Agriculture Notes

Organic Farming: Wheat Production and Marketing

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The information provided in this Agnote is applicable to organic mixed farming enterprises that grow crops in rotation.

Introduction

Wheat is the most commonly grown cereal in Australian organic farming systems. It is adapted to a range of climatic and soil conditions so it suits many of the mixed farming areas in Victoria. Organic wheat production requires attention to soil fertility, rotation, agronomy, and grain storage to ensure product quality and marketability. Cereals comprise the largest export volumes of any certified organic category, growing from 252 tonnes in 1999 to over 1,297 tonnes exported in 2003. Premium prices can be expected for organic wheat and these reflect quality parameters that are similar to conventional wheat. There are approximately 1,511 certified organic farms in Australia, and 14% or 212 of these produce cereal crops.

Production requirements

Region and rainfall

Current organic wheat production in Victoria is concentrated in the Wimmera and north central regions with smaller quantities being produced in the north east. Wheat is best suited to areas where annual rainfall is between 300-600 mm. Growing season rainfall (April to November) is critical to achieve good establishment, tillering and grain filling.

Soil management

The National Standard for Organic and Bio-dynamic Produce (2004) provides general principles for the management of soil in an organic farming system.

i. Healthy soil is the prerequisite for healthy plants, animals and products. With organic farming, the care of a living soil and consequently the maintenance or improvement of soil structure, fertility and nutrient cycling, is fundamental to all measures adopted.

ii. Sufficient organic material should be regenerated and/or returned to the soil to improve, or at least maintain, humus levels. Conservation and recycling of nutrients is a major feature of any organic farming system.

The basis of a successful organic grain crop is the fertility of the soil in which it is grown. Soil fertility is based on the physical, biological and chemical components of the soil environment. Physical soil fertility in an organic farming system can be promoted by:

- having an adequate supply of organic matter through green manuring and pasture phases,
- having good soil structure through minimising cultivation,
- having moisture retention but also good drainage,
- having sufficient gas exchange around the root zone, and
- warmth and moisture at the appropriate time.

Biological fertility refers to the diversity and activity of soil organisms. Soil organisms play a fundamental role in recycling nutrients for plant growth. The soil environment that is most beneficial for these organisms to operate has:

- plenty of oxygen (needed for aerobic microbes),
- a neutral pH, and
- organic matter that contains sufficient levels of nitrogen.

Chemical fertility refers to the level of available nutrients required for plant growth. Wheat has a requirement for phosphorus, nitrogen and potassium. The majority of Australian soils are deficient in phosphorus with the amount of phosphorus in the soil depending on the parent material, the extent of weathering, how much has been lost through leaching and the level of organic matter. Options that are available to organic producers to ensure adequate phosphorus supply for crop growth include:

- maintain soil pH between 5.5 and 6.5 ($CaCl_2$) to achieve maximum phosphorus availability,
- encourage biological activity with sufficient high quality organic matter (*Mycorrhizae* fungi can form symbiotic relationships with plant roots to facilitate phosphorus supply, and some bacterial species can solubilise phosphorus for plant uptake),

- apply allowable phosphorus inputs (based on a demonstrated need) such as reactive phosphate rock and avian deposits (Guano™). Generally, reactive phosphate rock is effective as a source of phosphorus in areas that have an annual rainfall of at least 750mm and acidic soils.

In organic farming systems the supply of nitrogen for plant growth comes primarily from the fixation of atmospheric nitrogen via the legume/*rhizobia* symbiosis. This can occur during a pasture phase, or by growing a legume-based green manure crop that is returned to the soil. Subterranean clover and lucerne provide the highest additions of nitrogen to the soil.

Figure 1. Subterranean clover pasture can provide nitrogen for wheat production.

Potassium is also essential for crop growth and is linked to both phosphorus and nitrogen supply. Potassium deficiency can be a problem on lighter textured soils but is not considered a widespread problem in cropping systems. It is important to monitor soil health regularly through appropriate testing to understand nutrient supply, biological and physical health.

Rotation

In organic farming systems wheat is grown in rotation with pasture or legume phases. Wheat can be grown directly after a pasture phase when soil fertility is maximised providing that adequate management of grass weeds has occurred. Grass weeds can compete vigorously with wheat and can be a source of disease and seed contamination. A break crop such as canola, followed by wheat, is useful to avoid potential disease problems in wheat after a pasture phase. Research has shown that decomposing canola stubble can provide a bio-fumigation effect in soil, decreasing the potential for common wheat diseases. However, canola is a 'nutrient hungry' crop and in an organic system, growing wheat after canola may not be the most productive rotation option.

Weed management

Organic farming systems rely on an integrated approach to weed management, using a range of tools to reduce the impact of weeds in both pasture and crop. The grass weeds, typically annual ryegrass (*Lolium rigidum*, Gaudin) and wild oats (*Avena fatua* L.) are the most important weed species that compete with organic wheat.

