

EVALUATION OF VEGETATION AS USEFUL METHOD OF CLASSIFICATION TREES VALUES IN AGRICULTURAL LANDSCAPE

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Agricultural landscape are still modified by human. Trees are very important elements in agricultural ecological network. The purpose of the study was vegetation evaluation on example of Sokolow Podlaski commune. Sokolow Podlaski area with dominated agriculture area are located on east part of Poland. Methodology included field research, divided study areas into special-landscape units and vegetation evaluation. It was distinguished native, exotic and cultivated tree species with different vegetation values.

Keywords: evaluation of vegetation, agricultural landscape, Sokolow Podlaski commune

Introduction

Diversity of tree species depend on many natural, historical and political influences. Trees are very necessary elements in agricultural landscape (Marsall and Moonen, 2002) and may also be valuable for their possible function as “corridors” and “stepping stones” to facilitate species dispersal.

In many areas on the World a dramatic decrease in biological diversity of agricultural landscape can be observed as a result of human pressure. Many plant and animal species typical for agricultural landscape are rare and on the verge of extinction (Robinson and Sutherland, 2002). Refuges, especially linear ones, such as hedgerows, play an important role as ecological corridors (Le Cour et al., 2002).

The purpose of the study was evaluation of vegetation as useful method of classification trees values in agricultural landscape on example of Sokolow Podlaski commune in Poland. Rural landscape with many fields and meadows are dominated types of land uses in Sokolow Podlaski commune. Classification of tree species values it is very important for shaping Sokołów Podlaski rural landscape which is still influenced by human pressures.

Material and methods

Sokolow Podlaski commune (137.18 km² area) is located on the east part of Poland. This area belongs to Mazowiecko-Poleski Section according to Matuszkiewicz (1993).

Research was done on agricultural landscape without forest, parks and cemeteries areas on Sokolow Podlaski commune during 2011–2012. Field study was included division rural landscape into special landscape unities, characteristic of tree species, distinguished types of



Figure 1 Location of study area

vegetation. Border of special landscape unities were located along the main roads of Sokolow Podlaski commune. Vegetation evaluation included five main criteria: It was done evaluation of vegetation including five criteria of assessment as number of plant species, origin of trees, type of plantings, tree-covered areas, health of plantings (tab. 1) with bonitation points as:

- 2 points – minimum value,
- 4 points – medium value
- 6 points – high value.

Plant species and their origin were grouped according to Matuszkiewicz (2007).

Results and discussion

Plant species were represented by 4 syntaxonomic classes and companion species. Most of the plants were from *Quercus-Fagetea* community. It was distinguished 14 plant species from *Quercus-Fagetea* like *Acer campestre* L., *Carpinus betulus* L., *Fraxinus excelsior* L., 2 species from *Salicetea purpureae*, one specie from *Epilobietea angustifolii* and *Vaccinio-Piceetea*. Native, exotic and cultivated plants were occurring in the study area (tab. 2).

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Table 1 Evaluation of vegetation

	Criteria	Bonitation points
Number of tree species	above 4 tree species	6
	3-4 tree species	4
	1-2 tree species	2
Origin of trees (dominated in each specila-landscape units)	n – native species	6
	c – cultivator species (planted trees)	4
	ex – exotic species (introduced artificiall	2
Types of plantings	avenues, group of trees, single trees	6
	group of trees, single trees	4
	only single trees	2
Tree-covered areas (%)	above 25%	6
	11–25%	4
	5–10%	2
Health of plantings	good (mostly without canopy losses, trees hallows, diseases)	6
	medium (sometimes with canopy losses, trees hallows, diseases)	4
	bad (many canopy losses, trees hallows, diseases)	2

Table 2 Tree plant species in agricultural landscape of Sokolow Podlaski commune

Latin name	Syntaxonomic class	Status in Poland*
<i>Acer campestre</i>	<i>Querc-Fagetea</i>	n
<i>Acer platanoides</i>	<i>Querc-Fagetea</i>	n
<i>Acer pseudoplatanus</i>	<i>Querc-Fagetea</i>	n
<i>Acer pseudoplatanus Atropurpureum</i>	companion specie	ex
<i>Aesculus hippocastanum</i>	companion specie	ex
<i>Alnus glutinosa</i>	<i>Salicetea purpureae</i>	n
<i>Betula pendula</i>	companion specie	n
<i>Carpinus betulus</i>	<i>Querc-Fagetea</i>	n
<i>Corylus avellana</i>	<i>Querc-Fagetea</i>	n
<i>Euonymus verrucosa</i>	<i>Querc-Fagetea</i>	n
<i>Fagus sylvatica</i>	<i>Querc-Fagetea</i>	n
<i>Fraxinus excelsior</i>	<i>Querc-Fagetea</i>	n
<i>Malus domestica</i>	companion specie	c
<i>Padus avium</i>	<i>Querc-Fagetea</i>	n
<i>Pinus sylvestris</i>	<i>Vaccinio-Piceetea</i>	n
<i>Populus alba</i>	<i>Salicetea purpureae</i>	n
<i>Prunus avium</i>	<i>Querc-Fagetea</i>	n
<i>Prunus domestica</i>	companion specie	c
<i>Prunus mahaleb</i>	companion specie	ex
<i>Quercus robur</i>	companion specie	n
<i>Quercus rubra</i>	companion specie	ex
<i>Robinia pseudoacacia</i>	companion specie	ex
<i>Sambucus nigra</i>	<i>Epilobietea angustifolii</i>	n
<i>Tilia cordata</i>	<i>Querc-Fagetea</i>	n
<i>Ulmus laevis</i>	<i>Querc-Fagetea</i>	n

