

LAND MANAGEMENT

SOIL CONSERVATION

The facts about direct drilling in Hawke's Bay

What is the problem?

Along with Wairarapa, Hawke's Bay is the most wind erosion prone area in the North Island. In 1983 a survey identified 112,000 hectares of land throughout the region as prone to wind erosion if cultivated. Half of this area is classed as high producing cropping soil. With topsoil only a few centimetres deep on some arable land, cropping and soil loss cannot afford to go hand-in-hand.

The East Coast of the North Island is regularly hit by strong northwesterlies from September to December each year. This is when paddocks are at most risk from wind erosion as the wind coincides with spring crop planting. These winds, reaching up to 120km an hour can be devastating, ruining crops, toppling trees and blowing away valuable top-soil. If this problem continues it could reach the stage where underlying gravels, pumice or hard pans are exposed, rendering the land virtually worthless.

As a rule of thumb 1mm of soil over 1 hectare equals 10-15 tonnes of soil!

What can I do?

There are two ways to reduce the chances of wind erosion occurring. Either:

- Reduce wind speed. Shelterbelts provide good long term protection but take time to establish.
- Reduce the ability of the soil to blow. This may involve irrigating to form a surface crust, leaving the seedbed with a slight rubbly finish or direct drilling (no-tillage).

But I've tried direct drilling and it didn't work!

New drill designs and a better understanding of weed and pest control have helped overcome many teething problems associated with direct drilling. In dry, wind prone areas, establishing pasture and fodder crops by direct drilling should be more reliable than cultivation.



Hawke's Bay receiving its annual dose of strong northwesterlies, October 1996. Note: Only the paddock on the left has been cultivated.

How much will it be likely to cost me?

A cost comparison between Conventional Cultivation and No-Tillage

Below are typical figures for summer crop establishment or autumn regrassing:

Direct Drilling	Conventional Cultivation	Your current operation
Herbicide Glyphosphate 31t/ha @ \$14/lt \$42/ha	Plough Cap-off	\$90/ha \$35/ha
Pulse 0.125lt/ha@ \$35/lt \$4.40/ha Application \$30/ha	Powerharrow & Roll	\$90/ha
Direct Drilling \$85/ha*	Drill & Roll	\$62/ha
Total \$161.40/ha		\$277/ha

*Direct drilling rates range from \$75 to \$100/ha depending on the contractor and technology used. Additional pest control may be necessary with direct drilling. Refer to 'Use of insecticides' for these costs.

What are the benefits from a no-tillage system?

- **Shorter time-frame:** Conventional cultivation requires a paddock to be left fallow for four to five weeks to control weeds. With no-tillage, grazing can occur right up until the paddock is sprayed off. It cannot be grazed for three days afterwards when using glyphosphate. Spraying paddocks prior to cultivation will reduce fallow time but this must be added to the establishment cost.
- **Nil wind blow risk:** Hawke's Bay experiences strong, dry northwesterlies during October and November most years. Paddocks worked up around this time on light country are extremely prone to wind erosion. No-tillage provides the security against loss of topsoil for those establishing crops going into the summer.
- **Water erosion minimised:** Heavy rainfall on newly cultivated paddocks causes water to scour out channels as it runs down-slope. This results in loss of top-soil, bare areas growing nothing but weeds and a bumpy paddock.

With no-tillage, by leaving the roots of the preceding dead crop behind, erosion is virtually eliminated.

- **Soil Structure improved:** Over time regular tillage causes a compaction layer (pan) and a consequent reduction in the movement and storage of water in the soil and the ability of roots to penetrate and grow. Direct drilling stops the destruction of soil structure and allows soil micro-organisms and earthworms to build up. In addition, because all wheel traffic takes place on the untilled soil during direct drilling, the effect of wheel compaction is greatly reduced.

Direct drilling protects top-soil from wind erosion and run-off during heavy rain.



- **Soil moisture:** All tillage results in loss of moisture by evaporation. Almost all direct drilling involves only minor soil disturbance and retains a mulch on the surface in form of dead crop residue which reduces soil moisture losses. This is very important in areas such as Hawke's Bay which suffer from drought. Some drill openers retain more moisture in the drill slot which in turn affects seedling establishment. Inverted T shape slots have proven superior to V slots in retaining moisture. Harrowing will help cover the seed slot except for those drills with their own press wheels.
- **Minimal disturbance of weed seed bank:** With direct drilling, the continual mixing of weed seeds with soil, and buried seeds brought to the surface is eliminated. Because there is no fallow period, however, it is important to insure herbicides are applied correctly before sowing.

What are the drawbacks with No-Tillage?

- **The need to level paddocks:** Cultivation is required. If necessary, cultivate light soils in autumn when the wind hazard is less.
 - **Use of insecticides:** With cultivation, the habitat of pests such as grass grub, springtails and slugs is destroyed. With no-tillage, the residue left can create an undisturbed habitat for these pests which can move into the drilled slot, or along the surface and eat seeds and seedlings.
 - Check for grass grub in autumn by digging several inspection holes in the paddock. Grass grub can be controlled by Gaucho® seed treatment (\$75/ha) or alternatively, applying the insecticides Thimet® or Counter® at crop emergence, neither of which are worm friendly. To prevent damage to spring sown crops by springtails and other insects use Superstrike® coated seed. Springtail populations can be checked for later on by placing a white handkerchief on the ground and stamping on it.
- Check the handkerchief for springtails and if necessary, discuss spraying options with your local agrichemical representative.
- Slugs can be controlled by baits (\$35-\$65/ha) applied at drilling, or spun on at a later date if the population increases. Test for slugs by placing a board on the paddocks for a few nights. Inspect the underside for slugs, and assess the general climatic conditions; if wet and cool then the risk is quite high. One slug is one too many!
 - **Key Point:** Keep a close eye on pest levels. Failure to do so could spell disaster.

Summer crops are a pre-requisite when re-grassing

- Poor results often occur when autumn direct drilling is carried out after a single spray just prior to drilling. This is because pastures are often drought stressed in February/March, so there is a poor uptake of herbicide, resulting in a poor kill of the old pasture. The pasture is then at risk of reverting back to the original species. Seed lying on the surface can also germinate after spraying.
- Rather than go to grass, the most successful re-grassing programme in Hawke's Bay is to go through a summer greenfeed crop first. The two herbicide applications (spring and autumn) allow two hits at hard-to-kill weeds such as thistles.
- Do not try short-cuts on good soil types. Weed regrowth on good sites will be more vigorous than on poorer land.

Fertiliser requirements

- Normal cultivation exposes soil organic matter to the air so soil microbes can break it down, releasing nitrogen.
- Use some nitrogen fertiliser with direct drilling to overcome this initial lockup of nitrogen. Soil test the area in advance so, if necessary, lime can be applied six to 12 months before drilling or phosphate and sulphur can go on with the seed. Ensure you do not get seed burn problems by selecting the appropriate fertiliser or using a drill which places the seed beside and not in contact with the fertiliser. Seek good advice from your local fertiliser representative.

When is the correct time to direct drill?

If you can wriggle your pocket knife in the soil up to the blade, soil conditions should be suitable to direct drill. If not, it is either too dry or old roots have not had time to break down sufficiently.

Cross Drilling

Trials at Massey have shown no benefits in cross drilling. It is suggested the extra cost is better invested in other inputs such as more fertiliser.

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Mention of product trade names implies neither endorsement of those products or criticism of similar products not mentioned.

For further information

For further information on soil conservation, ask for the other titles in this series, or contact Land Management Officers at the Hawke's Bay Regional Council for advice:

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