CHANGES OF WEED SPECTRUM DURING THE SEASON IN VINEYARD

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ABSTRACT

The aim of this paper was to determinate weed species, which were occurred in selected vineyard in Žabčice and evaluate differences in weed infestation in spring and summer season. The evaluation was rating at a young vineyard the variety Pinot Blanc. Vineyard is divided into three parts: grassed space between rows, part close to the trunk and soil cultivation space between rows. In each section were carrying out 25 phytocenological reléves. Data were analyzed by the method Canonical Correspondence Analyses (CCA). It was identified 49 plant species in a vineyard in Žabčice. Identified species were divided by CCA into 3 groups; spring period group, summer period group and different factor group.

Key words: weeds, vineyards, phytocenological reléves

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INTRODUCTION

A weed is frequently defined as plant, which growing at place, where is not wanted. This definition emphasizes the negative status of weeds and agrees with the point of view of growers and other people interested in different kinds of agricultural activity (Lipecki, 2005).

Weed communities are characterizing by plasticity and adaptability to changing conditions. In the past, the introduction of new cropping technologies affected the occurrence of weeds. Species that are unable to adapt to new conditions gradually disappeared and adaptable species quickly filled up free space (Mikulka, Chodová, 1996).

Good weed management is critical for newly planted vineyards, because of the relative inability of new vines to compete for light, water and nutrients. Vines are most susceptible to competition from weed during their first three to four years of growth (Elmore, Donalds, 1999).

MATERIAL AND METHODS

Experimental vineyard is located at university farm in Žabčice (approx. 25 km south from Brno). Soil is in the vineyard is sandy, characterized with degraded chernozem. Values of pH classified soil almost neutral to slightly acid and with humus deficiency. The altitude of locality Žabčice is 185 meters above sea level. Žabčice are lying in Moravian dry area, which extends into a rain shadow. Rainfalls are distributing unevenly during the growing season. Overall drought has dried winds increase. More detailed rainfalls and temperature conditions are show in Tab. 1.

Tab.1. Table of rainfalls and temperature conditions in Žabčice

Month	Long-term average		Values in 2013	
	Rainfalls (mm)	Temperatures (°C)	Rainfalls (mm)	Temperatures (°C)
January	27.5	- 2.4	20.2	-1.0
February	25.5	- 0.2	42.1	0.7
March	27.2	3.8	40.8	1.8
April	37.8	9.1	20.2	10.6
May	73.3	14.2	109.0	14.7
June	78.4	17.1	147.4	18.3
July	76.4	18.6	4.7	21.9
August	68.8	18.0	43.6	20.4
September	44.5	14.3	63.2	14.0
October	40.0	9.1	-	-
November	40.4	3.7	-	-
December	30.3	- 0.4	-	-

The evaluation was carried out at young vineyard in the variety Pinot Blanc in April and August 2013. Vineyard is divided into to three parts, grassed space between rows, part close to the trunk and soil cultivation space between rows. In each part, 25 phytocenological reléves were evaluated. The plots hadeach section had 15 m^2. Abundance of weeds was assessed using estimation method in percentages.

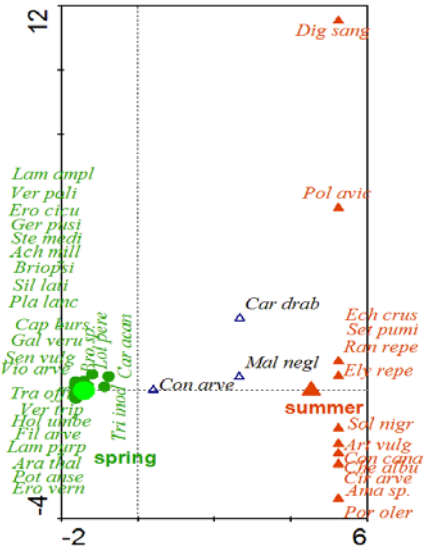
Latin names of identified species were used by Kubát (2002). Standard green works were done in agronomic dates.

Data collected in vineyard in Žabčice were processed by Multivariate Analysis of Ecological Data. The optimal analysis is directing by Length of gradient, which is determined by Detrended Correspondence Analysis (DCA). Then it was used Canonical Correspondence Analysis (CCA). While testing the materiality using Monte-Carlo was converted 499 permutations. Computer program CANOCO 4.0 processed data (Ter Braak, 1998).

RESULT AND DISCUSSION

Data collected in vineyard in Žabčice were processed by DCA. The gradient length was 7.112, therefore CCA was selected for subsequent data processing. CCA analysis defines the layout of weed species, which is express by ordination diagram on the Fig. 1. CCA analysis results are at the level of significance $\alpha = 0.002$ for all canonical axes and it explains 12.1% of the total variability in the data.

