TOP 10 OF THE MOST DANGEROUS WEED SPECIES IN THE SPRING BARLEY CANOPIES DURING THE LAST DECADE IN THE SLOVAK REPUBLIC

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Abstract: *In the years 2000 - 2009 (10 years) was conducted weed survey on the farms in conventional farming system. The aim was to detected top 10 of the most harmful weeds, as important biotic stress factor, on the farms in the canopies of spring barley in all production regions of the Slovak Republic. The actual weed infestation was evaluated by standard methods common used by a counting method per square. The four randomly established sample quadrants were situated minimally 20 m from field margin and apart each other, respectively. Three most dangerous weeds in spring barley stands in the maize production regions were: Cirsium arvense (L.) Scop, Elytrigia repens (L.) DESV and Avena fatua L.. In sugar beet production region it was Cirsium arvense (L.) Scop, Tripleurospermum perforatum (Mérat) M. Lainz and Anthemis spp.. In potato production region it was Chenopodium spp., Tripleurospermum perforatum (Mérat) M. Lainz and Anthemis spp.. Temporral dynamic of actual weed infestation depends on production region. In the last decade was detected the very significant increase of volunteer winter oilseed rape infestation of spring barley stands in maize production region and Cirsium arvense (L.) Scop., Galium aparine L.. Anthemis spp., Amaranthus spp., Chenopodium spp., Atriples spp., Lamium spp. and Tripleurospermum perforatum (Mérat) M. Lainz infestation in sugar beet production region and Lamium spp. in potato production region. Significant increase was detected by Avena fatua L. infestation in sugar beet production region. Very significant decrease of Chenopodium spp and Galium aparine L. infestation was detected in maize production region and significant decrease was detected by Anthemis spp. infestion. After herbicides control the significant changes in weed flora were noted in term of abundance and share of some weed species on total weed community The originality of result is in mapping the weed species in cultural crops.*

Key words**:** *weed infestation, spring barley, mapping, temporal dynamic*

INTRODUCTION

Spring barley is used mainly for malt production and as a feed for animals. The rest is used in food industry and as a seeds. The varieties have to be chosen properly, so that their genetic potential was fully used, therefore they have to be grown in appropriate conditions (PSOTA, 2000). Modern spring barley varieties have been developed with the aim of combining high productivity and standardised product quality under the high-input conditions using pesticides for weeds control, diseases, and insects as well as heavy application of nutrient rich and water – soluble inorganic fertilizers (LACKO-BARTOŠOVÁ, MACENKOVÁ, 2007; MACÁK et al., 2008).

Changes in farming systems, routine use of specific herbicides over many years in the climate can effect weed populations. The increases in winter cropping saw increases in weeds such as cleavers, speedwells, pansy, volunteer rape and grass weeds, which could also grow in the spring. Many common spring species decreased in populations, such as hemp-nettles and charlock in arable areas, also because of changes in herbicide uses (DAVIES, 2007).

MATERIAL AND METHODS

The assessment of the most dangerous weed species and their dynamic in canopies of spring barley was conducted at the Slovakia in the years 2000 - 2009. The fields were selected in all production regions of Slovak Republic. An actual weed infestation was evaluated before preemergence application of herbicides. Screening of each field was made on 1 m^2 area with four replications. The four randomly established sample quadrants were situated minimally 20 m from field margin and apart from each other, respectively. The level of infestation was evaluated according to average density of weeds per square meter (Table 1). Obtained data from farms was statistically analysed by correlation analysis in Statistica 7.0.

Table 1

Evaluation scale of actual weed infestation

Group of weeds*	Actual weed infestation				
	none	weak	low	medium	Heavy
	Infestation level				
	0	1	2	3	4
	Number of weeds per m^2				
Excessively dangerous	-	≤ 2	3-5	6-15	≥ 16
Less dangerous	-	≤ 4	5-8	9-20	≥ 21
Less important	-	≤ 8	9-15	16-30	≥ 31

- weed species according to checklist Hron, Vodák, 1959, modified by authors

Table 2

Characteristic of evaluated production region of the Slovak Republic

Characteristics	Maize production region (MPR)	Sugar beet production region (SBPR)	Potato production region (PPR)
Share of total arable land	24%	16.2%	18.9%
Altitude	up to 200 m	up to 350 m	350-500 m
Average year temperature	9.5-10.5°C	8-9°C	6.5-8°C
Average year precipitation	550-600 mm	550-650 mm	700-800 mm

RESULTS AND DISCUSSIONS

In the last decade the most dangerous weed species in the winter wheat canopies in maize production region were *Cirsium arvense* (L.) Scop, *Elytrigia repens* (L.) *DESV and Avena fatua L.*. In sugar beet production region were the most dangerous weeds *Cirsium arvense* (L.) Scop, *Tripleurospermum perforatum* (Mérat) M. *Lainz and Anthemis spp.*. In potato production region were the most harmfull weeds: *Chenopodium spp., Tripleurospermum perforatum* (Mérat) M. Lainz and *Anthemis spp.*.

