

**Arkadiusz Artyszak\*, Beata Michalska-Klimczak\*, Emre Ölçer\*\***

*\*Warsaw University of Life Sciences – SGGW, Poland; \*\* Çukurova Üniversitesi, Adana, Turkey*

## **SUGAR AND SUGAR BEET PRODUCTION IN TURKEY AND POLAND IN THE YEARS 1995-2014**

### *PRODUKCJA CUKRU I BURAKÓW CUKROWYCH W TURCJI I W POLSCE W LATACH 1995-2014*

**Key words: sugar beet, European Union, Poland, Turkey, sugar**

*Słowa kluczowe: burak cukrowy, Unia Europejska, Polska, Turcja, cukier*

*JEL codes: Q13, Q17*

**Abstract.** The work summarizes changes, which involved the sugar and sugar beet production in Turkey and in Poland, in the years 1995-2014. Sugar beet area in Turkey has decreased by 7% and in Poland by 48%. Harvest has increased by 51% in Turkey and has remained unchanged in Poland. Sugar beet yield has increased: in Turkey by 63% and in Poland by 97%. 71% farmers have stopped cropping sugar beet, while in Poland this share has been 87%. Mean plantation size has increased in Turkey by over a factor of 2 (compared to 1997), while in Poland it has been by a factor of almost 4. Sugar production in Turkey has dropped by 13% (compared to 1997) and in Poland it has grown by 29%. Three new sugar plants started operation in Turkey in the years 1995-2014. In Poland 58 facilities shut down. Turkey's securing position of major sugar producer is to be expected, under the conditions of increased pace of production concentration and implementing new production technologies. Withdrawal of sugar production quotas in the EU resulted in increased sugar beet spring sowing in several member states, including Poland. Further developments in 2018 and in the following years shall depend on the profitability of sugar beet crops and of sugar production. Significant influence is also to be expected from the isoglucose competition, production of which is to enjoy quotas withdrawal, as well.

## **Introduction**

Sugar is produced by farmers in roughly 100 countries in the world. Typically, over 70% of global sugar production is consumed domestically. This strongly benefits a large export market. A significant share of this trade is regulated by bilateral long-term agreements, and usually preferential terms are in force [Řezbová et al. 2013]. Production and trade of sugar are closely related to the sustainable development policies [Smutka et al. 2013].

Turkey is one of the largest producers of sugar beet in the world. The country has also been applying for European Union membership for many years. In Turkey, sugar beet is very important for the agriculture landscape. The value of sugar beet production contributes 2.5% of the total value of crop production in the country. Production of sugar beet has a share of 8.7% in Europe and 6.2% in the world [FAO, 2014]. Turkey is the fifth largest beet sugar producer in the world, behind France, Germany, the United States, and Russia. Sugar in Turkey is among the most important commercial products with one of the largest added value contributions to the Turkish economy [Akçay, Uzunoğlu 2006].

Poland is the third, after France and Germany, sugar producer in the EU. The planned withdrawal of production quotas for sugar and isoglucose in the EU on the 1st of October 2017 has already resulted in increasing of sugar beet area in Poland, and following increase of production of sugar and isoglucose is expected.

The aim of the work is to compare changes to the sugar and to the sugar beet production in Turkey and in Poland, over the years 1995-2014.

## Material and methods

The following data has been used in this work: Association of Sugar Industry Engineers and Technicians (STC), FAOSTAT, Comite European Des Fabricants De Sucre (CEFS), Turkish Sugar Agency (TSA), Turkish Sugar Factories Corporation (TSFC) covering the years 1995-2014. For the investigated traits mean and the coefficient of variability (CV) have been calculated, along with the standard deviation (SD) and approach by the trend estimation method has been taken. The results are summarized in a table and figures format.

## Results and discussion

In the years 1995-2014, sugar beet area in both countries showed a decreasing tendency; in Poland it has been decreased 47.6% and in Turkey by 7.4% (fig. 1). In Turkey sugar beets are cropped usually in the Central Anatolia Region, specifically around Ankara, Konya, Eskisehir, Afyon, Tokat and Yozgat cities. Typically, cropping involves rotating sugar beet with cereals, pulses, fodder crops and sunflowers [USDA 2017].

