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## Conference Paper

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# IMPROVEMENT OF NATURAL GRASSLAND AS A FACTOR OF RURAL DEVELOPMENT IN LOWER DANUBE REGION<sup>1</sup>

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**Summary:** *The aim of this paper is presenting of importance of natural grasslands (meadows and pastures) in rural development of Lower Danube region. Production of efficient quantities of food for domestic animals and preservation of environment is strategically important for economic prosperity and animation of local population, as an aim to stay in rural areas and to develop their agricultural productivity. Lower Danube region have possibilities for development of agricultural production, because it possessed enough quantity of natural resources with highest quality. The territory of Lower Danube region make following municipalities: Golubac, Majdanpek, Negotin, Kladovo and Kučevo. In this municipalities land under meadows and pastures is on the second place, just behind arable land. Due to the presence of NP Derdap on the territory of Lower Danube region is concluded that there are no obstacles for rural development, from the aspect of natural resources. But the following problems: fragmentation of land, the extensiveness of use, inadequate intake of organic matter and degradation processes caused by the action of man, affected the quality of natural grassland (meadows and pasture) and the production of forage crops in general. Because of that one of the most important tasks of rural development of these municipalities is proper using of grassland, which going to enabled development of this kind of agricultural production and protection of important plant species.*

**Key words:** *pastures, meadows, rural development, Lower Danube Region*

## INTRODUCTION

Rural areas in Serbia were defined as an area whose main physical and geographical characteristics of land use for the purpose of agricultural and forestry production. In Republic of Serbia almost 70% of area is treated as a rural and in those areas lives almost 43% of population. Main source of employment is agriculture (1/3 of the population in rural areas are employed in agriculture) (*Jovanović and authors, 2012.*). Because of that, one of the most important goals is finding the possibilities to improve agricultural production and animation of local population to quit migration from rural to urban areas.

Another goal of rural development (especially in area of Lower Danube region) is preservation of natural resources (water, land, plant and animal potentials – local species) in the way of creation the sustainable environment. Agricultural production beside of positive effects, also manifest a series of negative effects: it comes to changes in the natural environment by deforestation, soil conservation is intense, it comes to the elimination of diversity for the sake of creating uniformity - monoculture on arable land, the application of mineral fertilizers and pesticides is increasing and with more and more genetic manipulation of cultivated plants, it causes the weakening of natural soil fertility (reduction in the level humus) (*Kovačević, 2010.*).

*Kljajić (2012)* emphasises that the use of land in the Republic of Serbia is followed by a series of problems: fragmentation of land, the extensiveness of use, inadequate intake of organic matter and degradation processes caused by the action of man and nature. Erosion processes (72% of the land in Serbia is threatened by erosion), also affect land degradation.

Those effects represent potential damage for all types of agricultural lands, thereby endangers the possibility of development of rural areas. In these areas, depopulation processes are becoming more and more expressed, villages are becoming „old“ which has negative impact on

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livestock production and grasslands quality (especially in high mountain areas) (*Jovanović, Bekić, 2012a*).

With the advent of new trends in agriculture, production of sufficient quantities of food for domestic animals is a link in a development of family farms. *Arsić and authors* (2013) emphasize that this type of production creates a link between crop production and animal husbandry, where the conditions of intensive use of natural resources - land, water and solar energy.

Production of sufficient quantities of high quality forage food is one of the most important tasks in sustainable farming. So the question arises how it is possible to provide a stable basis for the development of livestock production, due to the devastation of permanently low subsidies. With the changing climate trends come to droughts in the period of vegetation, which affects the growth rates of concentrated animal feed, which then raises the price the price of basic foodstuffs. (*Jovanović and authors, 2013*.)

Production of forage crops on the natural grasslands is idea for finding the solution about balance between environment and agricultural production. Pastures and meadows are part of natural grasslands and them significantly create production of forage crops and involves in used agricultural lands. Only with proper using of grassland will be enabled development of this kind of agricultural production and protection of important plant species, especially because on the area of Lower Danube region is located NP "Đerdap".

## MATERIAL AND METHODS

Research is based on the results of quantitative and qualitative analysis of natural conditions and agricultural resources of the Lower Danube Region, with special emphasis on natural grasslands (pastures and meadows). Data were collected from available statistical documents (especially data from *Census of agriculture, 2012*), as well as from national publication and different scientific papers of this scientific area. Data were analysed by using the analytical-synthetically statistical method.

