

filling the feed gap

4. Biodiversity

Project collaborators:

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Biodiversity indicators were monitored on the five Grain & Graze Focus Farms, comparing different land uses including cropping, pasture and remnant vegetation paddocks. Over 2 years of monitoring, results showed the areas of remnant vegetation generally supported higher invertebrate and bird numbers. Microbial activity tended to be higher in cropping paddocks. Ground cover was lowest in cropping paddocks.

Aim: To determine the extent to which on-farm biodiversity is influenced by land use management, including cropping, grazing and non-productive or remnant vegetation areas, as well as by factors such as climate, soil type and topography.

Method: Biodiversity was monitored on each of the five Murrumbidgee Grain & Graze Focus Farms (at Coolamon, Euroley, Sebastopol, Tarcutta and Tootool) as part of the National Biodiversity in Grain & Graze project. The data collected during the period from April 2006 to December 2007 includes:

- invertebrate types (eg. spiders, ants & beetles)
- soil microbial activity
- bird species
- vegetation assessment (plant species and their abundance, ground cover, etc)
- soil characteristics

Four paddock types (land uses) were monitored on each Focus Farm, including:

- cropping
- pasture phase (lucerne)
- permanent pasture
- remnant/native vegetation

Results:

Invertebrates (spiders, beetles, ants)

Figure 4a - Invertebrate species, Focus Farms, 2006 & 2007

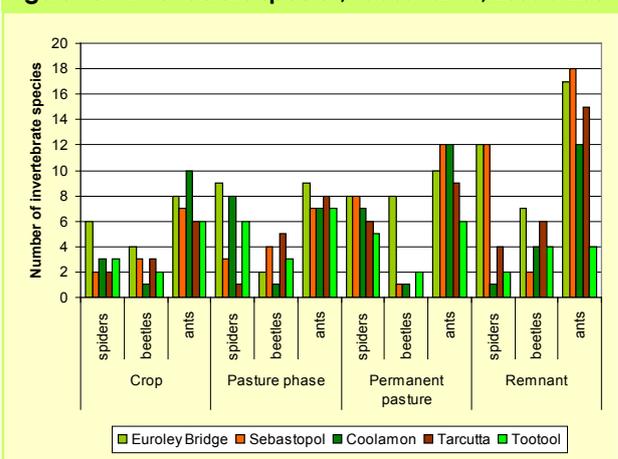
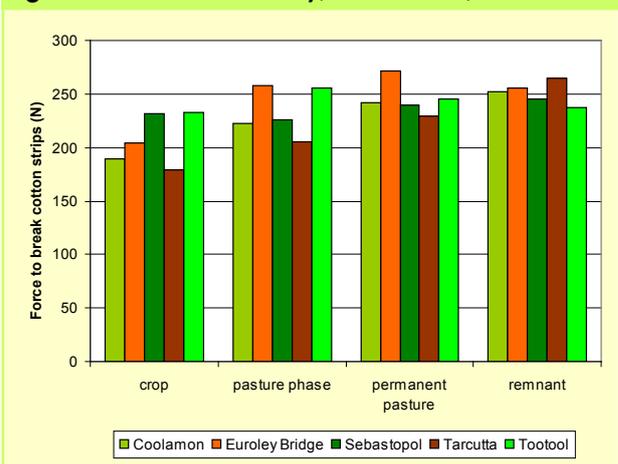
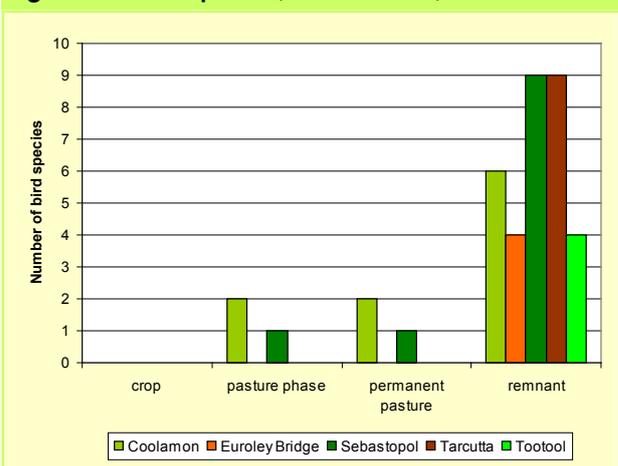


Figure 4b - Microbial activity, Focus Farms, 2006 & 2007



Note: force required to break cotton strips is an indicator of microbial activity - the less force required, the greater the microbial activity. (Cotton strips had been buried in each paddock).

Figure 4c - Bird species, Focus Farms, 2006 & 2007



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- Invertebrate numbers tended to be higher in the remnant/native vegetation areas of the Focus Farms and lower in the cropping paddocks, including those in the pasture phase (Figure 4a).
- There were more ant species present in each of the paddock types than spider or beetle species.
- Several predator beetle species were found in the paddocks, indicating potential for an Integrated Pest Management (IPM) program.
- Invertebrate numbers are more likely to be affected by on-farm activities (eg. tillage) than by impacts from the wider area.

Microbes

- Microbial activity tended to be higher in cropping paddocks (Figure 4b).
- Monitoring indicated a trend towards higher microbial activity with better ground cover within each land use - to be confirmed.