Sugar beet production in Poland practically has not changed, while in Turkey it has grown by 50.9% (fig. 2). Sugar beet yield in both countries increased considerably: in Poland by 97.1%

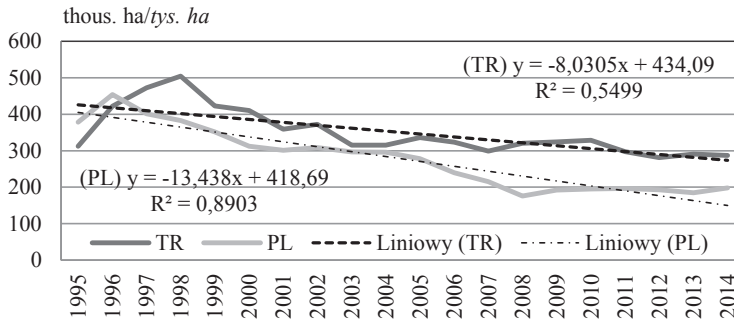


Figure 1. Sugar beet area harvested in Turkey and Poland in the years 1995-2014

Rysunek 1. Powierzchnia uprawy buraków cukrowych w Turcji i w Polsce w latach 1995-2014

Source: own study on the basis of data on [CEFS 2010-2014, STC 1995-2004, TSA 1995-2014, TSFC 1995-2014, FAOSTAT 1995-2014]

Źródło: opracowanie własne na podstawie [CEFS 2010-2014, STC 1995-2004, TSA 1995-2014, TSFC 1995-2014, FAOSTAT 1995-2014]

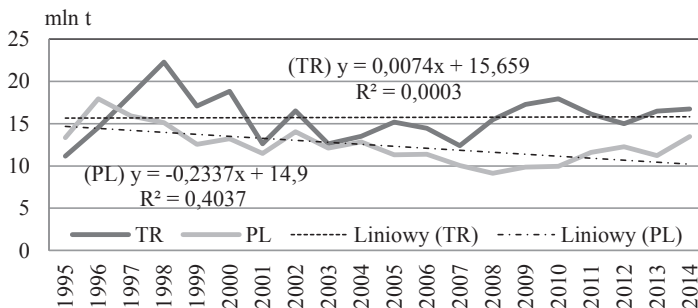


Figure 2. Sugar beet production in Turkey and Poland in the years 1995-2014

Rysunek 2. Produkcja buraków cukrowych w Turcji i w Polsce w latach 1995-2014

Source: see fig. 1

Źródło: jak na rys. 1

Figure 3. Sugar beet yield in Turkey and Poland in the years 1995-2014

Rysunek 3. Plon buraków cukrowych w Turcji i w Polsce w latach 1995-2014)

Source: see fig. 1

Źródło: jak na rys. 1

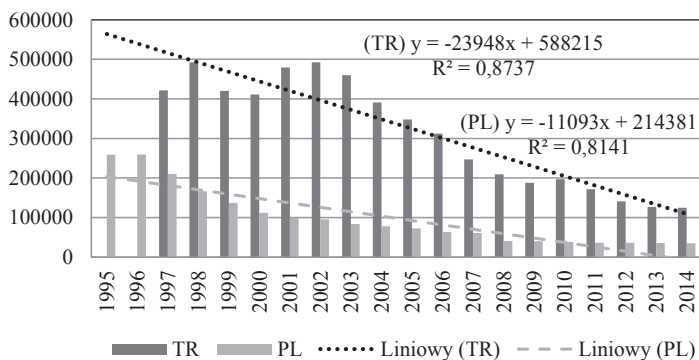
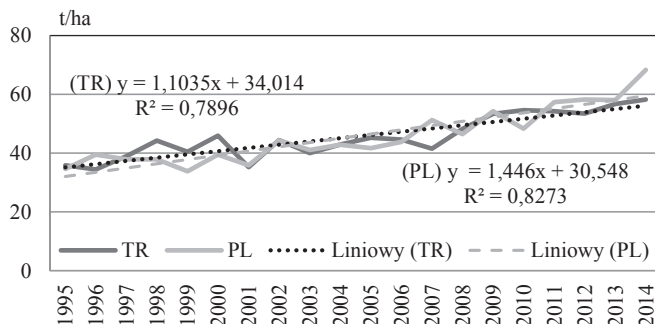


Figure 4. Number of sugar beet growers in Turkey and Poland in the years 1995-2014

Rysunek 4. Liczba plantatorów buraka cukrowego w Turcji i w Polsce w latach 1995-2014

