CASE STUDY: RECLAIMING THE SOIL FOR A MARKET GARDEN

The northern rivers area of New South Wales is remarkably scenic and a feeling of peacefulness pervades in the rural areas. However, in an area near Lismore I found Hogan Gleeson, a man who doesn't take the easy way and enjoys a challenge.

This organic enterprise is a remarkable achievement in creating productive market gardens from two unlikely landforms by

- reclaiming a paddock that had been damaged by stock and machinery
- creating accessible and stable land from a very steep hillside.

THE CORN FLAT

The corn flat, an area of about 0.5ha had been depleted of nutrients and had its structure changed for the worse by overwork in the years when it was part of a dairy under previous owners.

It is called the *corn flat* because it used to grow corn for pigs associated with the dairy. There was a possibility that the soil could have been treated for pests such as black beetle. Hogan had the soil tested before he started farming and there were no residues. It is now a productive market garden producing tatsoi, tomatoes, carrots, onions, garlic.

Figure 25: Hogan Gleeson and tatsoi

The main crop is tatsoi, a large, leafy, green Asian vegetable that can be steamed or used in stir-fry. The garden is in production all the year round.

The garden is irrigated by gravity feed through pressure regulated drip tapes (hoses with holes in them) from a dam on a nearby hillside.

How did Hogan reclaim the soil?

He originally needed to deep rip to 600mm to break up a compacted layer. He then limed at one tonne to the acre.

He has developed a routine that continually improves the soil:

- Start with a green manure cover crop
- Spread compost and some trace elements. Chicken litter and sawdust is composted for 12 months before use
- Sow a heavy feeder such as tomatoes into a 250—300 mm mulch. A suitable heavy feeder is a crop that is high yielding with a good profit margin; it is one that takes advantage of the rejuvenated ground and the high nitrogen content of the soil. After these crops more and more earthworms are noticed. These crops are harvested in two or three months
- Plant melons or pumpkins directly into the remaining mulch
- Plant carrots, onions or garlic. These are also planted into a mulch and planted in late autumn and grow through late autumn and winter when the nut grass is dormant. The mulch is used at a time when the nut grass is dormant and the season is dry
- Plant tatsoi into a 300 mm mulch, which includes the old tomato plants. The tatsoi is harvested four weeks after planting

- Plant another crop of tatsoi. The two tatsoi crops are planted from mid spring until late summer. These are cultivation phases that help control nut grass, which grows actively in these seasons
- Plant a green manure crop and start the cycle again

Except that each year in late winter one quarter of the garden is inoculated with a commercial source of beneficial organisms and spread with a 300mm mulch, sometimes lime and compost are also added. This means that at the end of every four years each part of the garden has had a season under mulch. At this stage the mulch is bought in a large roll that is laid out like a carpet. However Hogan intends to grow a pasture of oats, vetch and lucerne and use this for mulch.

Tomatoes are protected from nematode and other pests by the use of a beneficial parasitic fungus, which is mixed with water, molasses and other ingredients. This fungus and other beneficial microbes were developed by a commercial arm of Macquarie University. The compost also contains ammonia and some naturally occurring beneficial microbes that suppress nematodes.

Permanent beds. Hogan uses the same wheel tracks each time his tractor works on the garden, no matter what the crop. He works with an A-model Farmall, the seat is off-set to make it easier to keep the planted row in view. He cultivates within 25 mm of the plants. The horizontal knives are mounted to skim only the top 10—15 mm of soil. He finds that cutting the weeds at this shallow depth means that the soil is not turned and so earthworms and the soil environment are unharmed.

Hogan explained the importance of using permanent beds and wheel tracks to reduce compaction and the need for deep cultivation on the cropping area. In the past frequent cultivation and the use of chemicals has destroyed fungi and mycorrhiza. It has been shown that fungi and mycorrhiza hold clay to their surfaces and so it is possible that when they are destroyed by cultivation, the clay moves down through the large spaces between the sand particles and forms a deep clay pan in the sub-soil. This can result in destruction of the soil structure and poor moisture penetration and waterlogging of the topsoil.

Machinery. The power harrow is used instead of a rotary hoe. This harrow has a circular motion which is less damaging to soil structure than the traditional rotary hoe which can shatter soil aggregates and also cause smearing (see figure 26). The harrow fits neatly across the bed and Hogan fits a cowling on each side to make a permanent and raised bed in one pass.

Figure 26: Crumb roller and power harrow

Note the crumb roller at the back of the harrow. You can just lower the roller part if you want to break up clods on the surface of the soil without disturbing the soil underneath.

Figure 27: Permanent wheel tracks (1) and raised bed (2). The irrigation hose (3) runs down the furrow

Weeds

Hogan needs to weed every week in summer; nut grass is an on-going problem. As mentioned above, the ground is cultivated when the nut grass is actively growing and mulched in its dormant season. Hogan observes that he is winning the war against nut grass and he expects to be rid of it eventually.

Figure 28: The power harrow has knives to cut weeds with minimal disturbance to earthworms and to soil structure

Figure 29: Wheel hoe for weeding small areas without damaging small plants

The wheel hoe is used in a patch of broccoli. Hogan says it's useful for an area of up to 2.5ha. Advantages include:

- avoids compaction
- saves time (quicker than getting the tractor and extra machinery)
- saves fuel
- doesn't bury small plants

Markets

Hogan has found that due to demand, he sells most of his produce at local markets.

THE TERRACES

In contrast to the corn field garden are the very steep slopes rising up from the flat valley floor. The soils range from kraznozems to chocolate brown and Lismore basalt. Hogan realised that they would be productive if only they were in an accessible landform. Once geotechnical surveys had shown that the area would be stable, he devised a method to create larges terraces that he now uses for tomato crops in autumn to winter.

Moreover the terraces are really a mix of swail and terrace, designed so that excess water (from rainfall) drains to the back of the terrace so that

- excess moisture is held for the next crop
- there is no erosion to carry soil down the slope

Conclusion

Hogan is an organic market gardener whose story includes improving two distinct types of farm while he has farmed them organically.