Using energy requirements to compare the suitability of alternative methods for broadcast and site-specific weed control – CORRIGENDUM

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In the original publication of Coleman (2019), the reported tillage parameters and implement definition for the rotary hoe were based on a power take off (PTO)-driven cultivator; however, the presented energy consumption calculations were for the ground-driven implement. The name rotary hoe is used for two significantly different implements: i) a PTO-driven cultivator commonly used in the UK and Australia for aggressive soil disturbance with slow work rates, and ii) a ground-driven implement used for shallow cultivation in the US with high work rates.

The direct energy estimate of 8 to 10 MJ ha\(^{-1}\) was calculated using parameters provided for the US definition of the rotary hoe in Bowman (1997) and ASAE (2000), with a cultivation depth of 2 to 5 cm and a forward speed of 14 to 16 km h\(^{-1}\). The draft force figure provided in ASAE (2000) of 600 N m\(^{-1}\) relied on for energy estimates is correct; however, an additional PTO energy consumption of 2 to 4 MJ ha\(^{-1}\) was incorrectly included. The implement does not require any external rotational power, so the inclusion of this energy is incorrect. The correct direct energy consumption per hectare is 6 MJ ha\(^{-1}\). The indirect energy associated with rotary hoe tiller surface wear rates of 15 to 158 g ha\(^{-1}\) was based on a PTO-driven implement (Casilli et al. 2017). This value has been updated to match other ground-driven implements with wear rates of 30 to 96 g ha\(^{-1}\) (0.6 to 1.9 MJ ha\(^{-1}\)). Energy associated with the transport of the implement (3.5 MJ ha\(^{-1}\)) remains unchanged with similar reported equipment masses. The updated total estimated energy consumption range of 10 to 11 MJ ha\(^{-1}\) has been included in Figure 3, whereby the rotary hoe now sits below the sweep cultivator, based on average energy consumption. The rotary hoe entry from Table 3 has been revised to reflect the corrected direct and indirect energy consumption estimates.

The correct definition of the rotary hoe to match the energy estimation assumptions is a ground-driven implement, featuring curved steel fingers that uproot weeds by rapidly lifting the top 2 to 5 cm of soil. The curved steel fingers are mounted on a flexible, spring arm enabling...
fast movement over large fields, with the ground-driven wheels typically measuring 45 to 53 cm in diameter.

The authors apologize for this error.

**References**


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**Table 3.** Corrected summary of direct and indirect energy consumption for the ground-driven rotary hoe. References provided cover efficacy of control option and/or estimations for energy consumed including variables used in draft force and energy for transport calculations.

<table>
<thead>
<tr>
<th>Method</th>
<th>Direct energy input</th>
<th>Energy source</th>
<th>Consumable</th>
<th>Estimated equipment mass</th>
<th>Indirect energy input</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rotary hoe</td>
<td>MJ ha⁻¹</td>
<td>Draft</td>
<td>kg m⁻¹ width</td>
<td>MJ ha⁻¹</td>
<td></td>
<td>(ASAE 2000; Bond et al. 2003; Bowman 1997)</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td></td>
<td>30-96 g steel</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Hatzenbichler Rotary Hoe (Hatzenbichler 2019)"