*n – native species (occurring in central Europe), ex – exotic species (introduced artificially), c – cultivated species (planted trees)

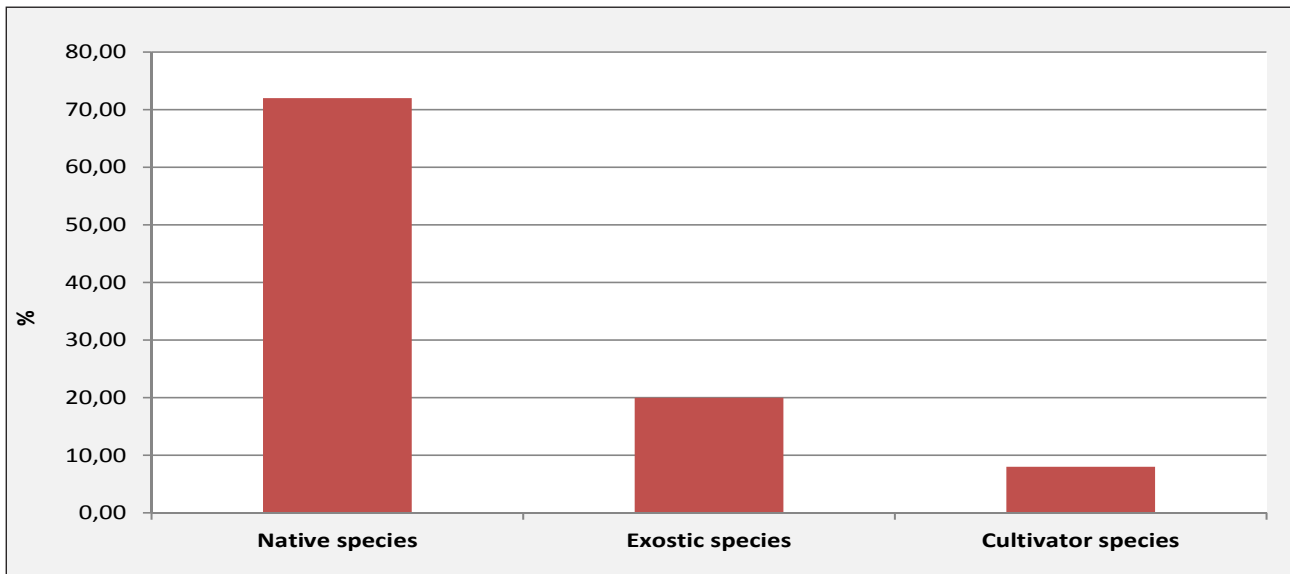


Figure 2 Origin of trees in the study area

Native species like *Acer pseudoplatanus*, *Fraxinus excelsior*, *Alnus glutinosa* dominated in the Sokolow Podlaski commune (72%). Exotic (20%) and cultivated (8%) species were observed less frequently in the study area. Exotic plants were represented by *Acer*

pseudoplatanus 'Atropurpureum' L., *Aesculus hippocastanum* L., *Prunus mahaleb* L., *Malus domestica* Borkh. and *Prunus domestica* L. were typical for cultivated plants in the Sokolow Podlaski commune.

Arable land was divided into 13 special-landscape units (Fig. 3).

Vegetation evaluation included five main criteria: number of plant species, origin of trees, type of plantings, tree-covered areas, health of plantings. It was distinguished areas with high (25–30 points), medium (19–24 points) and low (<19 points) planting values. Areas with high planting values are located in the south-east part of Sokolow Podlaski commune. Diversity of plant species, dominated of native species, avenues, groups of trees, single trees, tree-covered above 25% of unit and good health of plantings were mostly characteristic of four units with high vegetation values (units: 5, 6, 10, 11). It was occurring also four areas with medium vegetation areas on the central and the south-east part of the commune (units: 2, 9, 12, 13) (Fig. 3). Less group of trees and single trees were characteristic for these units. 5–10% tree-covered areas with mostly single, exotic plant species were occurring in units with low vegetation values (units: 1, 3, 4, 7, 8) (Tab. 3). These areas are located on the west and the south part of Sokolow Podlaski commune.

