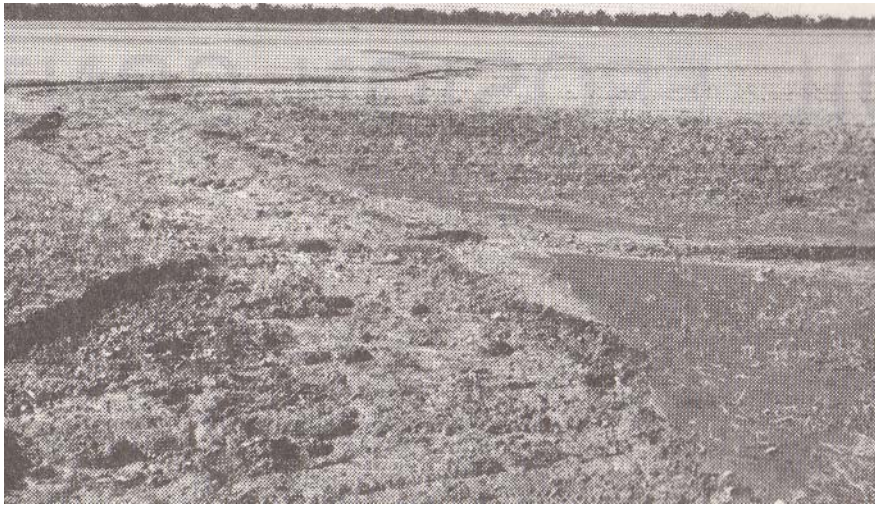


REDUCED TILLAGE FOR SOIL EROSION CONTROL

"Why move several thousand tonnes of soil repeatedly each year to control several hundred kilograms of weeds."

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WHAT IS REDUCED TILLAGE ?

Reduced tillage is any farming practice which involves fewer cultivations than used in conventional fallowing. Conventional fallowing is where stubble is burnt or grazed and weeds are controlled by cultivation.

WHY IS REDUCED TILLAGE IMPORTANT?

Cultivation, particularly the frequent and regular cultivation which occurs during conventional fallowing, helps break down soil aggregates. Rain falling on these finer particles forms a surface crust, and the rain is less readily absorbed. More water runs off and less is available for the following crop. This extra runoff usually causes soil erosion of arable land.

Farmers cultivate land to prepare a seedbed, to control weeds and to conserve soil moisture. Unfortunately, cultivation also exposes bare soil to the direct effects of rainfall.

In New South Wales, cultivation of land in preparation for sowing winter cereal crops takes place during spring, summer and autumn, seasons when heavy rain storms can be expected. Heavy rain falling on bare soil usually causes severe soil erosion.

Controlling weeds is perhaps the most important reason for frequent cultivation during the fallow period. If weeds are controlled by means other than cultivation, the number of cultivations can be significantly reduced. Modern herbicides and selective grazing practices can control weeds and this is the essence of reduced tillage practices.

TYPES OF REDUCED TILLAGE

There are four systems:

Reduced Cultivation - involves grazing of crop stubble and weed growth after harvest followed by seedbed preparation which includes fewer cultivations than for a conventional system. There may be only one cultivation followed by an application of a contact herbicide before or after sowing.

Direct Drilling - involves no cultivation prior to sowing directly into undisturbed soil. Stubble from the previous crop and subsequent weed growth are removed by grazing during the fallow and the stubble remaining is usually burnt after the seasonal break of rain. The fallow is sprayed with a contact herbicide prior to sowing. This practice is usually adopted in the winter rainfall areas of the Southern and Central Tablelands and Slopes.

Minimum Tillage - involves the retention of stubble. Most of the weeds are controlled with herbicides during the fallow together with one mechanical cultivation.

No-Tillage - is a crop management practice in which there are no cultivations during the fallow period between crops. All weed control is achieved by the use of herbicides and the next crop is sown directly into undisturbed soil through the remaining stubble and weed residue. This practice is more usual in the northern summer rainfall areas of the State where stock are not generally available to control weeds and stubble.

