



## WHEAT PRODUCTION IN VOJVODINA (1979/88)

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### Abstract

The Vojvodina is situated in the north of Yugoslavia. It extends between the Danube and Sava rivers and the state borders of Hungary and Romania. Over the ten-year period 1979-1988, the average area sown to wheat in the Vojvodina was 341,381 hectares, or 21.1% of cultivated land. The annual average of wheat production was 1,634,820 metric tons, which equates to an average annual yield of 4.79 t/ha, and an annual gross average value (all values expressed in United States Dollars) of \$277,919,400. The annual average wheat production per capita over the ten years therefore amounts to 805 kg or \$136.90. The greatest annual average yields have been recorded in the following communities: Temerin (5.41 t./ha.), Vrbas (5.41 t./ha.), Ruma (5.28 t./ha.) and Srbobran (5.28 t./ha.), and the smallest in Sremski Karlovci (3.62 t./ha.), Novi Knezevac (3.82 t./ha.) and Coka (3.95 t./ha.). Local conditions of climate and soils have a great influence on wheat yields.

Key words: Vojvodina, area sown to wheat, wheat production, wheat yield

### Introduction

The Vojvodina is the northernmost part of the Federal Republic of Yugoslavia. Its bounds are set by the rivers Danube and Sava on the south and west and the national borders with Hungary and Romania on north and east. Vojvodina covers an area of 21,506 km<sup>2</sup>, and it has a population of 2,012,517 (1991 Yugoslav census). The Vojvodina is a predominantly agricultural region. 17,844 km<sup>2</sup> or 83% of the territory is used for agricultural purposes, of which 90.7 % (16,181 km<sup>2</sup> or 75.2 % of the whole region) is cultivated

The world's main wheat-growing areas (90%) are situated in the northern hemisphere (Madaric, 1985). Wheat is used principally as a source of flour for bread, and about 70 % of the world's population eat bread made from wheat. In addition to the central role of wheat in the milling and baking industries, it is also important in pharmaceuticals. Straw, as a wheat by-product, is also utilised in cattle-stalls, as matting and as a raw material for the production of paper, cardboard, etc.. Wheat can be seen as a strategic product with a direct influence on the development of global trade flows and International politics.

According to Borojevic (1986), the basis for eventual success in the creation of high-yield varieties can be attributed to the introduction of Italian wheat strains, which became the base-stock for the development of our own varieties. Borojevic goes on to claim that, after 1970, wheat varieties from

Novi Sad, Zagreb and Banjaluka were completely squeezed out by these new Italian-derived varieties. The most productive varieties leading sorts were 'Sava' and 'NS-rana 2' (see table "Contribution of the sorts to the yield increase in Vojvodina" (Borojevic, 1983)). According to Misic et al (1986), the most important factor besides ecological conditions and the level of technology, for the intensification of wheat production in Yugoslavia, has been the existence of locally-developed high-yield varieties which have been acclimatised to the different agro-ecological conditions pertaining in our county". According to Malesevic and Spasojevit (1986), an record in the absolute wheat yield was unexpectedly achieved in 1983-84, while in 1984-85, there disappointment despite all the prerequisites for a new yield record being in place. This resulted in pressure for the application of newer technology to agriculture, so as to make the crop less susceptible to climatic conditions but also to boost its potential yield within the locally prevailing environment.

There are special problems associated with wheat production on the hydromorphic black soils, smonizas and saline soils, which predominate in the Yugoslav Banat. These, so called "minute" soils, require a short and optimal periods of cultivation. According to Spasojevic (1984) it is necessary to increase the quantity of mineral fertilisers (kg/ha) and to ensure that any agro-technical operations are executed at the correct time and to a high standard, if any increase in yield is to be achieved.

According to Borojevic and Jovanovic (1984), "In the absence of stability in the demand and supply in wheat, and frankly in agricultural products in general, there is a need for a price policy'. This is equally true today (1997). According to Borojevic (1984), "in recent years there has been a stagnation in the wheat yields achieved in Vojvodina. This year, 1984, we have achieved the record of 5.88 t/ha in agricultural combines (this is a higher yield than the best previous, in 1976, by 0,44 t/ha). Some combines achieved yields of over 6.0 t/ha (Becej, Kovin, Novi Sad, Pancevo, Ruma, Sremska Mitrovica,

### *Objective*

The purpose of this paper is to analyse the production of wheat in the Vojvodina on the basis of data for the ten-year period 1979-1988. After 1988 there is no published statistical data for the Vojvodina, hence the period chosen. Although we have analysed the earlier period, it is possible to make estimations of wheat productions in the Vojvodina since, and these point to a further rise in production.