Source: see fig. 1

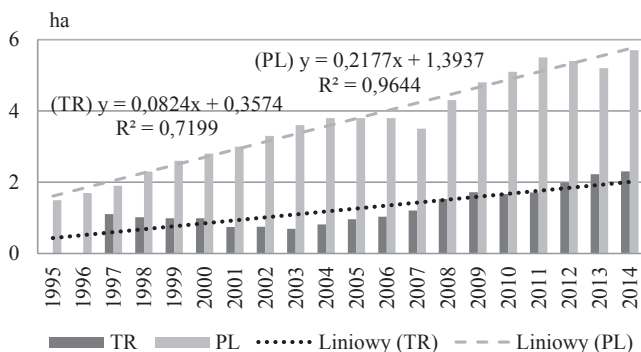
Źródło: jak na rys. 1

Figure 5. Average size of sugar beet plantation in Turkey and Poland in the years 1995-2014

Rysunek 5. Średnia powierzchnia plantacji buraków cukrowych w Turcji i w Polsce w latach 1995-2014

Source: see fig. 1

Źródło: jak na rys. 1



and in Turkey by 62.6% (fig. 3). In Poland, sugar beet cropping in the years 1995-2014 was abandoned by 86.6% farmers – either by an independent decision or under pressure from the 2006-2010 sugar reform. On the other hand, in Turkey, this reduction reached 70.5% (compared to 1997) – figure 4. Mean plantation area in Poland has increased by a factor of 4, and in Turkey by a factor of over 2, compared to 1997 (fig. 5). Production of sugar in Poland has increased by 29.4% and in Turkey it has decreased by 13.4% – compared to 1997 (fig. 6). Since 1995, in Poland 58 sugar factories have been shut down, while in Turkey 3 new have started (fig. 7).

There are seven beet sugar producers in Turkey. Six of them are private entities while one is public (Turkseker). The latter has been in the privatization process for the past eight years. The seven Turkish producers collectively own 33 factories with a total production capacity of 3.1 MMT per annum. There are also five starch based sugar (SBS) producers, and all of them are privately owned. Their total processing capacity is 1 MMT of corn [USDA 2017].

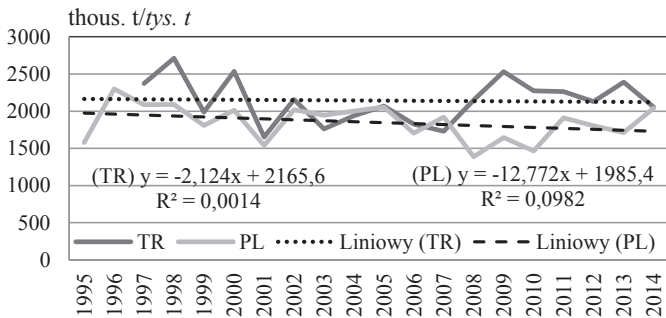


Figure 6. Sugar production in Turkey and Poland in the years 1995-2014

Rysunek 6. Produkcja cukru w Turcji i w Polsce w latach 1995-2014

Source: see fig. 1  
Źródło: jak na rys. 1

Figure 7. Number of factories operating in Turkey and Poland in the years 1995-2014

Rysunek 7. Liczba czynnych cukrowni w Turcji i w Polsce w latach 1995-2014

Source: see fig. 1  
Źródło: jak na rys. 1

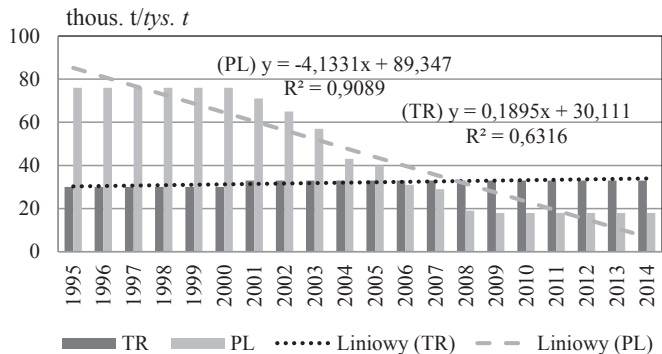
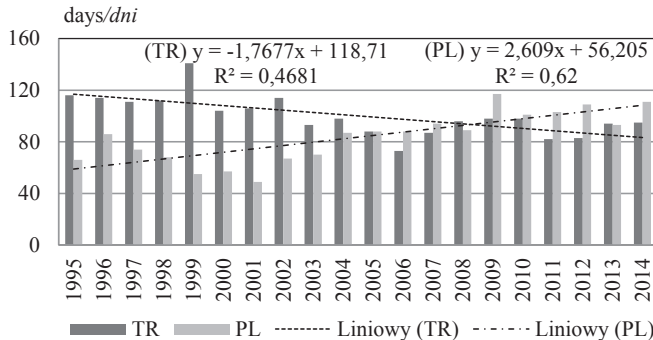