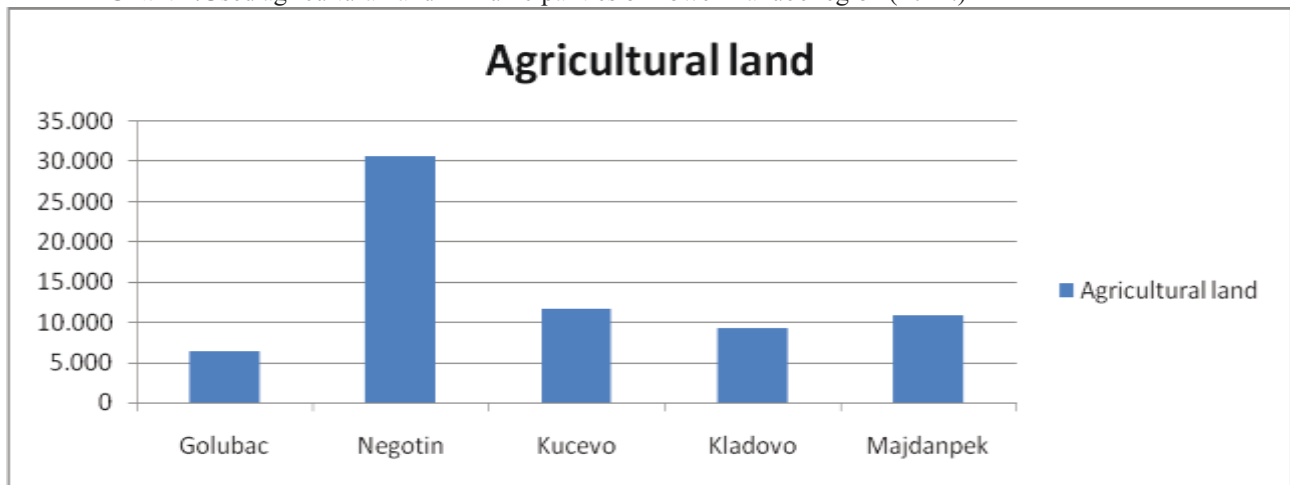
## RESULTS AND DISCUSSION

Lower Danube region (Carpathian area) is located in eastern Serbia and includes territory of the following municipalities: Golubac, Kučevo, Majdanpek, Kladovo and Negotin. This region gravitates toward the Danube River and orographically it belongs to southern Carpathians. It is the area of 732.35 km<sup>2</sup> and includes Iron Gate and NP "Đerdap". Climatic and soil factors are favourable for improvement of agricultural production and the Danube River represents the largest water potential of all municipalities.

*Capacities of natural resources and vulnerability of the National Park „Đerdap“ and its protected area, which includes the largest part of Carpathian area, predispose this area for reaffirmation and development of traditional agriculture and integral and organic production of healthy food with special quality characteristics, based on methods of traditional production. (Nikolić, Popović, 2010:205).*

In municipalities of Lower Danube Region there are favourable natural conditions for development of plant and animal agricultural production. However, besides unfavourable age structure, there is also large fragmentation of estates, weak clustering of agricultural producers and lack of organized production and sale which could be a problem in the process of sustainable development. (*Jovanović, Bekić, 2012*.)

According to the *Census of agriculture from 2012 year*, on territory of Lower Danube region agricultural land includes 68.883 ha. In the following chart will be seen territorial distribution of agricultural land by municipalities. (Chart 1.)

**Chart 1.** Used agricultural land in municipalities of Lower Danube region (2012.)

Source: *Census of agriculture, 2012.*, RZS, Belgrade

According to Chart 1, on territory of Lower Danube region exist enough agricultural land for performing all kinds of agricultural production. The highest share of agricultural land is notified in municipality of Negotin (30.726 ha). On second place is municipality of Kučevo, with 11.622 ha of agricultural land. On the third place is municipality of Majdanpek (10.916 ha). Municipalities with a least agricultural land are Kladovo (9.203 ha) and Golubac (6.416 ha).