The main factor of increasing *Cirsium arvense* spread is not only several years setting land aside but also other factors – as the increase of large-scale farming together with simple crop rotations, higher doses of fertilizers and decreasing intensity of soil treatment, and at last but not least financially expensive herbicide treatment (TÓTH, 2008).

In the years 2000-2009 raised the spring barley stands infestation with volunteer winter oilseed rape very significantly. It was only one weed, which increased its populations in spring barley stands in this region, three other weed decreased their populations. *Chenopodium spp* and *Galium aparine* L. decreased weed infestation of spring barley stands very significantly and *Anthemis spp*. significantly (Table 3) One of the main reason of *Chenopodium spp*. decrease is the late germination of this weed species and because of that it could be effectively suppressed by cereals, especially at higher densities in the uniform pattern

(COLQUHOUN et al., 2001). Problems with *Galium aparine* can be successfully solved if herbicide treatments are done strictly in time. Their present high position in the weediness is related to the possibility of their occurrence and growing in all crops, dose of fertilizer – especially *Galium aparine* is a nitrophilic species, relatively tolerant towards many commonly used herbicides (TÓTH, 2008)

In the sugar beet production region was detected very significantly increased of spring barley weed infestation with following species: *Galium aparine* L., *Cirsium arvense* (L.) Scop. *Tripleurospermum perforatum* (Mérat) M. Lainz., *Anthemis spp*., *Amaranthus spp*., *Chenopodium spp*., *Atriplex spp.* and *Lamium spp*.. In the last decade significantly increased the infestation of spring barley stands with *Avena fatua* L. (Table 4).

In the last decade very significant raised only infestation of spring barley with *Lamium spp.*in potato production region (Table 5).

Table 3

Temporal dynamic of the ten most dangerous weed species in the spring barley canopies in maize production region

	Weed	Correlation coefficient of spring barley weed infestation temporal dynamic in maize production region
1.	*Cirsium arvense* (L.) SCOP	0.3988 NS
2.	*Elytrigia repens* (L.) DESV	-0.1700 NS
3.	*Avena fatua* L.	-0.1857 NS
4.	*Chenopodium spp.*	-0.7620 VS
5.	*Galium aparine* L.	-0.6517 VS
6.	Volunteer sunflower	0.1079 NS
7.	Volunteer winter oilseed rape	0.7720 VS
8.	*Tripleurospermum perforatum* (Mérat) M. Lainz	0.2524 NS
9.	*Anthemis spp.*	-0.5055 S
10.	*Sinapis arvensis* L.	-0.2482 NS

Legend: VS-very significant, S-significant, NS-non significant

Table 4

Temporal dynamic of the ten most dangerous weed species in the spring barley canopies in sugar beet production region

	Weed	Correlation coefficient of spring barley weed infestation temporal dynamic in sugar beet production region
1.	*Cirsium arvense* (L.) SCOP	0.7716 VS
2.	*Tripleurospermum perforatum* (Mérat) M. Lainz	0.7075 VS
3.	*Anthemis spp.*	0.8336 VS
4.	*Galium aparine* L.	0.8067 VS
5.	*Avena fatua* L.	0.5233 S
6.	*Amaranthus spp.*	0.6997 VS
7.	*Chenopodium spp.*	0.6888 VS
8.	*Sinapis arvensis* L.	-0.1995 NS
9.	*Atriplex spp.*	0.6860 VS
10.	*Lamium spp.*	0.6355 VS

Legend: VS-very significant, S-significant, NS-non significant

Table 5

Temporal dynamic of the ten most dangerous weed species in the spring barley canopies in potato production region

	Weed	Correlation coefficient of spring barley weed infestation temporal dynamic in potato production region
1.	*Chenopodium spp.*	-0.0392 NS
2.	*Tripleurospermum perforatum* (Mérat) M. Lainz	0.4660 NS
3.	*Anthemis spp.*	-0.0491 NS
4.	*Elytrigia repens* (L.) DESV	0.1305 NS
5.	*Galium aparine* L.	-0.4378 NS
6.	*Sinapis arvensis* L.	-0.0131 NS
7.	*Avena fatua* L.	0.2280 NS
8.	*Lamium spp.*	0.7960 VS
9.	*Cirsium arvense* (L.) SCOP	-0.2280 NS
10.	*Galeopsis tetrahit* L.	0.0716 NS

Legend: VS-very significant, S-significant, NS-non significant

CONCLUSIONS

The most dangerous weed species of spring barley in the last decade in all production regions of the Slovak Republic were: *Cirsium arevense* (L.) Scop., *Tripleurospermum perforatum* (Mérat) M. Lainz, *Anthemis spp, Chenopodium spp.* and *Avena fatua* L.

Lamium spp. increased their populations in spring barley stands in sugar beet and potato production region very significant.

In maize production region very significantly decreased its population *Chenopodium spp*. and *Galium aparine* L..

In sugar beet production region was detected that 8 weed species, from Top 10, increased their population very significantly.

Temporal dynamics of actual weed infestation depend on climate conditions of production region, forecrop and canopy health condition.

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