### *Method*

On the base of data from the Statistical Annuals, 1979/88, we worked on the following parameters: area sown to wheat, wheat production, wheat yield, gross value.

## **Results of investigations and Discussion**

In the period 1979/88, the cultivated land sown to wheat ranged between 285,355 ha (1986) and 395,773 ha (1983), a variation of 110,418 ha or 27.9 % (Figure 1). The ten years' average of the area sown to wheat was 341,381 ha, i.e. 21.1% of the cultivated land (Table 1). Over the same period, wheat production varied more widely, ranging from 1,237,919 tonnes (1979) to 2,084,170 tonnes (1988), a variation of 846,251 t. or 40.6 % (Figure 1). This sort of data denotes a great changeability in the conditions of wheat production in the Vojvodina. The annual average wheat production was 1,634,820 t (Table 1). The wheat yield over the same period ranged between 3.80

t/ha (1979) and 5.61 t/ha (1988), a variation of 1.81 t/ha or 32.3%. The average annual yield over the ten years was 4.79 t/ha (Table 1).

In order to show the real importance of the wheat production values (t) and yields (t/ha) for Vojvodina we will consider wheat production per capita, and also financial production values. The price of wheat on the world market varies between \$0.14 and \$0.20 /kg (depending on the time of year), so we can take a price of \$ 0.17 /kg or \$ 170 / tonne as representative. The annual average of wheat production was 1,634,820 metric tons, which equates to an annual gross average value of \$ 277,919,400. At an average annual yield of 4.79 t/ha, this produces an average annual gross income of 814.3 \$/ha. In the same period, the Vojvodina had 2,031,910 inhabitants (Pokrajinski zavod za statistiku, 1983; 1993). The annual average wheat production per capita over the ten years therefore amounts to 805 kg or \$ 136.90 (Table 1).

An analysis of the wheat production per capita globally for 1979/88 reveals that Canada leads, with 1,002kg or \$170.30 per capita, followed by Australia (939kg or \$159.60 per capita) and Hungary (591 kg or \$100.50 per capita). France was in fourth place with 535 kg or \$91.00 per capita (UN Statistical Yearbook, 1991). Taken as a state-unit, the province of Vojvodina, meanwhile (805 kg and \$136.90 per capita) would appear in third place. Former Yugoslavia came in 11th (diagram wrongly labelled 12<sup>th</sup>/18<sup>th</sup>) place with 243 kg or \$41.30 per capita, but, were the Vojvodina extracted from those statistics, would be 17<sup>th</sup> (188 kg or \$32, less than ¼ of the Vojvodina's value).

### Wheat Production in Vojvodina Communities

There are 45 communities in the Vojvodina. The biggest in terms of area and population is Zrenjanin (1,324 km<sup>2</sup> and 136,778 inhabitants (1991). The smallest is Sremski Karlovci (50 km<sup>2</sup> and 7,398 inhabitants in 1991). According to the average from 1979/88, the greatest area sown to wheat was in Sombor (19,000 ha), Zrenjanin (19,347 ha) and Subotica (18,053 ha), and the smallest had Sremski Karlovci (169 ha) and Beocin (852 ha). That is to be expected, because in terms of area, the first three communities are the biggest, and other two the smallest in Vojvodina (Table 1). It is however very interesting to see the average proportion of the cultivated land dedicated to wheat over the decade. The highest proportion was to be found in the communities Mali Idos (28.8%), Backa Topola (27.2%), and Kula (26.0%), and the lowest in Sremski Karlovci (7.8%) and Beocin (12.3%). There is a correlation between the average annual wheat yield and the proportion of the cultivated land dedicated to wheat. Mali Idos is ranked ninth in Vojvodina according the wheat yield (5.15 t/ha<sup>2</sup>), Kula 10<sup>th</sup> place (5.13 t/ha) and Backa Topola 20<sup>th</sup> (4.89 t/ha). Communities with smallest average proportion of the cultivated land dedicated to wheat had the smallest average wheat yield, too. Sremski Karlovci was ranked last (45th) (3.62 t/ha) and Beocin, 42<sup>nd</sup> (3.99 t/ha). The highest annual average wheat yields are recorded in communities of Temerin (5.48 t/ha), Vrbas (5.41 t/ha) and Ruma and Srbobran (5.28 t/ha), and the smallest in Sremski Karlovci (3.62 t/ha), Novi Knezevac (3.82 t/ha) and Coka (3.96 t/ha) (Table 1). As illustrated in Fig. 3, annual average wheat yields are the highest in the central and western Backa, then in western, middle and southern Srem and the south-west Banat (over 5.0 t/ha), and the smallest in the northern and eastern Banat (less than 4.5 t/ha).

