TOP 10 OF THE MOST DANGERUS WEED SPECIES IN MAIZE STANDS IN THE SLOVAK REPUBLIC IN THE YEARS 2000-2010

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Abstract: *In the years 2000 – 2011 (12 years) was conducted weed survey on the farms in conventional farming system. The goal was to detect the most harmful weeds, as important biotic, environmental stress factor, on the farms in the canopies of maize for grain in maize, sugar beet and potato production regions of the Slovak Republic. The fields were selected in all production regions of Slovakia. 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. Obtained data from farms was statistically analyzed by correlation analysis in Statistica 7.0. According to the obtained data and results of weed survey the most troublesome weeds with the heaviest weed infestation level of maize for grain stands were in maize production region Chenopodium spp., Amaranthus spp. and Echinochloa crus galli (L.)P. Beauv.; in sugar beet production region Persicaria spp., Atriplex spp. and Echinochloa crus galli (L.)P. Beauv.; in potato production region Atriplex spp., Chenopodium spp. and Elytrigia repens (L.) P. Beauv. An actual weed infestation depends on production region. 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 dynamics of actual weed infestation depend on climate conditions of maize, sugar beet and potato production region, forecrop and canopy health condition. Weeds are always a problem in maize for grain stands. They can rapidly reduced the yield of maize, but management and control may be considered necessary to safeguard crop quality and yield. The originality of result is in mapping the weed species and its actual weed infestation in cultural crops (maize for grain stands).*

Key words**:** *words: maize for grain, weed infestation, mapping*

INTRODUCTION

Weeds occur in almost every field. Cultivated crops together with weed species compose agrophytocenos. The occurrence to concrete weed species in agrophytocenos is affected by biological properties of crops, ecological factors of the localities, as well as by the intensity of the used agro technology (TYŠER and HOLEC. 2004). Weeds belong to the factors that negatively affect crop production. As a part of crop stands, they cause yield loss, even though treatment measures are taken (TÓTH, 1999) Although maize (*Zea mays*) is a vigorous and tall growing plant, it is susceptible to competition from weeds, with losses greater than 30% commonly reported (RAHMAN, 1985). The maize yield formation is negatively affected by unfavourable weather conditions, pests and diseases and mainly by weeds (MARTINKOVÁ, HONĚK, 1998). The high level of weed infestation is caused by lack of water in the soil. Unfavourable conditions gradually affect the height of plants, stalk diameter at the base of the plant, number of leaves and vitality of maize, number of grains in ear and the thousand seed mass (ALI et al., 1999).

MATERIAL AND METHODS

The assessment of the most dangerous weed species in canopy of maize for grain was conducted at the Slovak fields in 2000 – 2011. The fields were selected in all production regions (Table 2). Common chemical weed practices were used. Present study assessed the actual weed infestation of weed species in canopy of maize for grain during the years 2000 – 2011.

An actual weed infestation was evaluated before application of herbicides with concordance to modified international scale. Screening of each field was made on the quadrant of $1m^2$ area with four replications. One quadrant of each replication was (1.0m x 1.0m). The four randomly established sample quadrants were situated minimally 20 m from field margin and apart each other, respectively. The fields with same history were selected. Standard mechanical and chemical weed control have been used. The level of infestation was evaluated according to average density of weeds per square meter (Table 1). Received dates from farms were computed to whole area of growing crop and 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 checklist Hron-Vodák, 1959, modified by authors Smatana-Týr, 2011.

Table 2

Characteristic of evaluated production region of the Slovak Republic

Characteristics	Maize production region (MPR)	Sugar beat 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

According to the obtained data and results of weed survey the most troublesome weeds with the heaviest weed infestation level of maize for grain stands were in maize production region *Chenopodium* spp., *Amaranthus* spp. and *Echinochloa crus galli* (L.) P. Beauv.; in sugar beet production region *Persicaria* spp., *Atriplex* spp. and *Echinochloa crus galli* (L.) P. Beauv.; in potato production region *Atriplex* spp., *Chenopodium* spp. and *Elytrigia repens* (L.) P. Beauv. (table 1).

