

Part two of a three-part series:

Pasture cropping techniques and land management

By COLIN SEIS

Pasture cropping is a system that requires management to achieve success. In part 1 of this series, we covered some advantages and research conducted on pasture cropping. In this article, we cover some techniques involved, and land management.

SOIL HEALTH

Reasons for pasture cropping can be very diverse and include: reducing costs; increasing profit; growing fodder, grain or dual-purpose crops (feed and grain); stimulating pasture; repairing soil structure; creating litter and ground cover; and improving soil biological health.

After more than 150 years of abuse and inappropriate land management, most of Australia's farming soils have become biological deserts propped up by expensive soil additives such as fertilisers.

These biological deserts were caused primarily by the absence of perennial plants, litter and ground cover, needed to maintain the myriad of micro and macro soil organisms required to grow healthy pastures and crops.

Soil biomatter is dramatically improved by pasture cropping methods and subsequently this plays a very real role in a healthy pasture cropping ecosystem. This is because the soil is only lightly aerated by the zero-till sowing points and not turned over as in a traditional ploughing method.

This leaves the increase in surface vegetative matter and the perennial grasses and their root matter intact. The soil microbiology can continue to perform its role in the ecosystem. These microbes stimulate plant growth. Their absence from any soil is a step backwards and they must be maintained at all costs.

GROUND PREPARATION

Livestock are a very important component of pasture cropping. Large mobs of sheep or cattle (2000 sheep at 100-150 sheep per hectare) are carefully used in a time-controlled or rotational grazing method to manage weeds, create litter and mulch, and prepare areas for cropping.

Using stock in this manner is not only a very effective weed controller, it is also a very efficient method of running stock over the whole property.



Unless the height of the perennial grasses is no more than 150-170 millimetres (ankle height), they will shade the emerging crop as it germinates. Grazing of the pasture just before sowing will prevent shading, the animals will create mulch, and weeds are also controlled.

Preparing the paddock in this manner does not have to be performed in one operation. It is better in two or three grazings over a two- or three-month period. It is also important not to consistently graze below the 150-170mm grass height as that stresses the plants and significantly delays plant recovery.

Having a layer of plant material litter among perennial plants over summer will conserve soil moisture better than bare fallow, which is used in conventional cropping methods.

Using large mobs of stock for ground preparation and weed control is controversial. It has been stated many times that stock will cause soil structure problems in cropping paddocks.

This is only the case when there are very low levels of ground cover, litter and plant roots. Pasture-cropped paddocks where there are good, perennial pastures and ground cover show very little compaction and soil structure problems from grazing stock.

Care should be taken, however, with large mobs of stock on very wet ground with very small amounts of litter. Soil compaction and pugging could occur. Wait until the soil dries before putting stock onto the paddock.

WEED CONTROL

The reason weeds invade pastures and crops is usually not understood. Nature's intent is to have a 100% ground cover of plants 100% of the time. Most annual weeds usually grow in large numbers in an attempt to provide ground cover to hold soils together, and all the other reasons we already understand.

The weeds are usually not very competitive against other pasture species, and having abundant perennial species in the pasture will cause the weeds to rapidly diminish in number. Killing these weeds haphazardly by spraying herbicide will only make the manufacturer and supplier wealthy, not the farmer.

Again, the message is to have 100% ground cover with perennial pasture species and litter 100% of the time. The weeds will be reduced from 50% of the pasture to almost 0% with correct land management in two to four years and at



very little financial cost. Herbicides have been successfully used in pasture cropping in conventional operations but must be used very carefully and selectively.

SOWING PROCESS

The species of plants present in a pasture need to be identified and assessed before a crop can be sown into that pasture. The assessment needs to determine if the pasture plants are perennial or annual, etc, and if they are a useful grazing plant. It should also be determined whether the weed (or plant) is going to affect yield of the planned crop.

The active growing time of plants in the pasture is very important. One reason is the grazing value. Another is if a crop can be grown successfully in the pasture without controlling growth of the pasture species to get the best crop yield.

Winter-growing perennial species are more difficult to crop into for good crop yields. This particularly applies to introduced plants such as phalaris, perennial rye grass, lucerne, etc.

The sowing process is a very important part of pasture cropping. These steps should be followed:

- Have the paddock rapidly grazed to 150-170mm height (ankle height) with large mobs of stock.
- Use zero-till sowing equipment to sow at the correct depth.
- Sow the correct crop for your application, soil type and district.
- Conduct a soil test and use correct inputs at the recommended rates.

Because all crops sown by zero-till pasture cropping methods are slower developing, the crops can be sown up to two weeks earlier than the usual recommendations.

IN CROP

The importance of having living plant groundcover, plant litter and mulch combined as organic matter cannot be stated strongly enough. It is this organic matter in pasture-cropped paddocks that conserves moisture, prevents weeds and improves soil health.

Most of this organic matter will come from perennial grass pastures. Most summer-growing, perennial native grass species in a pasture do not actively start to grow until October in most areas.

When they are in a crop, they usually do not start to

actively grow until even later in the year because they depend on sunlight and temperature and will be suppressed by shading of the crop until after harvest.

This shading effect and slowing down of native perennial, summer-growing plant growth during the crop grain filling period allows the cereal crop seed to fill correctly without pinched grain and also reduces any green matter contamination in the grain at harvest.

But this is not the case with many introduced plants such as phalaris and lucerne, which can be a problem because they grow early in spring and result in the crop having pinched grain and problems at harvest with green plants in the crop.

Attack of crops by the red-legged earth mite and other insects can be a problem in the first few years of pasture cropping. Given time, the invading insect population will no longer be a problem as predators will move in and help create a balance between damage-causing insects and naturally occurring, beneficial insects. A wide, diverse range of insects is a sign of a healthy pasture.

Crop diseases such as "takeall" and "crown rot" can be a problem in conventionally sown crops. Plant diseases in pasture-cropped paddocks are generally not a problem because there is a diverse mix of perennial pasture grass and the soil is in a healthy state.

However, common sense and recommended crop rotations are a good policy.

The author's property 'Winona' has had a variety of crops sown, such as wheat, oats, lupins, cowpeas and cereal rye by pasture cropping methods since 1992. There has been no evidence of crop diseases in pasture cropped paddocks on Winona in all that time. ■

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Next issue: The final part of this series will be in the next issue of *Australian Organic Journal*. It will cover the role of perennial pastures, machinery and equipment, and a case study on an organic pasture cropping trial. Part 1 can be downloaded from the *Australian Organic Journal* archives at <www.bfa.com.au>.