Land management practice trends in Tasmania’s broadacre cropping industries
Introduction

Broadacre cropping (includes cereals, oilseeds, lupins, sugar cane, legumes, hops, cotton, hay and silage) is an important industry in Tasmania, contributing almost $198 million or 18 per cent of the gross value of agricultural production of the state and 0.5 per cent to the gross value of Australia’s agricultural production in 2009–10 (ABS 2011). According to national land use mapping, about 130 700 hectares, or almost 2 per cent of the total area of the state (Figure 1), was cropped in 2005–06 (ABARE–BRS 2010).

Improving soil condition is important to agricultural productivity and the quality of ecosystem services provided to the community from rural lands. Wind and water erosion, soil carbon rundown and soil acidification reduce the land’s ability to provide productive soils, protect biodiversity, maintain clean air and water and withstand the effects of climate change, while producing food and fibre. Table 1 summarises the impact of some land management practices used in the broadacre cropping industry on soil condition.

Caring for our Country—the Australian Government’s $2 billion flagship natural resource management initiative—is funding projects in the sustainable farm practices national priority area under the improving management practices and landscape scale conservation targets. These projects provide information to farmers in the broadacre cropping, dairy, horticulture and beef cattle/sheep industries about land management practices that will help improve soil condition and contribute to maintaining a healthy environment.

By 30 May 2012, $448 million had been approved for projects across Australia to improve soil and biodiversity management practices on farm. On farm practice change is being monitored using the biennial Australian Bureau of Statistics (ABS) Agricultural Resource Management Survey (ARMS), which surveys 33 000 of Australia’s 135 000 agricultural businesses (farmers). Results are reported at the national, state and natural resource management region levels (ABS 2009).

Cropping industry profile

According to ABS estimates, in 2009–10 Tasmania had over 2400 broadacre cropping businesses, a decrease of about 10 per cent since 2007–08. During this time the area of broadacre crops increased by an estimated 5 per cent.

In 2007–08 (2009–10 data were not publishable) the average age of managers of Tasmanian crop businesses was 54 years: on average they had managed their holdings for 23 years and farmed in their local region for 30 years. An estimated 15 per cent of crop businesses (359) had a Landcare group member.
Land management practices

Caring for our Country provided project funding to encourage farmers to better manage ground cover by reducing tillage and increasing crop residue retention, to test and lime soils regularly and to build soil carbon. This funding has complemented the activities of state agencies, industry and community groups. Data from the ABS 1995–96, 2000–01 and 2010–11 agricultural censuses (which surveyed all agricultural businesses) and the 2007–08 and 2009–10 ARMS help track trends in adoption of these practices. The percentage of farmers reporting the use of particular practices can exceed 100 where more than one method (such as crop residue retained in some areas, burnt in others) is used on a holding.

Table 1: Cropping management practices expected to improve soil condition.

<table>
<thead>
<tr>
<th>Practice</th>
<th>Increases carbon</th>
<th>Reduces wind erosion risk</th>
<th>Reduces water erosion risk</th>
<th>Reduces soil acidification risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>No cultivation apart from sowing</td>
<td>Indirectly</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>Crop residue left intact</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Indirectly</td>
</tr>
<tr>
<td>Soil pH testing</td>
<td>Indirectly</td>
<td>Indirectly</td>
<td>Indirectly</td>
<td>Y</td>
</tr>
<tr>
<td>Soil nutrient testing</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>Lime or dolomite applied to reduce soil acidity</td>
<td>Indirectly</td>
<td>Indirectly</td>
<td>Indirectly</td>
<td>Y</td>
</tr>
</tbody>
</table>

Figure 1. Cropping in Tasmanian natural resource management regions, 2005–06. Source: ABARE–BRS (2010).
Figure 2. Percentage of businesses in Tasmanian natural resource management regions using different cultivation intensities to prepare land for broadacre crops, 2007–08 to 2010–11. The 2007–08 numbers include businesses preparing land for pasture.

Figure 3. Percentage of crop area in Tasmanian natural resource management regions prepared by broadacre cropping businesses using different cultivation intensities, 2007–08 to 2010–11. The 2007–08 numbers include areas prepared for pasture.
Crop residue management

Retaining residues between crops affords protection from soil loss through wind and water erosion, while helping to improve soil organic matter (soil carbon). Seasonal factors, such as the incidence of pests, weeds and disease, and heavy stubbles (in wetter years) may affect management. Between 2007–08 and 2009–10 there was a slight increase (from 8 per cent to 10 per cent) in the estimated number of farmers retaining crop residues in Tasmania, declining slightly to 9 per cent in 2010–11 (Figure 5). This percentage increased in two of the three natural resource management regions, with an increase in the South region (from 6 per cent to 11 per cent). Longer term ABS data indicate that the number of broadacre cropping businesses in Tasmania retaining crop residue after harvest in 2010–11 was about two times greater than in 1995–96.

Between 2007–08 and 2009–10, the area where crop residue was retained after harvest in Tasmania was estimated to have increased from 19 per cent to 26 per cent, decreasing to 24 per cent in 2010–11 (Figure 6). Similar trends were estimated for all three natural resource management regions. Since 1995–96 the area of crop residue retention in Tasmania is estimated to have increased from 12 per cent to 24 per cent (Figure 7).
Figure 4. Percentage of crop area in Tasmania prepared by broadacre cropping businesses using different cultivation intensities, 1995–96 to 2010–11.

