Tillage and cover crop management as an option to minimize soil compaction and weed infestation

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Low intensity tillage is economically beneficial and minimizes soil erosion, but it often accompanied by problems, such as soil compaction and higher weed and pest infestation.

A cereal-based crop rotation, which is common practice in Lithuania, increases the occurrence of the specific weeds and pest, especially when low intensity tillage technologies are applied.
The main purpose of our study was to measure the effect of white mustard *Sinapis alba* L., as a cover crop, on soil compaction and weed pressure in different tillage systems.
Trial design:

DP – deep ploughing (20-22 cm)
SP - shallow ploughing (14-16 cm)
SH - harrowing (8-10 cm)
DH - harrowing (14-16 cm)
DD - direct drilling

Crop rotation:
Field pea
Winter wheat
Winter oilseed rape
Spring wheat + cover crop
Spring barley + cover crop

White mustard was established across the tillage treatments (in a half of all plots) approximately 3 weeks before harvest of the main crop, using a fertilizer spreader, in 2013 (spring wheat) and 2014 (spring barley).
Trial design:
Results:

White mustard biomass per 1 m²

- P(20-22): 800
- P(14-16): 400
- H(8-10): 600
- H(14-16): 200
- DD: 300
Results:

Total biomass (including white mustard) g per m²

- DP
- SP
- SH
- DH
- DD

Graph showing total biomass with and without white mustard.
Results:

Total weed biomass g per m$^2$

- DP
- SP
- SH
- DH
- DD

without WM
with WM
Results:

Bulk density g m$^{-3}$

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<thead>
<tr>
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<th>0-10 cm</th>
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<tbody>
<tr>
<td>DP</td>
<td>without WM</td>
</tr>
<tr>
<td>SP</td>
<td>1.50</td>
</tr>
<tr>
<td>SH</td>
<td>1.55</td>
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<tr>
<td>DH</td>
<td>1.50</td>
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<tr>
<td>DD</td>
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Results:

Total porosity m$^3$ m$^{-3}$

- DP
- SP
- SH
- DH
- DD

0-10 cm

- without WM
- with WM
Message:

White mustard had a positive effect on soil bulk density, total porosity and other physical properties at the soil surface (0-10 cm). It also clearly reduced number and mass of weeds in all tillage treatments.

Our results suggest that White mustard as cover crop might be an option for weed suppression and top soil loosening.