WHAT ARE THE ADVANTAGES OF REDUCED TILLAGE?

Reduced tillage systems are important for soil erosion control because they:

- reduce the effect of raindrop impact on the soil surface
- reduce surface sealing of soils
- increase infiltration of water into the soil
- reduce runoff from the soil surface
- reduce the rapid breakdown of soil structure
- slow the breakdown of organic matter in the soil
- reduce the formation of hard pan layers in soils
- provide a better soil environment for crop growth
- slow down overland flow of surface runoff
- reduce wind erosion



Spraying to control weeds.

OTHER ADVANTAGES OF REDUCED TILLAGE

As well as reducing soil erosion, reduced tillage offers the advantages of:

- fuel savings, because fewer cultivations are needed
- improved timing of sowing because the soil is generally in a better condition (firmer) sooner after rainfall
- time savings from less workings which allow farmers to devote more time to management decisions
- reduced stream and reservoir pollution as runoff carries less sediment and is less turbid
- benefits to the community from lower maintenance costs on roads and bridges
- a much longer grazing period each year in the southern and central parts of New South Wales.

WHERE CAN REDUCED TILLAGE PRACTICES BE ADOPTED?

Direct drilling and reduced cultivation are recommended for use mainly in southern and central New South Wales where ley pasture is a major component in the crop rotation and management practice.

Experiments have shown that crop yields are the same, or slightly better, where reduced tillage is used instead of conventional cultivation.

Adoption of reduced tillage practices in southern and central New South Wales generally does not involve the purchase of new, expensive machinery. The only items of equipment needed in these areas to begin reduced tillage are a boom spray and a standard combine.



Comparison of soil erosion on bare fallow in the foreground and stubble retained fallow in the background.

Reduced tillage can be implemented in northern New South Wales by reducing the number of cultivations to the minimum necessary to control the seed set of weeds. The method of cultivation used must retain the maximum level of stubble on the soil surface during the storm period, October to March to decrease the erosion risk. Other methods of reduced tillage are not practised in the north where the grazing animal is not a component of crop rotation systems.

In northern New South Wales the development of minimum and no-tillage practices is being encouraged, but they are not yet proven and cannot be recommended because

- precise recommendations are not yet available from research
- no herbicides are registered for use in no-tillage practices
- suitable sowing equipment has not been developed for use in heavy stubble and plant residue on heavy clay soils
- it is essential to retain stubble from a previous crop to protect the soil from the heavy rain which occurs during the summer.

THREE THINGS TO REMEMBER BEFORE STARTING REDUCED TILLAGE

It is very important to realise that adoption of these new tillage practices does involve:

- a closely supervised grazing management programme to control weeds and produce a plant sward easily killed by herbicides.
- suppression of the weed component of a paddock in the long term to the point where weeds can be controlled before sowing by grazing and herbicide spray without cultivation.
- a more flexible approach to crop management. Seasonal conditions will alter soil moisture content, weed growth, amount of crop stubble and time of sowing. Grazing strategy, the herbicide spray programme and cultivation practice may need to be altered from year to year to account for these changes.

In northern New South Wales, minimum- and no-tillage systems offer most promise but are still in the experimental stage and cannot yet be recommended as soil erosion control measures.

In southern and central New South Wales, reduced cultivation and direct drilling are proven agricultural practices and their adoption, as erosion control measures, is recommended.

Farmers who want to conduct trials under a reduced tillage system are welcome to seek advice from officers of the Soil Conservation Service on how to set up and undertake such a trial.

Each property has a different range of soil types, farm machinery and past management history, so that a trial for reduced tillage is best worked out on site, where consideration can be given to associated management practices.



REFERENCES

One of the most comprehensive selections of further reading material published to date is contained in the :-

Journal of the Soil Conservation Service of
N.S.W. Volume 34, Number 4, October, 1978.

For further information contact your local Soil Conservation Service Office or Soil Conservation Service Research Centre.