THE 21ST EDITION OF THE NATIONAL CONFERENCE ON SOIL SCIENCE "THE HISTORICAL BANAT: SOIL, AGRICULTURE, TRADITIONS", 23-28 AUGUST 2015, TIMISOARA

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Abstract

The United Nations decided 2015 to be the International year of soils in order to raise awareness and promote a more sustainable usage of these critical resources worldwide. Healthy soils represent the key support for obtaining agroalimentary products, fuel, fibres, and medical products, as they play an essential role in the ecosystems. The 21st edition of the National Conference on Soil Science with international participation was organized in Timisoara on 23 - 28 August 2015, under the care of the Romanian National Society of Soil Science. The conference represented a good opportunity to analyse and debate the current soil issues, in their various aspects in order to establish viable agricultural strategies and policies. Since 1961, when the first National Conference on Soil Science was organized in Timisoara, coordinated by the founding members of the Romanian National Society of Soil Science, until today there have been organized 20 editions. Among the latest events organized by the territorial organizations of the Romanian National Society of Soil Science we can mention the ones organized in Timisoara (2003, 2015); Cluj – Napoca (2006); Iasi (2000, 2009); Craiova (2012). Banat represents the historical region situated between the rivers Mures (North) and Tisa (West) the Danube river (South) and The Carpathians, between the narrow pass from Zam and Cerna river springs (East). The total surface of the historical Banat is of 28,526 Km2, being currently situated on the territory of three states: Romania – Romanian Banat with the surface of18, 966 Km2 (66.5%); Serbia – Serbian Banat with the surface of 9,276 Km2 (32.5%) and Hungary with the surface of 284 Km2 (1.0 %). During the 21st edition of the National Conference on Soil Science organized in Timisoara there have been analysed and discussed the current aspects related to the use of soil resources, with practical on field applications in the following counties Timis, Arad, Caras – Severin (Romania); Csongrad (Hungary) and Pancevo (Serbia).

Key words: Historical Banat, geographical limits, total surface, soil resources.

The 21st edition of the National Conference on Soil Science with the theme *"The Historical Banat: Soil, Agriculture, Traditions"* was organized in Timisoara on 23-28 August 2015. The on field applications were conducted in the following counties: Timis, Arad, Caras – Severin (Romania); Csongrad (Hungary) and Pancevo (Serbia). The first national conference on soil science was organized in Timisoara in 1961 by the founding members of the Romanian National Society of Soil Science. Between 1961 - 1967 the conferences were held annually, and between 1967 -2015, the conferences were held every three years.

In the interval 2000 - 2012, the territorial organizations of the Romanian National Society of Soil Science organized the following five editions of the national conferences:

- 16th edition - Suceava (2000);
- 17th edition - Timişoara (2003);
- 18th edition - Cluj - Napoca (2006);
- 19th edition - Iasi (Moca, V., 2009);
- 20th edition - Craiova (2012).

The 21st edition of the National Conference on Soil Science coincided with the declaration of the year 2015, the "International Year of Soils". The United Nations' initiative to celebrate the International Year of Soils was intended to raise awareness and promote a more sustainable usage of this critical resource worldwide.

The scientific event organized in Timisoara between 23 - 28 August 2015, included two different phases:

- phase 24 - 25 August 2015, when scientific papers were presented in the six specialty sections of the Romanian National Society of Soil Science and during the following two symposiums: *"The Soil, natural resource with multiple functions"; "Factors and pedogenetic processes from the temperate region";*

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- phase 26 – 28 August 2015 included the on field applications that were conducted on three lines where 12 soil profiles characteristic to the Banat region were presented (Câmpia Joasă a Banatului; Mounty Banat).

MATERIAL AND METHOD

By choosing the conference theme to be "*The Historical Banat: Soil, Agriculture, Traditions*" the organizers managed to highlight the various problems related to soil resources in the present context of "*sustainable agriculture and development"*.

To become familiarized with the general natural environment of Banat and for the proper activity of the conference, the organizers prepared and draw up the primary documents that were presented in two distinct volumes.

- The programme of the 21st National Conference on Soil Science, "*The Historical Banat: Soil, Agriculture, Traditions*" with on field applications in the following counties Timis, Arad, Caras – Severin (Romania); Csongrad (Hungary) and Pancevo (Serbia), Eurobit Publishing House, Timisoara, 121 p (Rogobete, G.,Țărău, D., 2015), includes the presentation of indoor activities and on field applications.