Figure 5. Percentage of broadacre cropping businesses in Tasmanian natural resource management regions using different crop residue management practices, 2007–08, 2009–10 and 2010–11.
Figure 6. Percentage of crop area in Tasmanian natural resource management regions reported by broadacre cropping businesses with different crop residue management practices, 2007–08, 2009–10 and 2010–11.

- **Area with crop residue left intact**
- **Area with crop residue modified (ploughed or mulched)**
- **Area with crop residue removed (baled, burnt or grazed heavily)**

Figure 7. Percentage of crop area in Tasmania reported by broadacre cropping businesses with different crop residue management practices, 1995–96 to 2010–11.

- **Area with crop residue left intact**
- **Area with crop residue modified**
- **Area with crop residue removed**
Managing soil acidity

About half of Australia’s agricultural land has a surface soil pH of less than or equal to 5.5, which is below optimum for extremely acid-sensitive agricultural crops and below the optimal level to prevent subsoil acidification (National Land and Water Resources Audit 2001). Where soil acidity moves further down the soil profile, damage may be irreparable. Very acid soils are unlikely to support good ground cover, increasing the risk of soil loss through wind and/or water erosion and reducing input to soil carbon.

It is estimated that about 21 per cent of Tasmanian cropping land has a high risk of soil acidification, 22 per cent is at moderate risk and 57 per cent at low risk (Figure 8; Table 2). Areas at high risk are where soil pH is low, the soil has a low capacity to buffer against pH decreases and the dominant (current and/or past) agricultural practices are highly acidifying. Fifty per cent or more of the areas under cropping in the North and South regions are thought to be at moderate to high risk of acidification.

Regular testing of soil pH and applications of lime and/or dolomite can be used to manage surface soil pH. Testing soil nutrient levels to better match fertiliser applications to crop requirements can also help slow soil acidification. Estimates of the number of broadacre cropping businesses in Tasmania undertaking pH and nutrient testing showed a decline between 2007–08 and 2009–10; from 41 per cent to 36 per cent for pH testing and from 38 per cent to 32 per cent for nutrient testing (Figure 9). The estimated percentage of farmers testing soil pH and nutrients increased (from 41 per cent to 43 per cent) in the North West region (Figure 9). Decreases in soil pH testing and soil nutrient testing occurred in the North region (from 46 to 36 per cent and 42 to 34 per cent respectively) and the South region (from 31 to 21 per cent and 27 to 19 per cent respectively; Figure 9).

The estimated number of cropping businesses in Tasmania applying lime and/or dolomite to their holdings to manage soil acidity increased (from 44 per cent to 52 per cent) between 2007–08 and 2009–10 (Figure 10). Longer-term data for cereal businesses (a major component of the cropping business category, which excludes cotton, rice, sugar, oilseeds and pulses) show that an estimated 35 per cent applied lime or dolomite in 1995–96; this increased significantly to 85 per cent by 2009–10 (Figure 11). A total of 74,811 tonnes of lime and 34,225 tonnes of dolomite was applied by Tasmanian broadacre crop farmers to their holdings at rates of 2.30 and 2.28 tonnes per hectare respectively in 2007–08 (Table 3).

Table 2

<table>
<thead>
<tr>
<th>Region</th>
<th>Low risk (%)</th>
<th>Moderate risk (%)</th>
<th>High risk (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>North</td>
<td>41</td>
<td>32</td>
<td>26</td>
</tr>
<tr>
<td>North West</td>
<td>93</td>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td>South</td>
<td>48</td>
<td>15</td>
<td>36</td>
</tr>
<tr>
<td>Tasmania</td>
<td>57</td>
<td>22</td>
<td>21</td>
</tr>
</tbody>
</table>

Table 2. Estimated percentage of Tasmanian cropping area at risk of soil acidification. These estimates were produced by intersecting cropping (dryland and irrigated) from Land use of Australia 2005–06 (ABARE–BRS 2010) with the soil acidification risk map produced by Wilson et al. 2009.
Figure 8. Tasmanian cropping areas in natural resource management regions with low, moderate and high risks of soil acidification. This map was produced by intersecting cropping (dryland and irrigated) from Land use of Australia 2005–06 (ABARE–BRS 2010) with the soil acidification risk map produced by Wilson et al. 2009.

Figure 9. Percentage of Tasmanian broadacre cropping businesses undertaking pH and soil nutrient testing, 2007–08 and 2009–10.
Figure 10. Percentage of Tasmanian broadacre cropping businesses applying lime or dolomite to their holdings, 2007–08 and 2009–10.

Figure 11. Percentage of cereal (excluding rice) businesses in Tasmania applying lime or dolomite to their holdings, 1995–96, 2000–01 and 2009–10. Note: Data for 2009–10 presented here are slightly different from that for Figure 10; there is no direct comparison between cereal cropping businesses and total broadacre cropping businesses.
Conclusions

The data suggest that there are further opportunities for broadacre cropping businesses in Tasmania to reduce tillage and increase crop residue retention to help reduce the risk of soil loss through wind and water erosion and increase soil carbon. Given the extensive and insidious nature of soil acidification, with almost 43 per cent of all cropland in Tasmania at moderate to high risk of acidification, it may be necessary to increase regular testing and, where needed, liming of cropping soils, especially in the North and South regions.
References