Fig.1. Ordinary diagram expresses the impact of the season for the presence of weed species



Explanatory notes: Ach mill (*Achilea millefolium*), Ama sp. (*Amaranthus* sp.), Ara thal (*Arabidopsis thaliana*), Art vulg (*Artemisia vulgaris*), Briopsi (*Briopsida*), Bro sp. (*Bromus* sp.), Cap burs (*Capsella bursa-pastoris*), Car drab (*Cardaria draba*), Car acan (*Carduus acanthoides*), Cir arve (*Cirsium arvense*), Con arve (*Convolvulus arvensis*), *Con cana* (*Conyza canadensis*), Dig sang (*Digitaria sanguinalis*), Ech crus (*Echinochloa crus-galli*), Ely repe (*Elytrigia repens*), Ero cicu (*Erodium cicutarium*), Ero vern (*Erophila verna*), Fil arve (*Filago arvensis*), Gal veru (*Galium verum*), Ger pusi (*Geranium pusillum*), Hol umbe (*Holosteum umbellatum*), Che albu (*Chenopodium album*), Lam ampl (*Lamium amplexicaule*), Lam purp (*Lamium purpureum*), Lol pere (*Lolium perenne*), Mal negl (*Malva neglecta*), Pla lanc (*Plantago lanceolata*), Pol avic (*Polygonum aviculare*), Por oler (*Portulaca oleracea*), Pot anse (*Potentilla anserina*), Ran repe (*Ranunculus repens*), Sen vulg (*Senecio vulgaris*), Set pumi (*Setaria pumila*), Sil lati (*Silene latifolia*), Sol nigr (*Solanum nigrum*), Ste medi (*Stellaria media*), Tar offi (*Taraxacum officinale*), Tri inod (*Tripleurospermum inodorum*), Ver poli (*Veronica polita*), Ver trip (*Veronica triphyllos*) a Vio arve (*Viola arvensis*).

The green circle  indicates a factor of spring season and the red triangle  indicates a factor of summer season. These factors affect the presence of identified weed species and these factors divided this species into two groups. The factor most affecting the species, if the sign of name of weeds is in close distance. It means, for example, occurrence of *Viola arvensis* is bound to spring season and the occurrence of the species *Solanum nigrum* influences the summer. Species which are marked with a blue triangle  are influenced with some other factor, which is not further specified in the analysis.

The occurrence of these perennial species is dependent on the season, but it can also go on rainfall conditions, plant allelopathy relationships or other factors. These species represent for example *Convolvulus arvensis*.

Species whose occurrence is bound to the spring period are *Achilea millefolium*, *Arabidopsis thaliana*, *Briopsida*, *Bromus* sp., *Capsella bursa-pastoris*, *Carduus acanthoides*, *Erodium cicutarium*, *Erophila verna*, *Filago arvensis*, *Galium verum*, *Geranium pusillum*, *Holosteum umbellatum*, *Lamium amplexicaule*, *Lamium purpureum*, *Lolium perenne*, *Plantago lanceolata*, *Potentilla anserina*, *Senecio vulgaris*, *Silene latifolia*, *Stellaria media*, *Taraxacum officinale*, *Tripleurospermum inodorum*, *Veronica polita*, *Veronica triphyllos* a *Viola arvensis*. Totally, was identified 25 weed species. The species we can according by biological properties divided into next groups. The highest occurence have have annual winter and perennial species. Annual winter weeds overwinter in the rosette stage (Líška, Hunková, Otepka, Žembrey, 2003). This includes for example *Lamium purpureum* and *Capsella bursa-pastoris*, as proposed by the Mikulka (1999). There is also interesting range of ephemeral species and annual early spring species. Ephemeral weeds have only a very short growing season. They grow out in autumn, during winter or very early spring. Growth and development terminated in the spring (Líška, Hunková, Otepka, Žembrey, 2003). As reported Mikulka (1999), these include for example *Veronica hederifolia* or *Erophila verna*.

Species whose occurrence is bound to the summer period are *Amaranthus* sp., *Artemisia vulgaris*, *Cirsium arvense*, *Conyza canadensis*, *Digitaria sanguinalis*, *Echinochloa crus-galli*, *Elytrigia repens*, *Chenopodium album*, *Polygonum aviculare*, *Portulaca oleracea*, *Ranunculus repens*, *Setaria pumila* a *Solanum nigrum*. Totally, was identified 13 weed species. According to the biological characteristics, we can identify species divided into late spring and perennial category. Late spring weeds have very extensive thermal amplitude. They grow out at temperatures from 4 °C to 45 °C; these species germinate in large at higher temperatures (Dvořák, Smutný, 2003). This includes for example *Setaria pumila*, *Echinochloa crus-galli*, *Amaranthus retroflexus* and *Solanum nigrum*, as confirmed Kazda, Mikulka and Prokinová (2010).

Species whose occurrence is bound to the different factor are *Cardaria draba*, *Convolvulus arvensis* a *Malva neglecta*. Totally was identified three weed species, all species were influence with other factors. These species are propagated mainly by seeds and fruits, but also vegetative. After maturation generative organs not die, but continued in grow (Dvořák, Smutný, 2003). They occur mainly in perennial crops, meadows, grassland and in vineyards (Líška, Hunková, Otepka, Žembrey, 2003).

CONCLUSIONS

In 2013, it was identified 49 plant species in a vineyard in Žabčice. Identified species were divided by CCA into 3 groups. During the spring season were dominant annuals and ephemeral species; in summer occurred late spring and perennial species. The last group consists of three species whose occurrence is impressing with other factors such as season of year. The spring season was most diverse in weed species.

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