- *The Historical Banat: Soil, Agriculture, Traditions*, Eurobit Publishing House, Timisoara (ISBN 978-973-132-239-1), 276 p (Rogobete, G.,Țărău, D., 2015), structured in two distinct sections.

The general context presented in 10 chapters focuses on soils, land improvement, agriculture and forestry in Banat region.

The spirituality of this region includes various aspects related to education – science (chapter 11); culture and Christian spirituality in Banat, tradition and present issues (chapter 12); cultural tradition in Banat: peasant writer, composers and journalists (chapter 13).

The concept as well as the graphic and textual database that form the text of the two volumes of the National Conference on Soil Science, with international participation, represent the contribution of numerous authors who are entirely responsible for the scientific content of their papers.

The two documents were published by the main organizers of this scientific activity: The "King Michael I of Romania" Banat University of Agricultural Sciences and Veterinary Medicine of Timisoara; National Research – Development Institute for Pedology, Agrochemistry and Environmental Protection, Bucharest; the county offices for pedology and agrochemistry from Timisoara, Arad and Caras - Severin.

The scientific event from Timisoara was organized under the patronage of the Romanian National Society for Soil Science and the celebration of *"2015 as the International Year of Soils"*. The subject analysed and subjected to debates this year was the territory corresponding to the Historical Banat. This geographic region includes numerous soils with different features and production capacity.

RESULTS AND DISCUSSION

a. The general natural environment of Banat

The Banat represents the historical region delimitated to the North by the Mures river, between Nadlag and Salciua, to the East by the Carpathians (Poiana Rusca, Godeanu and Cerna Mountains), between the defile from Zam and the springs of Cerna river, to the South there is the Danube river, between Orsova and Bazias, which continue until the confluence with the Tisa river, to the West of the Tisa river.

This geographic region with the total surface of 28,526 Km^2 is currently situated on the administrative territory of three states: *Romania – Romanian Banat* with the surface of 18,966 Km^2 (66.5%); *Serbia – Serbian Banat* with the surface of 9,276 Km^2 (32.5%) and *Hungary* with the surface of 284 Km^2 (1.0 %)

Administratively speaking, the *Romanian Banat* includes the entire surface of Timis and Caras – Severin counties and part of Arad County, to the south of Mures River, Mehedinti County, to the West of Orsova and several territorial administrative units from the South-Western part of Hunedoara County (Figure 1)

In Serbia the *"Banat"* coincides with Voivodina, situated to the East of Tisa river and which is divided as follows : North Banat District, Central Banat District and South Banat District. At the same time, a small part of Banat, situated to the West of Pancevo and Timis river was included to the metropolitan area of Belgrad (http://ro.wikipedia.org/wiki/Banat). In Hungary, the *Banat* identifies itself with the South-eastern area of Csongrad county, situated to the South of Mures river and to the East of Tisa river.

At the same time, it is mentioned that nowadays there are three main cities that, even though they were not part of the *Historical Banat* have gradually expanded their administrative territory in this geographic region, as follows: Arad, with the New Arad District, Szeged, with Ujszeged District and Belgrad, with Palilula District. The geographic region of Banat belongs to the Eastern side of the tectonic unit known as the Pannonian Depression that appeared after the collapse of a large surface of the Carpathian region, that occurred almost 45 million years ago (Oncescu, 1965). The Banat landform is characterized by a wide variety of morphological types oriented towards the Western plain and with an amphitheatre like distribution with the diameter of almost 200 km.

This element conditions the distribution in altitude of climate, vegetation and soil.