**Table 1.** Structure of used agricultural land in municipalities of Lower Danube region, in 2012. (ha)

Municipality	Agricultural area (ha)	Kitchen garden (ha)	Arable land (ha)	Meadows and Pastures (ha)	Orchards (ha)	Vineyards (ha)	Nurseries (ha)	Other (ha)
Golubac	6,416	35	4,436	1,698	179	65	-	2
Negotin	30,726	145	21,905	7,404	465	798	8	1
Kučevo	11,622	180	5,972	4,940	471	52	4	3
Kladovo	9,203	73	5,742	3,116	90	180	-	-
Majdanpek	10,916	89	2,876	7,575	328	56	-	-

Source: *Census of agriculture, 2012.*, RZS, Belgrade

In the Table 1, is presented used agricultural land, by categories of using and with that is confirmed that on territory of Lower Danube region agricultural land includes 68.883 ha. Lower Danube region includes following municipalities: *Golubac, Negotin, Kučevo, Kladovo, Majdanpek*.

Following the used arable land in observed municipalities can be concluded that in municipality of **Negotin** is the highest amount – 21.905 ha (almost 4-10 times higher than the other municipalities). On second place are municipalities **Kučevo**(5.972 ha) and **Kladovo** (5.742 ha). On the third place is municipality of **Golubac** (4.436 ha). Municipality with lowest amount of used arable land in total used agricultural land is **Majdanpek** (2.876 ha).

In the structure of used agricultural land, on the second place are **meadows and pastures**. Municipalities of **Majdanpek**(7.575 ha) and **Negotin**(7.404 ha) have biggest amounts. On the second place are municipalities **Kučevo**(4.940 ha) and municipality of **Kladovo** (3.116 ha). Municipality with the smallest share of meadows and pastures is **Golubac**(1.698 ha).

One of the reasons why comes to decreasing the agricultural land under meadows and pastures is migration of local population, especially in mountain area of Lower Danube region. On that way comes also to reduction in livestock and increasing of the share of weed at the expense of quality grasses and legumes. On that way comes to reduction of production of fresh fodder for animals, emphasizes the increased consumption of concentrated feed, which ultimately leads to increased prices of final products: meat, milk and other processed products.

Share of other categories in total used agricultural land is smallest than arable land and pasture and meadows, but distribution is the next:

1. **Orchards:** biggest amount of agricultural land used for orchards is in municipalities **Negotin** (465 ha) and **Kučevo** (471 ha). On the second place is municipality of **Majdanpek** (328 ha). Municipalities with lowest share of orchards are in **Golubac** and **Kladovo**.

2. **Vineyards:** highest part of vineyards on territory of Lower Danube region is located in **Negotin** (where exists the tradition of wine production), and it amount 798 ha. On the second place is municipality of **Kladovo** with 180 ha used for this kind of production. Municipalities **Majdanpek**, **Kučevo** and **Golubac** have 2-3 time hectares less than in **Kladovo** (almost 10 times less than **Negotin**).

3. **Kitchen garden:** at municipalities **Negotin** and **Kučevo** is notified approximately 145-180 ha. In rest of the municipalities of Lower Danube region is 2-3 time hectares less used for kitchen garden.