Wheat, as a plant, has a strong demand for warmth and humidity and well-aired and -drained soil. It is therefore clear that wheat will be affected by climatic and soils conditions. In the western and middle Backa the decade's average **air temperature** during the vegetation period was between 17.6° and 18.0°, in the western, central and southern part of Srem between 17.9 ° and 18.1° and in the south-western Banat between 18.2 ° and 18.3° c, (all Celsius). In the northern Banat, the average

air temperature during the vegetation period was between 17.9 ° and 18.1° and in the eastern part of Banat, between 18.1° and 18.3°c. Average annual **precipitation** during the growing season in the western and middle Backa, south-western Banat, and western, central and southern Srem was between 340 and 360 mm. In the northern Banat, it was between 300 and 320 mm, and in the eastern Banat, between 320 and 340 mm. Total **insolation** in middle and western Backa was between 2,030 and 2,060 hours and in the afore-mentioned parts of Srem, 2,050 and 2,090 h. In the south-western Banat between 2,090 and 2,120 h The value for northern Banat was between 2,060 and 2,090 h, and in the east Banat between 2,000 and 2,060 h (Provincial Hydrometeorological Institute, 1981/90). The values of these climatic elements are relatively close across the whole territory of Vojvodina, and cannot of themselves explain the differing wheat yields.

Two other climatic elements which have a larger influence on wheat yields in Vojvodina are **wind speed** and a saturation deficit in air **humidity**. In the four months most important for the development of wheat (March, April, May and June), the average wind speed in the western and central Backa was 3.03 m/s, in the south-western Banat 3.13 m/s, and in the western, central and southern Srem 2.77 m/s. In the northern Banat, this element had a value of 3.10 m/s, and in the eastern Banat 3.44 m/s. The higher wind speeds cause a higher rate of evaporation and that is the crucial climatic reason of the lower wheat yields. The average March - June saturation deficit of the air humidity was as following: west and central Backa, 3.12 mm Hg; south-west Banat, 3.23 mm Hg; western, central and southern Srem 2.86 mm Hg; northern Banat, 3.52 mm Hg, eastern Banat of 3.1 mm Hg (Provincial Hydrometeorological Institute, 1981/90).

Soil conditions have an even stronger influence than climate on wheat yields in Vojvodina. In the western and central Backa, south-western Banat, and western, central and southern Srem, calcareous Chernozem, Chernozem with signs of past swamping and Chernozem-like calcareous Meadow Soil predominate. The northern and eastern Banat, in contrast, are dominated by Chernozem with signs of clay in loess, hydromorphic black soils, limeless, hydromorphic black soils salinized and hydromorphic smonitza soil (Nejgebauer et al, 1972). The largest wheat production was in the communities which had the most cultivated land dedicated to wheat. The communities of Sombor, Zrenjanin and Subotica thus achieved 16.9% of the total wheat production of Vojvodina. Also, the wheat yields of these three communities were higher (4.81 t/ha) than the Vojvodina average (Table 1). The values of wheat production and wheat gross income per capita depend on the volume of production, yields and the size of the population. On the basis of wheat production and wheat gross product was the community of Secanj with \$349.90 per capita, Plandiste with \$323.50 per capita, Zitiste with \$322.30 and Srbobran with \$320.30 per capita (Table I, Fig 4).

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*Table 1: Average annual areas of cultivated land (ha.), area sown to wheat (ha.), wheat production (t), wheat yield (t/ha), wheat gross product (\$), wheat production per capita (t/person) and wheat gross product per capita (\$/person) over the decade 1979/8.*

*Source:* Pokrajinski zavod za statistiku, (1981/90)

Figure 1. Wheat harvesting in the Vojvodina in the late 1970s. Photo S. Lazukić.

Figure 2. Area sown to wheat (ha) wheat production (t) and yields wheat (t/ha) in Vojvodina over the period 1979/88.

Figure 3. World-wide Order of Average annual income (\$) per capita (1979/88)

Figure 4. Average annual wheat yields (t/ha) in the Vojvodina communities (1979/88)

Figure 5. Average annual wheat gross product (\$) per capita in the Vojvodina communities (1979~88)