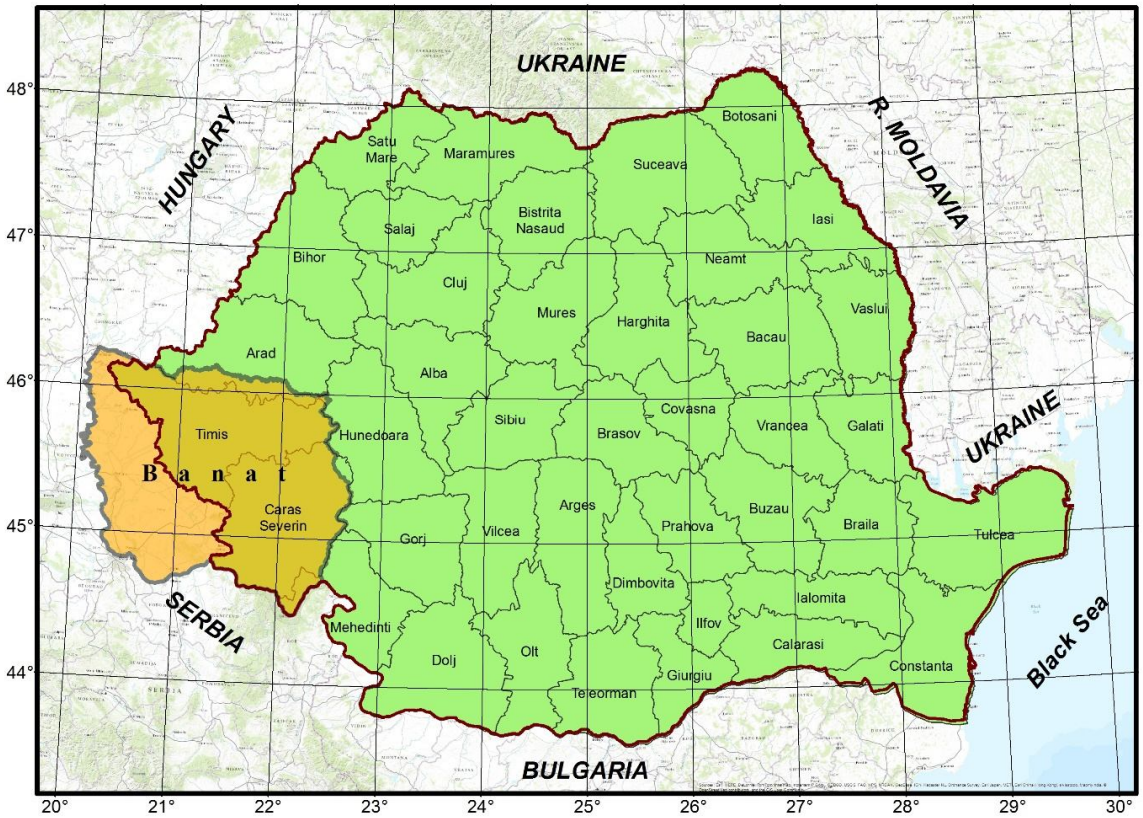

Figure 1 **Administrative map of Romania and the delimitation of Historical Banat**

The Southwestern part of Romania that also includes the Banat region is characterized by temperate climate with sub-Mediterranean influences in the South and oceanic in the North and East (Figure 1). The particularities of the landform generate local particularities that lead to the differentiation of climatic parameters.

In the plain region, the characteristic average isotherms are of 10 and 11^0 C, with higher values in the South-West of the region, at Moldova Veche. The landform determines the decrease of temperature in relation to the altitude, being characterized by average values of 3 – 4^0C in the mountain area and up to below zero on the highest crests of the Ţarcu – Godeanu mountain. It is also mentioned that the depressions: Timiş – Cerna, Brebu and Almăj record lower average temperatures.

The annual average rainfall is determined by the trajectory of the western air currents, of oceanic origin, and by the influence of Mediterranean cyclones. The average rainfall in the plain region increases from 520 mm in the West to almost 700 mm in the East, while in the hill region the average values vary between 600 mm and over 800 mm (Oravita). In the mountain area the annual average rainfall arrive up to 1160 mm at Semenic.

In Banat there are represented almost all the layers and vegetation areas of Romania, except for the steppe.

Considering the existent layers, from the high plain up to the top of Ţarcu Mountain, almost 2000 species of cormophytes coexist in various cenotic combinations, which represent almost half of the species of Romania's flora.

The Banat hydrographic basin, that includes the two administrative territorial units of Timis and Caras – Severin counties and part of Arad, Gorj and Mehedinţi county cover a surface of 18,320 Km^2; this represents almost 7.7% of Romania's entire surface.

