BENEFITS OF RETAINING STUBBLE—QUEENSLAND

Key points
- Retaining stubble can decrease soil erosion, increase soil water content and increase soil biological activity.
- Stubble burning, grazing and cultivation are management practices that can decrease stubble cover.
- Where stubble retention is in place, it is important to ensure adequate nitrogen availability in order to reach full yield potential.

Background
Historically, stubble has been burnt because it improves weed control and creates easier passage for seeding equipment. However, the practice of burning stubble has declined throughout Queensland cropping regions due to concerns about soil erosion and loss of soil organic matter. Instead of being burnt, stubble is now more commonly retained, which has several advantages for soil fertility and productivity (figure 1).

Reduced erosion risk
One of the main benefits of stubble retention is reduced soil erosion (figure 2). Retaining stubble decreases erosion by reducing the raindrop energy at the soil surface and decreasing run-off. In order to protect the soil from erosion, crops need to be managed so that at least 30–40% ground cover is maintained throughout the year, but especially during the summer months when there is a greater chance of high-intensity rainfall. The amount of cover produced by crops will vary according to seasonal conditions and crop variety. However, as a general rule of thumb, a 1.5 t/ha grain yield should typically provide 90% stubble cover. This cover may decrease over the fallow period, however, depending on whether the site is subsequently burnt, grazed or cultivated.

Increased soil water content
Another advantage of retaining stubble is that it increases soil water content by decreasing run-off, and increasing infiltration (figure 3). The greater the amount of stubble cover, the greater the potential benefits to soil water storage. Stubble coverage of 30% is considered the minimum level required for reducing the effect of soil water runoff. However, stubble coverage of 50% or greater will further benefit for soil moisture storage and erosion control.

Increased biological fertility of soil
Retaining stubble increases the input of carbon to soil. Stubble is approximately 45% carbon by weight and therefore represents a significant carbon source. Microorganisms in soil require organic carbon to obtain the energy they need to live. When stubble is retained, the greater inputs of organic carbon increase the number and activity of microorganisms in soil (see Organic carbon pools—Queensland and Microbial biomass—Queensland factsheets).
Management practices affecting stubble cover

Stubble burning, grazing and cultivation are the main management practices with the potential to reduce stubble cover. A single tillage operation using a chisel plough, for example, can reduce stubble coverage by 30–40% (Table 1).

**Table 1**: Estimated reduction in wheat or barley stubble cover from different tillage operations (reproduced from ‘Measuring stubble cover: Photostandards for winter cereals’).

<table>
<thead>
<tr>
<th>IMPLEMENT</th>
<th>RESIDUE BURIED BY EACH TILLAGE OPERATION (%)</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Fresh stubble</td>
</tr>
<tr>
<td>Disc plough</td>
<td>60–80</td>
</tr>
<tr>
<td>Chisel plough</td>
<td>30–40</td>
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<tr>
<td>Blade plough</td>
<td>20–30</td>
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<tr>
<td>Boomspray</td>
<td>negligible</td>
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</tbody>
</table>

It is recommended that stubble cover be maintained as long as possible in the fallow, and that planting and fertilising machinery be adapted to minimise disturbance. Where cultivation is required in order to control herbicide resistant weeds, this should be carried out as a one off operation.

Fertiliser application

High levels of stubble may increase soil moisture storage, increasing the yield potential (and nitrogen requirement) of the crop. However, stubble may also decrease the level of available soil nitrogen, which can reduce yield potentials. Where stubble retention is in place, it is important that nitrogen fertiliser and/or legume rotations be used to ensure adequate nitrogen is available for crop growth (see ‘Nitrogen’ factsheet).

Further reading and references