Plants colonization process mostly depended on time, type use of land and history (Peterken and Grame, 1984; Flinn and Vellend, 2005; Honnay et al., 2005). Despite the strong human pressure in agricultural

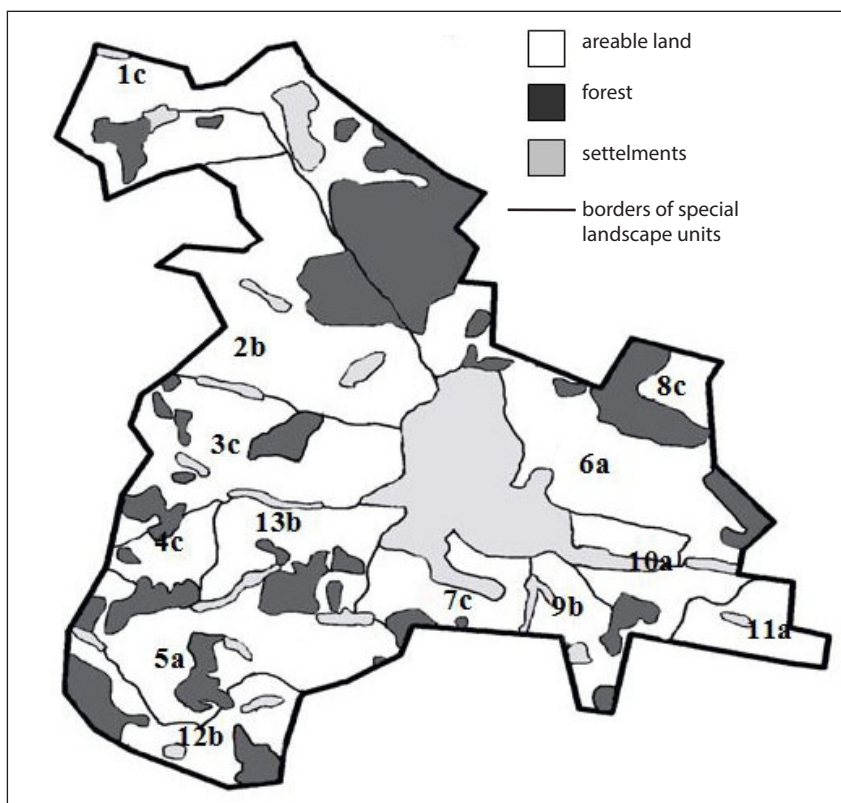


Figure 3 Special landscape units and vegetation evaluation
1, 2 – number of special landscape units, a – area with high vegetation value, b – area with medium vegetation value, c – area with low vegetation value

Table 3 Plantings evaluation of Sokolow Podlaski commune

Criteria	Number of special landscape units												
	1	2	3	4	5	6	7	8	9	10	11	12	13
Number of plant species	4	4	4	2	6	4	4	6	4	6	4	4	4
Origin of trees [dominated]	2	4	6	2	6	6	2	2	4	6	6	4	4
Types of plantings	4	6	2	4	6	6	4	2	4	6	6	4	4
Tree-covered areas	2	2	2	2	6	6	2	2	4	6	6	4	4
Health of plantings	4	4	4	4	4	4	4	4	4	4	4	4	4
Sum	16	20	18	14	28	26	16	16	20	28	26	20	20

areas native plants dominated (Orłowski and Nowak, 2007). The same results were observed on Sokolow Podlaski commune. Group of trees and single trees are the most popular types of planting on arable land. Trees have also aesthetic value in landscape. Moreover old trees are occurring on agricultural landscape. At the time of land use changes in landscape structure observed in many regions of the world (Le Cour et al., 2002; Marshall and Moonen, 2002), old trees are also a highly endangered element of various ecosystems (Jim, 2004; Orłowski and Nowak, 2007). It is very important shaping of ecological corridors in agricultural landscape of communes (Żarska, 2006).

Nowadays ancient and old forests do not take a large areas so plantings should be protected (Liro and Szacki, 1993; Shields et al., 2000). Tree plantings as one of the landscape elements have impact for keeping microbes, insects, plants, birds, and animals biodiversity. Ecosystems with greater biodiversity are considered by many to be more resilient to physical disturbances, natural disasters, and invasive species. Diverse ecosystems also provide ecological services that are expensive to replicate, like air and water purification, attracting pollinators, and providing natural material for advances in science and medicine. (http://www.epa.gov/greenacres/conf12_04/conf_knwldge.html).

Conclusion

1. Groups and solitary native plant species from Querco-Fagetea class dominated in the Sokolow Podlaski agricultural landscape
2. It was observed good condition of evaluated vegetation inspite of still human pressures.
3. It is necessary to continue research focus on green corridors because these planting should be included in the ecological structure of Sokolow Podlaski commune.

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