This hydrographic region has all landforms. The transition from the mountain area to the plain region goes through the piemontan hills and the intramontaneous paths that favour the rapid drain of water and a relatively rich hydrologic potential.

Thus, there are mentioned the passage from the Banat mountains with the maximum altitude of up to 1 446 m and the Banat plain, with the minimum altitude of 77 m.

The Bega Canal represents one of the few artificial navigation canals from Romania that crosses Timisoara.

Its construction started in 1728 and it continued in different phases.

b.The Banat soils

The geographic position on the continent and the presence of the Carpathians in the East put their mark on the mixture of different central European, east European and Balkan influences. The result of the interaction of pedogenic factors consisted of numerous types of soils with specific features. The main soil types and associations of Banat make the transition between the eastern European luvisoils and the brown-reddish soils from the South-Western part of the continent (Ţărău, D., et. al. 2012; Rogobete, Gh., Ţărău, D., 2015).

Based on the criteria of the Romanian System of Soil Taxonomy (Florea, N., Munteanu, I., 2012) there have been identified *23 soil types and associations* that were structured into the 11 RSST – 2012 soil classes, as follows: *Protisoils, Cernisoils, Umbrisoils, Cambisoils, Luvisoils, Spodisoils, Vertisoils, Hydrosoils, Salsodisoils, Histisoils, Antrisoils*. The spatial distribution of the soil types of Banat includes 1183,343 ha agricultural fields and 572,467 ha of forests, that from an administrative point of view belong to the counties: Timis, Caras – Severin, Arad and Mehedinti (Figure 2).