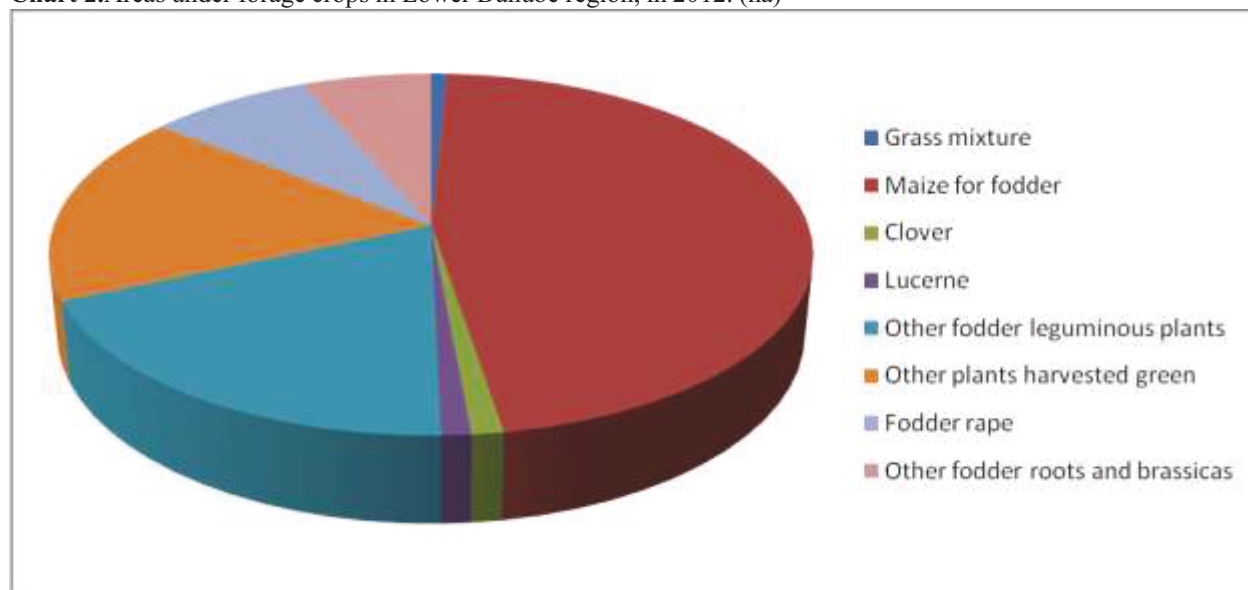
4. **Nurseries and other:** Share of these categories of used agricultural land in the municipalities of Lower Danube region is very small, almost immeasurably. In some municipalities they don't even exist. So it can be concluded that this kind of production is not interesting in these area.

The existence of sufficient meadows and pastures for managing the forage crop production is important for the future development of rural areas. Increasing of areas under meadows and pastures in the future leads to enlargement of plant production, i.e. production of sufficient amount of quality green biomass for grazing and basis for silage production for the period when animals aren't on open land.

Permanent use of land can lead to reduction in the share of suitable grasses and legumes in the mixture (in terms of cultivated grassland), reducing the nutritive value of biomass. On the natural grasslands situation is almost the same. Without grazing it comes to leads to the appearance of poor quality grass, thereby reducing the quality of food.

To emphasise the importance of improvement the natural grassland (meadows and pastures), in the following text will be show the areas under forage crops, as well on the level of Lower Danube region, as well on the level of Municipalities which constitute LDR<sup>5</sup>. (*Chart 2*)

**Chart 2.** Areas under forage crops in Lower Danube region, in 2012. (ha)



Source: *Census of agriculture, 2012.*, RZS, Belgrade

Based on previous data, in areas under the forage crops in Lower Danube region amounts 5.838 ha. The structure of used land for fodder production is diversified: areas under **grass**

<sup>5</sup>LDR – Lower Danube Region (acronym authors)

**mixture** occupies 1.484 ha (25.42%); areas under **corn for fodder** occupies 87 ha (1.49%); areas under **clover** spreads on 2.141 ha (36.67 %); while areas under **lucerne** spreads on 2.033 ha (34.82%). **Other fodder legumes** cover 35 ha of total land (0.60%). Almost the same area covers and **other plants harvested green** (0.55%), **fodder rape** (0.26%) and **other fodder roots and brassicas** (0.21%).

From this data can be concluded that the agricultural producers still rely their own production on production of clover and lucerne in large percentage. That kind of uniformed production is economically cost-effective, but it can lead to the poring of land, no mater of that these two plants are very important animal meal.

Based on data from Census of Agriculture, in municipalities of lower Danube region is following situation, related to the structure of areas under the forage crops (Table 2.):

**Table 2.** Areas under fodder crops in municipalities of Lower Danube region, in 2012 (ha)

	Grass mixtures	Corn for fodder	Clover	Lucerne	Other fodder legumes	Other plants harvested green	Fodder rape	Other fodder roots and brassicas
<b>Kladovo</b>	23	5	115	89	5	-	-	3
<b>Majdanpek</b>	211	30	616	164	-	6	13	5
<b>Negotin</b>	764	33	414	1.052	25	14	1	4
<b>Kučevo</b>	387	4	720	347	2	6	-	1
<b>Golubac</b>	101	15	249	381	3	6	1	-

Source: *Census of agriculture, 2012, RZS, Belgrade*

Clover production is dominant way of land using in almost every municipality. The highest area used for clover production is in municipality of **Kučevo** (720 ha) and in municipality **Majdanpek**(616 ha). Lowest area is notified in municipality **Kladovo**and it amounts 115 ha.

