

ON DESIGNING THE MEADOW AGROCENOSIS OF THE POLISSYA (REGION) OF UKRAINE

V.F. Shchesyuk¹, A. Y. Baluta², and O.V. Shchesyuk³

¹Director General, Volyn Research and Production Association, 65 Valutin str., Kovel, Volhynia region, Ukraine.

²Deputy Chief, Central Livestock Administration, Ministry of Agriculture and Food of Ukraine, Kiev, Ukraine.

³Research Officer, Volyn Area Scientific and Research Station for Meadow Areas of the Ukrainian Academy of Agricultural Sciences, Magister of Agriculture.

ABSTRACT

Geobotanical studies of the natural meadow associations in the wetland areas of the Polissya rivers of the Ukraine were conducted. The Polissya represents a forested region and the rivers include the Western Buh, Vyzhivka, Turia, Stokhid, and Styr. The dominant species is *Digrappis arundinacea* with *Poa palustris*, *Bromus inermis*, *Latirus pretense*, *Latirus palustris*, *Vicia sepium*, and *Urtica dioica* as codominants. Research demonstrated that the green feed production of *Digrappis arundinacea*, in combination with *Poa palustris*, was significantly greater (9.5 t ha⁻¹) than for *Digrappis arundinacea* alone while the crude protein content of the forage, at early flowering, increased from 16.7 to 18.8%. Over 3,000 associations of the Polissya region have been described and added to the data base. The useful grass species have been collected and their seeds will be used over the next years for the improvement of the grasslands and meadows of the Volyn Region.

KEYWORDS

Digrappis arundinacea, *Poa palustris*, wetlands, coefficient of association

INTRODUCTION

Managing the Ukrainian Polissya for optimal production had been handicapped by limited knowledge of their agrocenosis. The wetland meadows of the Styr and part of the Pripjat rivers were studied in different years (Afanasyev, 1969; Afanasyev et al., 1965). Some information about the meadows of Volyn can be found in monographs (Afanasyev and Sipaylova, 1982).

From the time of these studies, the anthropogenic influence on the meadow plants has increased and the plant coverage has changed substantially. The wetland meadows of many other small rivers is mostly unknown; there is little information on the dry channels and lowland areas of the wetland meadows of the Western Buh river. The objectives of the study were to examine the anthropogenic influence on the species composition of natural flora on the meadows. The major part of the rivers are localized which has resulted in the disappearance of several types of meadow groupings.

Inappropriate management can be identified in the meadows of practically the whole area of the Ukrainian Polissya. There has been little control of their management and the development of meadow species. Our research is aimed at determining the mechanism of self-regulation of the meadow ecosystems which must become the basis for designing a stable, highly productive and diverse meadow agrocenosis.

METHODS

Geobotanical studies were made in the wetland areas of the Polissya rivers of the Ukraine. The Polissya represents a forested region and the rivers include the Western Buh, Vyzhivka, Turia, Stokhid, and Styr. The dominant species is *Digrappis arundinacea* with *Poa palustris*, *Bromus inermis*, *Latirus pretense*, *Latirus palustris*, *Vicia sepium*, and *Urtica dioica* as codominants. During the research the following methodologies according to Braun (1957), Yaroshenko (1961), Vasilevich (1969), Voronov (1973), Neshatayev (1987), and

Ukrainian Feed Institute (1994) were used.

Species combinability in natural associations was expressed by the following formula (Voronov 1973):

$K = \frac{m \times 100}{n \times q}$, where **K** is the coefficient of associativity;

m is the number of plots where both species are represented;

n is the sum of plots where each of the two species occurs separately;

q is the occurrence of the species in phytocenosis, i.e. the percentage of the plots (from the total number of those taken) in phytocenosis where the species occur together.

A coefficient of combinability greater than 1 indicates that a species is associated more frequently with the second species than without it. Conversely, if the coefficient is less than 1, then the species is found more frequently without it. A coefficient of 1 means that the species have equal association and the occurrence of one species with the second does not differ from the general occurrence of the first in phytocenosis.

In a test of the association, 52 plots were observed each with an area of 10-m², and the presence of *Digrappis arundinacea* and *Poa palustris* were recorded. Both species were found together in 37 plots. Therefore, m=37, n=15, and q=71; the coefficient of association is:

$$K = \frac{37 \times 100}{15 \times 71} = \frac{3700}{1055} = 3.47$$

So, the coefficient of association of the two species *Digrappis arundinacea* and *Poa palustris* is positive.

RESULTS AND DISCUSSION

Species diversity and richness define the potential for utilizing the natural resources of the wetland meadows (Sharashova, 1989). Different species of plants accumulate different chemical elements which significantly influence forage quality and the health of animals (Kiyak, 1974). The natural meadow ecosystems of the rivers of Polissya area are stable and if managed properly are highly productive and yield high-quality forage (Shchesyuk and Shchesyuk, 1995). By studying the combinability (associativity) of the grass species in natural grass-growing areas which had the least anthropogenic pressure, we were able to obtain the information necessary for designing the grass agrocenosis and managing the meadow ecosystems (Shchesyuk and Sipaylova, 1992).

Positive association between two species occurs if their ecological niche overlaps and they can coexist. Natural models produced from geobotanic research led to a test of the influence of semi-dominants, such as *Poa palustris*, on the productivity of *Digrappis arundinacea*-dominated meadows and agrocenosis. The three-year field research confirm that the inclusion of *Poa palustris* into the dominant is only

15% of *Digrappis arundinacea* and increased the productivity of the grass growing areas by 11% which equals 75.1 t ha⁻¹ green weight in comparison with 65.6 t ha⁻¹ green weight. Simultaneously, the content of crude protein increased by 2.1% from 16.7 to 18.8% of dry weight. The forage was harvested at the early flowering stage.

We have described and mapped over 3,000 associations of the natural meadows of the Polissya region of Ukraine, and are presently completing the field research and analyses. The useful grass species have been selected and their seeds will be used in the future for improving the grass growing areas and meadows of the Volyn Region. The improved meadows and pastures will be used for recreational nature, medicinal (pharmaceutical) industry and beef production.

The build-up of the data base of the associations of meadow grasses and, especially, legumes on natural meadows has potential for designing stable and long-lasting multi-species agrocenosis which fully utilize the ecological environment, increase the productivity of feed-growing areas, positively influence the health of the animals, and increase the quality of their products and productivity. As the result of the research on wetland meadow ecosystems, it is planned to create a network of the meadow reserve projects which is now the model for developing unique meadow complexes. The ecological reserves which have been created preserve the valuable genetic diversity of the plants for forage, medicinal, honey production, ether and oil, decorative and other plants, would preserve the meadow associations and different ecological landscapes where flora and fauna co-exist. These areas would have scientific, aesthetic and pedagogical significance for specialists and society at large.

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