Birds

- Thirty-nine native bird species were found on the Focus Farms, compared with just 2 introduced bird species (*Common Starling and House Sparrow*). Lack of competition from introduced species means there is potential to rapidly increase native bird numbers and diversity through re-vegetation.
- Bird numbers were much higher in the remnant vegetation areas than in the cropping or pasture paddocks (Figure 4c).
- Five 'Listed Threatened Species' were found in remnant vegetation on three of the Focus Farms, including the *Superb Parrot, Brown Treecreeper, and Grey-crowned Babbler*.
- Off-farm remnant vegetation areas nearby (monitored as a reference point) were of better quality and supported higher bird numbers than on-farm remnant areas. Off-farm areas consisted of an over-storey (eg. Eucalyptus), extensive mid-storey (eg. wattles, bursaria), native ground cover (eg. spear grasses) and fallen timber, all of which are essential habitat components for a variety of bird species. In comparison,

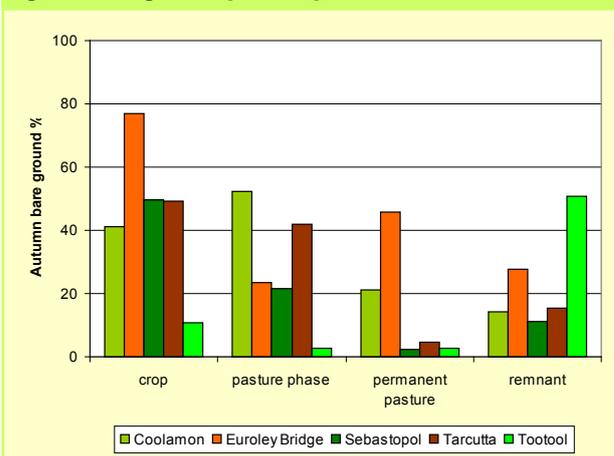
Figure 4d - 'Bringing Back the Birds' Field Day, Coolamon Focus Farm, March 2007



Figure 4e - Lucerne pasture (99% ground cover), Sebastopol Focus Farm, September 2006



Fig. 4f - Bare ground (autumn), Focus Farms, 2006 & 2007



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although on-farm remnant areas had an over-storey of Eucalyptus trees, they often had less fallen timber and mid-storey, with a large proportion of exotic ground cover.

- Remnant quality was also found to affect the presence and diversity of small bird species (eg. *Striated Pardalote*, *Weebill* and *Red-capped Robin*), which rely on mid-storey plants, ground cover and fallen timber.
- The off-farm areas of remnant vegetation were also generally larger than the on-farm areas, meaning they could support higher species numbers.
- Connectivity of remnant areas is also important for birds to live, feed and breed in. The on-farm sites were generally more isolated than the off-farm sites which were connected to other patches of vegetation in the landscape. Connecting on-farm remnant vegetation to areas such as roadsides or neighbouring patches will increase the area and diversity of vegetation. Corridors of native vegetation at least 30m wide have been found to be optimum for encouraging diversity of bird species.

Source: 'Bringing Back Birds: Focus Farm Bird Surveys 2006', S. de Lange & C. West (Murrumbidgee CMA). Murrumbidgee Region 'Birds on Farms' Grain & Graze fact sheet, J. Smith (UTAS) & regional atlases.

Vegetation

- As expected, bare ground area was generally lower in spring, although drought conditions meant there were not large differences between spring and autumn (Figures 4f & 4g).
- The cropping paddocks had the highest bare ground area in both autumn and spring.

Soil characteristics

- pH at 0-10cm varied between paddock types (Figure 4h), although only four out of the 20 paddocks were acidic (pH_{Ca} < 5.0).
- Phosphorus levels at 0-10cm also varied between paddocks, with no obvious trend between land uses (Figure 4i).

Acknowledgements:

all Focus Farm co-operators

Fig. 4g - Bare ground (spring), Focus Farms, 2006 & 2007

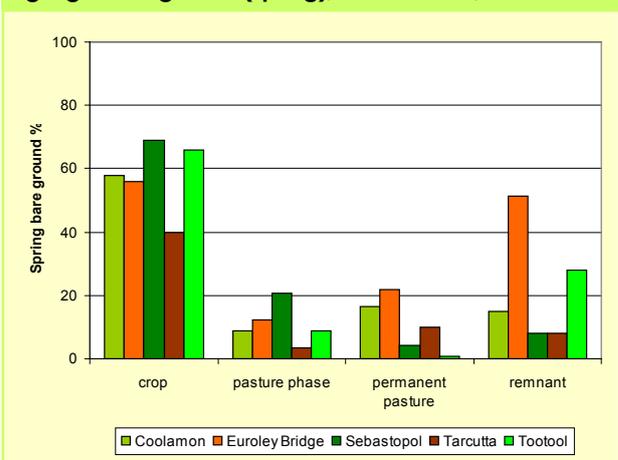


Figure 4h - Soil pH, Focus Farms, 2006 & 2007

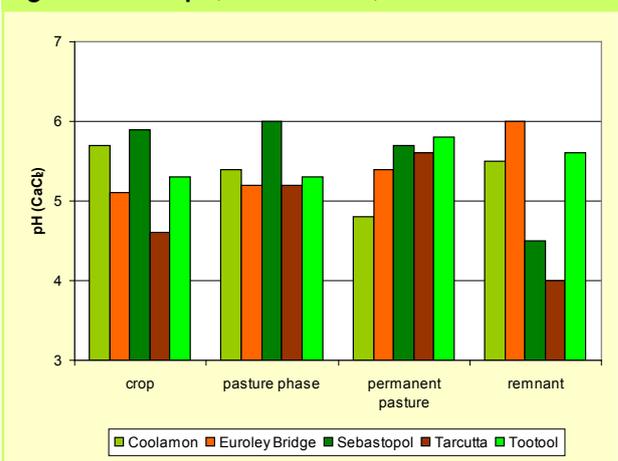


Figure 4i - Soil phosphorus, Focus Farms, 2006 & 2007

