THE INTRASPECIFIC COMPETITION EFFECTS ON GRASS PRODUCTIVITY OF DACTYLIS GLOMERATA L. AND LOLIUM PERENNE L.

EFECTUL COMPETITIEI INTRASPECIFICE ASUPRA PRODUCTIVITATII SPECIILOR DACTYLIS GLOMERTA L SI LOLIUM PERENNE L.

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To study the intraspecific competition and its influence on these species, Dactylis glomerata and Lolium perenne were cropped in pure culture and mixtures. Research was carried out at ICDP Brasov, on a chernozem soil, well supplied in NPK minerals. Dressing was uniform for both crops and it consists in 100 kg N/ha applied integrally in spring, 50 kg P_2O_5/ha and 50 kg K_2O/ha applied at the crop establishment. To assess the competition between these species it was determined the number of tillers, dynamic of tiller formation, morphological structure of tillers, specific weight, dynamic of DM accumulation during the first growth and vegetation period. It showed the existence of higher intraspecific competition for an only variety. Variety mixtures contribute at the better utilization of nutrition surface and improvement of photosynthetic efficiency, which influences the biomass production.

**Key words:** intraspecific competition, Dactylis glomerata, Lolium perenne
DM yield, morphological structure.

Introduction

The research referring to forage production on sowing grassland have as main objectives, to know exactly inputs for obtaining maximum yield and farmers profit. Of course, these objectives are solving only by perform technologies and correlate with market requirements.

Competition aspects there are in all communities, naturals or crops, monospecific or plurispecific. Corresponding to Malcom’s opinion (mentioned by Lemaire 1988) the competition is definition by appears depressives effects in mixture comparatively pure crop.

In association of two or more species there is in the some time, intra and inter specific competition aspects (Razec I.et al. 2006). So, in our studies we have to consider as important both type of competition.

Different physiological and morphological aspects between grass and legumes have a big influence on competition in mixtures (Soussana,J.F et al. 2007).
1995). Is difficult to separate effects because they interaction each other, under the influence of complex factors.

For better understanding how intraspecific competition has influence on grass productivity has studied two grass species, in pure crop and in mixture of varieties.

**Material and methods**

The studies were carried out between 2005-2006 at the Grassland Research Institute, Brasov, on a sandy loam chernozem soil with pH$_{H2O}$ 6.5 a good supply of phosphorus P$_{(AL)}$ 109 ppm and potassium K$_{(AL)}$ 361 ppm and 0.205 % of total nitrogen. The annual average rainfall is 747 mm and average temperature is 7.8 °C.

The biological material was grass species and varieties, *Dactylis glomerata* with Poiana, Regent and Olimp varieties and *Lolium perenne* with Mara, Magura, Marta varieties. One level of fertilizer was applied, 100 N kg ha$^{-1}$ annual in the spring.

Dynamic of vegetative tillers, morphological structure of tillers and their contribution on DM yield were determined in pure crop and in mixtures of varieties for each species of grass.

**Results and discussions**

The dynamic of vegetative tillers have a difference evolution in pure crop and in mixtures of varieties presenting in figure 1.

Total number of vegetative tillers was 70-645 /m$^2$ higher in pure crop than in mixture of varieties. The difference between type of crop due to different precocity of varieties of mixtures.

![Figure. 1 Dynamic of DM accumulation on first harvest](image-url)
The morphological structure of plant is different in function of type of crop, too. The mean number of green leaves on the tiller increase in mixture of varieties and determined increase leaves area index (LAI) range between 4.7-5.2 at *Dactylis glomerata* and 5.2-6.0 at *Lolium perenne*. This increasing has as effect improving photosynthetic efficiency and determined increase specific weight of tillers (Figure 2).

![Figure 2. Morphological structure of tillers](image)

Dynamic of DM accumulation on first harvest (Figure 3) in correlation with number of tillers and specific weight of tillers put in evidence the influence on DM yield. Between total yield of biomass and yield of leaves there is a negative correlation, because in steams is accumulate more weight of DM than in leaves in the same time with growth. This aspect has negative influence on forage quality (Razec M. et al. 2002).
Figure 3 DM accumulation on first harvest

Annual DM yield on each harvest is presented in Figure 4. For both species was registered increase in mixture crop. Thus, "L. perenne" increase with 1.34 t.ha⁻¹ DM yield and "D. glomerata" increase only with 0.35 t.ha⁻¹ DM yield.

Figure 4 DM yield on cycle of harvest (C)

Conclusions

• By utilization of some varieties mixtures with different earliness and ploidy is influenced the number of tillers, efficient utilization of nutrition space and DM yield.
• Tillers initiated early have vigorous growth, cover the nutrition space and determine the shading and eliminating of later tillers formed by axilar buds.
• Competition for light increases at the level of vegetal cover in the same time with advancing maturity, after 40-50 days from starting in growth the number of the tillers per unit surface increases of two times and also senescence leaves ratio increases to 24-56 % from total leaves.

• It was established a positive relationship between the number of formed tillers, specific weight of tiller and total biomass production for Dactylis glomerata and Lolium perenne.

• The effect of intraspecific competition is higher for one variety comparing with variety mixtures.

Bibliography


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Speciile Dactylis glomerata și Lolium perenne au fost cultivate ca soi în cultură pură sau ca amestec de soiuri, în scopul stabilirii mecanismelor prin care competiția intraspecifică influențează productivitatea acestor specii. Cercetările s-au desfășurat la ICDPajiști, Brașov, pe un tip de sol cernoziomoid, bine aprovizionat în elemente minerale NPK. Agrofondul a fost uniform pentru ambele culturi și a constat din 100 kg/ha N aplicat integral primăvara și câte 50 kg/ha P2O5 și 50 kg/ha K2O aplicat la înființarea culturii. Pentru evaluarea competiției s-a determinat numărul de lăstari formați, dinamica formării lăstarilor, structura morfologică a lăstarilor, greutatea specifică a lăstarilor, dinamica acumulării de substanță uscată, la primul ciclu de recoltă și în timpul perioadei de vegetație. S-a constatat existența unei competiții intraspecifice mai ridicată în cazul cultivării unui singur soi. Cultivarea amestecului de soiuri contribuie la o utilizare mai bună a spațiului de nutriție și la îmbunătățirea randamentului fotosintetic, cu efect asupra producției de biomasă obținută.

Cuvinte cheie: competiție intraspecifică, Dactylis glomerata, Lolium perenne, producția de SU, structura morfologică.