Management to reduce the seed bank of weed species prior to wheat production has to occur during the pasture phase. A range of options exist for producers to manage weed species in pastures:

- strategic heavy grazing of pasture to prevent seed set in late spring,
- cutting hay or silage,
- green manuring,
- mowing, and
- growing a forage break crop between the pasture and crop phases.

Figure 2. Trial site demonstrating strategic heavy grazing in spring can reduce grass weed seed set.

Figure 3. A competitive wheat cultivar with early vigour will shade many weed seedlings.

Strategies also exist for weed management during the crop year, such as delayed sowing and using competitive cultivars, but these should be considered in conjunction with sound pasture management practices.

- **Competitive cultivar:** choose a cultivar that has good early vigour, a tall growth habit and wide leaves. Some of this information can be obtained in the crop sowing guides.
- **Clean seed:** ensure that wheat seed is free of weed seeds.
- **Delayed sowing:** sowing can be delayed in order to achieve a weed germination that can then be cultivated prior to sowing. Delayed sowing can often result in reduced yield.

- **'Autumn tickle':** this light cultivation can stimulate ryegrass germination so that these seedlings can be cultivated prior to sowing.
- **Seeding rate:** this can be increased to reduce the competitive ability of grass weed species

Harvest and grain storage

Organic wheat is harvested in the same manner as conventional wheat. Care needs to be taken to ensure that the harvest sample is as clean as possible of weed seeds and other material, as penalties apply for foreign material in cereal grain. Harvesting equipment that can collect weed seeds through the seconds bin allows for more flexibility in the harvesting process and better weed management. Wheat grain should be harvested at or below the receival limits for moisture; this is usually 12.5% for wheat. Seed cleaning services are available but these will reduce the gross margin of the organic crop.

Figure 4. Harvest at correct moisture levels and aim to reduce weed seed contamination.

Many organic producers invest in sealed silo technology to store their grain on-farm. This provides flexibility in the marketing of organic grain, gives producers the opportunity to store seed for subsequent years and to assist in drought management by having grain for animal feed. Producers can consult the NSW Agriculture Agfact P3.5.1 On-farm Storage of Organic Grain for further information.

Marketing requirements

Quality

Protein content is critical for export and domestic markets. For export markets, most wheat is required to be above 12% protein. This is because many European countries have high duty charges for wheat with a lower protein content. It is important to have a good idea of the protein level of wheat grown in your region, as this will affect marketing decisions. For example, the majority of wheat grown in north east Victoria achieves less than 11% protein, whilst in the Wimmera and Mallee regions, higher protein levels can be achieved.

There is emerging interest in some Asian markets for cereal grain for the production of beverages and these may provide future market potential for lower protein content wheats. Some domestic markets require lower protein wheat, but the domestic market is limited and organic stock feed may be the only alternative if wheat is not exported.

Other important quality parameters for some markets include screenings, grain size and variety. The organic standards are similar to the conventional production standards, although this does depend on supply and can be more flexible in some years.

Price

Organic wheat prices vary considerably depending on the market and the quality (protein content, screenings, grain size, variety). Premiums vary depending on the season and can vary from zero (occurs rarely) to 100%. In most years, markets offer a premium of 30 - 50% above the conventional price.

Organic prices for wheat do not vary as greatly as the conventional market. This may be due to many producers growing on contracts. Generally the only assured markets for organic wheat with high prices are for the high protein (>14%) organic wheat grain which can be exported. Other markets vary more seasonally (ie. through supply) and as countries implement and change tariff rates.

Freight charges vary depending on the market and can be included as a delivered price for some companies, whereas others pay extra depending on where the receival station is.

Current organic wheat purchasers, 2008

- Haku Baku Noodles (Vic)
- Uncle Tobys (Vic)
- Casalare Specialty Pasta (Vic)
- Pureharvest (Vic)
- John Gidley and Company (Vic)
- Whole Grain Milling Company (NSW)
- Kialla Pure Foods (QLD)
- Green Grove Organics (NSW)
- Four Leaf (SA)
- Weston's Milling (NSW)

Useful references and contacts

- Burnett, V., Enshaw, T. and Sutherland, S. (2004) Non-chemical Options for Integrated Weed Management in Grain Production. Victorian Department of Primary Industries, ISBN 1 74146 126 X.
- Halpin, D. (2004) The Australian Organic Industry, Australian Government Department of Agriculture, Fisheries and Forestry, ISBN 0 642 53955 3.
- Madge, David (1995) Organic Agriculture: Getting Started Agmedia ISBN 0730664333.
- Neeson, R. and Banks, H.J. (2000) On-farm storage of organic grain, NSW Agriculture Agfact 102/28. Order No. P3.5.1.

- Organic Federation of Australia (OFA) www.ofa.org.au
- Victorian Winter Crop Summary (2006) Victorian Department of Primary Industries, ISBN 1741466741.

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