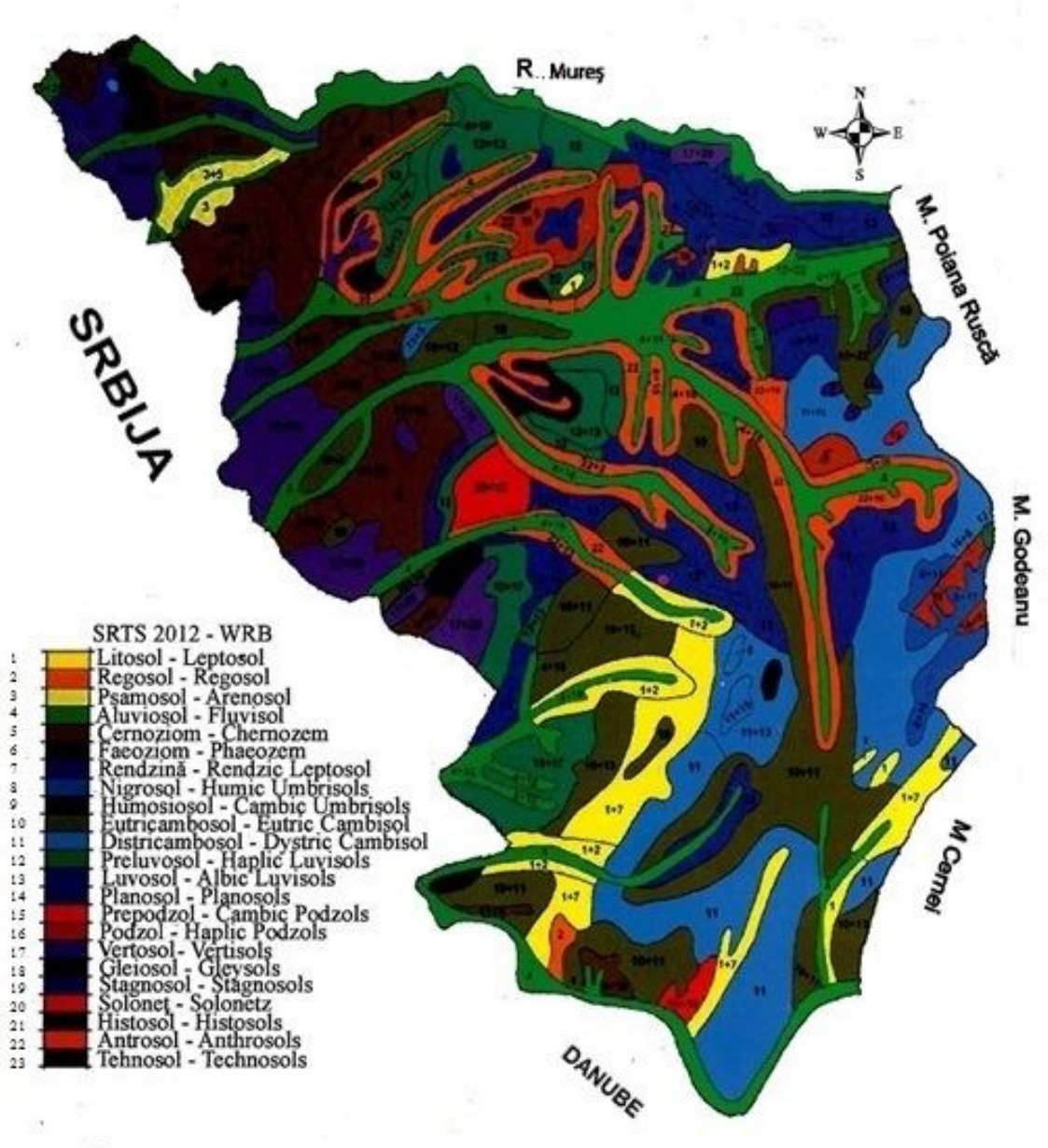

Figure 2 **Soil map of Romanian Banat (Timis, Caras – Severin, Arad, Mehedinti Counties)**

c. Banat agriculture and sylviculture

In Banat, **agriculture** represents one of the main segments of national economy, the equivalent of 12.77% of the entire agricultural surface of Romania. In the Western region there are certain differences between the four counties that form it.

The agricultural surfaces from Arad and Timis counties are quantitatively and qualitatively superior to the ones from Caras – Severin and Hunedoara counties. It is pointed out that Arad and Timis benefit from the productive potential of the Western plain while the other two counties benefit from the specific area of hills and mountains.

In 2013, the agricultural structure of the Western Region included the following spatial distribution for the four counties: Timis (37.04%); Arad (26.66%); Caras – Severin (21.27%) and Hunedoara (15.04%).

The evolution of agricultural surface on usage categories in the Western region, between 1990-2013 underwent the following modifications:

- the arable surface increased from 57.45%, in 1990, to 58.46%, in 2013;
- the surface of pasture was relatively constant between 28.16% and 28.39%;
- the surface of hayfields recorded a slight decrease from 11.96%, to 11.32%;
- the vineyards and orchards recorded insignificant decrease.

From the information provided by the Structural investigation in agriculture from 2007, in Timis County there were 88,474 agricultural exploitations, of which: 87,768 individual agricultural exploitations and 706 legal entities.

According to the data of the General Agricultural count from 2010, it resulted that the agricultural exploitations from Timis county decreased by 9,645 units of agricultural exploitations. The average surface on agricultural exploitation in Timis increased from 6.97 ha in 2007 to 8.69 ha in 2010.

The average surface on agricultural surface in Timis County is almost double in relation to the average surface/exploitation in Romania; this reflects the better concentration and usage of the agricultural field.

Within the limits of the historical province of Banat, there are mentioned 557.4 thousands ha of forest, which represent almost 30% of forest surface if considered the total surface of this territory (Rogobete, Gh., Ţărău, D., 2015).

In Banat there are the following national parks: Domoglet – Valea Cernei; Semenic – Cheile Carasului; Cheile Nerei – Beusnita and Lunca Muresului Natural Park, with elements protected at international taxonomy.

d. Land improvement operations

More than 200 years ago, the Banat plate was a swamp, but now it is an agricultural area with reliable crops, independent from climatic evolution.

The first significant hydrotechnical works were performed at the beginning of the 18th century, and we can mention: draining and underground drainage of agricultural fields, river regularization, water supply and others. One of the most important works consists in the double connection between the dam from Costeiu and the lock from Topolovat that regularized the flow of Timis and Bega rivers.

In the 19th century, 25% of the total surface of Banat was affected by the effects of excessive humidity, that is almost 1.9 million ha. In 1847, the riverbank of Somes River was regularized and drainage was performed on the agricultural fields between Mures and Cris rivers. At the same time, it is mentioned the organization and the functioning of the first hydraulic association of land owners, between 1840-1899, named *"The Association for the Regularization of Timis and Beghei Valley"*

With the Law from December 20th, 1910 it was organized by royal decision the *„Special Service of Land Improvement",* as part of the Ministry of Agriculture and Land, the first general manager being the *engineer Anghel Saligny*.

