Impact of seeding rate and delayed sowing on winter wheat and weed competition

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Introduction

Å Development of weed management strategy needs to consider biological characteristics of agricultural crops and weeds, their emergence time and other factors.
Changes: Climate and farming

- Long warm period in autumn (Sometimes vegetation of winter crops continues till December)
- Soft weather over the winter
- No crop rotation
- Development of reduced soil tillage system
Outcome

Å The necessity using herbicides for weed control in autumn

Å Spread of voluntiers: winter rape in cereals

Å Increasing number of infested fields by grass weeds: Apera, Avena, Bromus
# Weeds in winter wheat
*(Data of 36 field trials)*

<table>
<thead>
<tr>
<th>Weeds</th>
<th>Number of trials</th>
<th>Weed number 1 m$^{-2}$</th>
<th>Weed mass g m$^{-2}$</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Stellaria media</em></td>
<td>28</td>
<td>0,8 ų 15,7</td>
<td>0,2 ų 156,5</td>
</tr>
<tr>
<td><em>Tripleurospermum inodorum</em></td>
<td>28</td>
<td>0,5 ų 38,8</td>
<td>0,3 ų 505,0</td>
</tr>
<tr>
<td><em>Viola arvensis</em></td>
<td>26</td>
<td>1,0 - 44,5</td>
<td>0,5 ų 103,1</td>
</tr>
<tr>
<td><em>Veronica spp.</em></td>
<td>25</td>
<td>0,2 ų 28,0</td>
<td>0,1 ų 83,8</td>
</tr>
<tr>
<td><em>Galium aparine</em></td>
<td>22</td>
<td>0,2 ų 7,2</td>
<td>0,4 ų 65,2</td>
</tr>
<tr>
<td><em>Lamium purpureum</em></td>
<td>21</td>
<td>0,5 ų 52,5</td>
<td>1,4 ų 121,2</td>
</tr>
<tr>
<td><em>Capsella bursa-pastoris</em></td>
<td>21</td>
<td>0,2 ų 32,0</td>
<td>0,2 ų 87,0</td>
</tr>
<tr>
<td><em>Chenopodium album</em></td>
<td>13</td>
<td>1,2 ų 59,8</td>
<td>0,8 ų 67,6</td>
</tr>
<tr>
<td><em>Apera spica - venti</em></td>
<td>10</td>
<td>0,7 ų 868,0</td>
<td>1,2 ų 2133,0</td>
</tr>
<tr>
<td><em>Dirvinė čiužutė</em></td>
<td>8</td>
<td>0,5 ų 21,5</td>
<td>0,4 ų 117,8</td>
</tr>
<tr>
<td><em>Brassica napus</em></td>
<td>8</td>
<td>2,2 ų 8,2</td>
<td>1,1 ų 16,9</td>
</tr>
<tr>
<td><em>Myosotis arvense</em></td>
<td>6</td>
<td>0,5 ų 1,7</td>
<td>7,1 ų 10,6</td>
</tr>
<tr>
<td><em>Centauria cyanus</em></td>
<td>6</td>
<td>5,8 ų 23,5</td>
<td>42,2 ų 58,5</td>
</tr>
<tr>
<td><em>Other</em></td>
<td>1-2</td>
<td>0,2 ų 47,8</td>
<td>0,1 ų 95,0</td>
</tr>
</tbody>
</table>
Weed emergence and growing in cereals depends on:

- Soil tillage
- Establishment time
- Seed rate
- Weather conditions
Weed control

Â date of establishment of a crop may be used as a measure to reduce weed infestation.

Â Stand density may be as implement for increasing crop competitiveness
Field trial

The influence of plant density and sowing delaying on weed suppression was investigated in the crops of winter wheat in the field trials conducted at the Lithuanian Institute of Agriculture in 2015 and 2016 in Central Lithuania (55°23′50″N and 23°51′40″E).

The soil of the experimental site is Endocalcary-Endohypogeyic Cambisol (CM-p-w-can), neutrally acid light loam, rich in phosphorus and potassium.
Sowing time

- First decade of September
- Three weeks later
- Six weeks later
Seed rate

Seed rates were adjusted for seed weights and germination rate to give a population density of 200, 400 or 800 plants per m².
Germination of MATIN in autumn, depending on seed rate and sowing date of WW
Early sowing (3rd of September)

3 weeks later (23rd of September)
Weed number in early spring in *ww* crop

![Bar chart showing weed number at different crop sizes and sowing times.](Image)

- 2mln: Early sowing 254, 3 weeks later 232, 6 weeks later 111
- 4mln: Early sowing 256, 3 weeks later 243, 6 weeks later 74
- 8mln: Early sowing 232, 3 weeks later 187, 6 weeks later 45
Weeds mass g/m² in winter wheat crops in spring

2mio: 210.8
4mio: 96.0
8 mio: 57.5

early 3 weeks later
Number of weeds m2 spring germination

unexpectedly low germination rates at 4 mio and 8 mio, early sowing has a significant advantage over sowing 3 weeks later.
Grain yield of ww t ha-1

2mln
4mln
6mln

Early
3 weeks later
6 weeks later
Sowing delay

Å Recomendation for ww sowing at first decade of September in Lithuania could be slightly changed – especially if no chemical weed control would be used in autumn.
Thank you for your attention