket chains in Australia like Coles and Woolworths. This means they can provide a constant supply to all their stores all year round without being affected by climate vagaries.



6

Modern polyhouse

The roof opening is for controlling conditions.

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Modern polyhouse

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