Lucerne production is on the second place, when is talking about structure of land using for purpose of forage production. Most intensive production is in municipality of **Negotin**and production is spread on 1.052 ha. Lowest area under lucerne is notified in municipality of **Majdanpek**and it amounts 164 ha.

Production of grass mixtures is not as intense as clover and lucerne production in municipalities of Lower Danube region. Municipality with highest areas under grass mixture is **Negotin**(764 ha), while the lowest areas are in municipality **Kladovo** and it amounts only 23 ha.

Production of corn for fodder have long history in world production of corn, but in Republic of Serbia is not so common. But is noticeable that areas under this production grows from year to year. Municipalities in which is spread this kind of production are **Negotin**and **Majdanpek**, until the less areas are notified in **Kladovo**and **Kučevo**.

Production of other categories of fodder in municipalities of Lower Danube region are not developed as the other, but they are also significant. Production of fodder rape, fodder roots, brassicas and other legumes is important from the aspect of preparing of qualitative meals for animal and possibilities for using the plant residues as a green manure.

Following reason to highlight the need of improvement of natural grassland as a factor of rural development in these area in presence of National park Đerdap at the area of Lower Danube region.

National park „Đerdap“spreads on 63.608 ha and includes 43 highly protected species and 124 protected plant species and also many animal species. Biodiversity of this area represents an important link with countries of Eastern Europe since Carpathian area is located from Bratislava in Slovakia to Iron Gate, where Danube enters Romania, in length of 450 km. This could lead to creation of different strategies of sustainable development promotion in the countries - signatories of Carpathian convention.

In paper of *Jovanović and Bekić (2012)*, is emphasized that the Action plan for agro-biodiversity, instrument of Common Agricultural Policy (CAP), which is adopted in 2001 provides

the basis for introduction of biodiversity in European Union agricultural politics. Priorities of this plan are:

- Improvement and support of agricultural production favourable for environment and those systems which directly benefit biodiversity;
- Support to sustainable agricultural activities in area of rich biodiversity;
- Preservation and strengthening of favourable ecological structure; and
- Promotion of activities for the purpose of preservation of local and endangered cattle or plant species.

One of the tasks is taking care about qualities of natural grasslands (meadows and pastures), used for agricultural production or for some other human need. One of the limiting factors of the development of local areas may be:

- fragmentation of large individual holdings,
- poor farmers pooling of interests,
- lack of organized production and sales.

In the Lower Danube region, arising problems as a result of unplanned use of agricultural resources and negligent attitude towards the environment. Unplanned deforestation may threaten the biodiversity of mountain regions and cause erosion process, causing the damage on the surface layer of natural grasslands. Large number of old landfills and illegal waste can lead to contamination of groundwater. Underutilization of the potential for biomass production and obtaining bioethanol and biogas, complex administrative procedures, together with insufficient information producers and consumers may make the slow process of revitalization of the agricultural sector. Although these facts as alarming factor initiating the manufacturing process, with an orientation towards new methods of production management, preservation autochthonous species and the environment it will be possible to achieve a high level of development of rural areas.

## CONCLUSION

In area of Lower Danube region and their municipalities (Golubac, Negotin, Kučevo, Kladovo, Majdanpek), exist enough potential for agricultural production, with special emphasis on forage crop production. In the structure of used agricultural land, on the second place are meadows and pastures (24.733 ha). Municipality of Negotin and Majdanpek have highest share of agricultural land used for forage crop production and municipality of Golubac have the lowest one. Production is very diversified, but still agricultural producers rely their own production on production of clover and lucerne in big percentage. Due to the presence of NP Đerdap on the territory of Lower Danube region is concluded that there are no obstacles for rural development, from the aspect of natural resources.

With justified using of natural resources (water, land and air) in this area, managing of natural grasslands will lead to the sustainable rural development of all municipalities. On that way will be possible to expect that in near future accomplish main goal: highest yields of qualitative forage, environment protection and improvement of grassland managing.

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