In the first part of the 20th century, in the West of the country there have been conducted a series of works intended to redo and complete the old dams and drainage systems, that were locally completed with underground pipe drainage systems. In the second part of the 20th century the works were performed in different phases, mainly between 1950 and 1990.

The draining and underground pipe drainage works represent the main activity for the Western area, including 91.5% of the surface where hydro ameliorative works have been made.

In Timis county, drainage and underground draining have been performed on 438,788 ha, while in Caras – Severin County on 28,627 ha (Man, T., E., 2014).

The existent irrigation system from the main hydrotechnical systems of Timis County cover 9,929 ha.

Apart from these systems there are also functional a series of local irrigation systems, that cover a total surface of 5,941 ha.

The works performed to counteract soil erosion in the hilly areas cover a total surface of 84,823 ha, distributed in 13 systems in Timis county and 18 systems in Caras – Severin.

e. On field applications in Historical Banat

The second phase of the 21st National Conference on Soil Science from 26-28 August 2015 took place in the specific areas that allow becoming familiar with the diversity of the soil from Historical Banat.

The presentation and the description of the 12 soil profiles was done using the present methodology of soil analytical research and the classification criteria regulated by the Romanian System of Soil Taxonomy (SRTS – 12). The methodology used in describing the soil profile included: type and subtype classification, pedogenetic conditions, physical and chemical features, ecopedological indicators, bonitation grade for usage and crops (Florea, N., Munteanu, I. 2012; Vlad, V., Florea, N. et. al. 2012; Soil Survey Staff, 1999).

26 August 2015 –Timis, Arad and Csongrad

Area: *Câmpia Mureşului; Câmpia Vingăi – Câmpia Arancăi – Câmpia Jimboliei;*

Line: Timisoara – Arad – Nadlag – Makó – Kiszombor – Cenad – Jimbolia – Timisoara.

Soil profiles: P1 - Sânandrei: *molic reddish preluvosoil –;* P2 – Semlac: *quaternary section + cambic cernosiom;* P3 – Semlac: *typical faeosiom;* P4 – Kiszombor: *gleic – stagnic vertosoil;* P5 – Klarafalva: *gleic – stagnic cernosiom;* P6 – Jimbolia: *salsodic cernosiom.*

27 August 2015 –Timis, Pancevo, Caras Severin

Area: *Câmpia Joasă a Banatului*

Line: Timisoara – Voiteni – Moravita – Vrsac – Alibunar – Grebenac – Biserica Alba – Oravita.

Soil profile: P7 – Voiteni: *cambic cernosiom;* P8 - Voiteni: *argic faeosiom;* P9 – Sân Mihai (Locve): *gleic – saline cernosiom;* P10 – Nikolinci: *calcaric cernosiom;* P11 – Grebenac: *molic-gleic aluviosoil.*

28 August 2015 – Caraş Severin, Timiş

Area: *Mounty Banat*

Line: Oravita – Moldova Noua – Timisoara.

Soil profile: P12 – Moldova Noua (waste dump), objectives: planting forest vegetation, re-establishing ecological equilibrium, obtaining wood, improving local and general landscape.

The Historical Banat region is characterized by numerous types of soils, being represented by soils characteristic to temperate steppes up to the ones specific to coniferous forests from wet climate and/or alpine lawns.

The soil profiles selected for this conference organized in Timisoara focused on the correct taxonomic classification of soil units and the correlation with international systems and the substantiation of the recommendations related to developing agricultural technologies.

CONCLUSIONS

The 21st edition of the National Conference on Soil Science organized in Timisoara and Historical Banat on 23-28 August 2015 represented an important scientific event due to the number of scientific papers presented and the on field applications.

The main objective of the papers consisted in becoming familiarized with the soil resources from the Western part of Romania, based on which the present strategy of rural development should be developed.

The ongoing development of agricultural technologies represents the best capitalization of the fertility and quality of soil resources, respecting the conditions for environmental protection.

The documents and the programs drawn up on this occasion represented the necessary guide for knowing, protecting, improving and preserving the soil resources as they are of public usage, without having any decisional role.

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