Results of weed survey showed that in all production regions raised the amount of perennial weeds infested maize stands. In all three production regions were detected *Cirsium arvense* (L.) Scop. and *Elytrigia repens* (L.) P. Beauv.; in sugar beet production region Convolvulus arvensis (L.) and in potato production region Equisetum arvense (L.).

The spreading of invasive weed species in the maize for grain stands was also detected. In maize and potato production region became *Abutilon theophrasti* Medik. 10th and

8th place, respectively. But also others species were detected in warmer parts of Slovakia. The main invasive weed was *Ambrosia artemisiifolia* (L.). We have detected the same results as VEREŠ, TÝR, LACKO-BARTOŠOVÁ (2011), who have detected significant increase of *Ambrosia artemisiifolia* L. in the maize stands in maize production region.

According to TÓTH (2008) the most offensive weeds in the crop stands in Slovakia at present are *Cirsium arvense* (L.) Scop., *Chenopodium* spp. and *Elytrigia repens* (L.) P. Beauv., *Amranthus* spp., Atriplex spp., *Echinochloa crus galli* (L.) P. Beauv., *Persicaria* spp., *Datura stramonium* (L.). The similar corresponding results are profert by TYŠER, HOLEC (2004) in similar agricultural conditions of the neighbouring Czech Republic.

Table 3

Top 10 of most dangerous weed species in the maize fields in the Slovakia

No.	Maize production region	Sugar beet production region	Potato production region
1.	*Chenopodium* spp.	*Persicaria* spp.	*Atriplex* spp.
2.	*Amaranthus* spp.	*Atriplex spp.*	*Chenopodium* spp.
3.	*Echinochloa crus galli* (L.)P.Beauv	*Echinochloa crus galli* (L.)P.Beauv	*Elytrigia repens* (L.)P.Beauv
4.	*Datura stramonium* (L.)	*Cirsium arvense* (L.)Scop	*Persicaria* spp.
5.	*Fallopia convolvulus* (L.) Á.Löve	*Avena fatua* L.	*Echinochloa crus galli* (L.)P.Beauv
6.	*Persicaria* spp.	*Fallopia convolvulus* (L.) Á.Löve	*Amaranthus* spp.
7.	*Cirsium arvense* (L.)Scop	*Elytrigia repens* (L.)P.Beauv	*Convolvulus arvensis* (L.)
8.	*Elytrigia repens* (L.)P.Beauv	*Amaranthus* spp.	*Abutilon Theophrasti* Medik.
9.	*Avena fatua* L.	*Datura stramonium* (L.)	*Datura stramonium* (L.)
10.	*Abutilon theophrasti* Medik.	*Convolvulus arvensis* (L.)	*Equisetum arvense* (L.)

CONCLUSIONS

The most troublesome weeds in sugar beet stands were perennial weeds *Cirsium arvense* (L.) Scop., *Elytrigia repens* (L.) DESV., *Convolvulus arvensis* (L.) and *Equisetum arvense* (L.) and annual weeds *Chenopodium spp., Atriplex spp., Amaranthus spp., Echinochloa crus galli* (L.) P. Beauv, *Persicaria spp., Datura stramonium* (L.), *Avena fatua* (L.) and *Fallopia convolvulus* (L.) Á. Löve..

Besides mentioned weed species in the maize for grain stands occur also weeds in certain localities according to their site specific demands. Local actual weed infestation of maize stands was detected by species: *Iva xanthiifolia* Nutt., *Xanthium strumarium* (L.), *Xanthium spinosum* (L.), *Panicum capillare* (L.), *Panicum milleaceum* (L.), *Sorghum halepense* (L.), *Galinsoga parviflora* (L.) and *Galeopsis tetrahit* (L.) Necker.

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