Figure 8. Length of the campaign in Turkey and Poland in the years 1995-2014 (days)

Rysunek 8. Długość kampanii w Turcji i w Polsce w latach 1995-2014 (dni)

Source: see fig. 1  
Źródło: jak na rys. 1



Mean duration of a campaign in the analyzed period has lengthened in Poland almost twice, while in Turkey it has shortened by 18.1% (fig. 8). In the case of some traits, it can be noted that their variability has been significantly larger in Poland, than in Turkey. Specifically, these include: sugar beet cropping area, number of growers, number of operational sugar beet processors and mean campaign duration (tab. 1). In the case of the remaining traits, the CV was comparable for the two countries. The largest variability was observed for the number of growers (CV = 74.3%) and the number of operational (CV = 55.8%) in Poland.

Sugar beet cropping in Turkey is far more fragmented, in comparison to Poland. This stems from the large number of growers and mean plantation area. In 2014, in Turkey sugar beet was cropped by over 124 thsd farmers, while in Poland this figure did not exceed 35 thsd. Mean plantation area was respectively 2.3 ha and 5.7 ha. Changes of sugar beet production in Poland were varied by different regions of the Arkadiusz Artyszak [2012, 2013a, 2013b, 2013c] and were forced by the sugar market reform in the years of 2006-2010.

Table 1. Statistical characteristics of the evaluated traits

Tabela 1. Charakterystyka statystyczna ocenianych cech

Years/ Lata	Area harvested [thous. ha]/ Powierzchnia uprawy [tys. ha]		Sugar beet production [mln t]/Zbiory buraków [mln t]		Sugar beet yield/ Plon buraków/ cukrowych [t/ha]		Number of growers [thous.]/Liczba plantatorów [tys. szt.]	
	TR	PL	TR	PL	TR	PL	TR*	PL
Change 2014 to 1995/ Zmiana 2014 do 1995	-24.8	-180.0	+5.6	+0.1	+22.5	+33.6	-298.0	-224.0
Średnia/Mean	350.0	278.0	15.7	12.4	45.6	45.7	313.0	98.0
SD	64.1	84.3	2.6	2.2	7.3	94.0	137.0	73.0
CV [%]	18.3	30.4	16.7	17.5	16.1	20.6	43.7	74.3
Years/Lata	Average size of plantation/ Średnia wielkość plantacji [ha]		Sugar production [thous.t]/ Produkcja cukru [tys. t]		Number of factories Operating/ Liczba czynnych cukrowni		Length of the campaign [days]/ Długość kampanii [dni]	
	TR*	PL	TR*	PL	TR	PL	TR	PL
Change 2014 to 1995/ Zmiana 2014 do 1995	+1.2	+4.2	-317.0	+464.0	+3.0	-58.0	-21.0	+45.0
Średnia/Mean	1.3	3.7	2141.0	1851	32.1	46.0	100.0	83.6
SD	0.5	1.3	298	241	1.4	25.6	15.3	19.6
CV [%]	39.7	35.6	13.9	13.0	4.4	55.8	15.3	23.4

TR – Turkey, PL – Poland, CV – Coefficient of Variation, SD – Standard Deviation, \* compared to 1997  
TR – Turcja, PL – Polska, CV – współczynnik zmienności, SD – odchylenie standardowe, \* w stosunku  
do 1997 roku

Source: see fig. 1

Źródło: jak na rys. 1

## Conclusions

Sugar production quota in force in Poland until 30th of September 2017, limits production of sugar to 1 405 608 tonnes, and isoglucose production to 42 861 tonnes. Withdrawal of these sugar and isoglucose production limits in the EU will result in production increase in Poland, which is supported by the increased sowing of sugar beet in 2017. Considerable share of this sugar production will be exported from the EU. In the coming years, the production of sugar and isoglucose will depend on the profitability.

Turkey in the coming years may foster their strong position as sugar beet sugar producer. The condition for this to happen is successful concentration of production and introduction of new production technologies.

## Bibliography

- Akçay Yasar, Meral Uzunoğlu. 2006: "Sugar and Sugar Beet Policy Reforms in Turkey". *Journal of Applied Sciences* 6: 1123-1127.
- Artyszak Arkadiusz. 2012: „Zmiany w produkcji buraka cukrowego w województwie lubelskim w latach 2002–2011”. *Zeszyty Naukowe SGGW w Warszawie. Polityki Europejskiej, Finanse i Marketing* 8 (57): 26-35.
- Artyszak Arkadiusz. 2013a: „Zmiany w produkcji buraka cukrowego w województwie dolnośląskim w latach 2003-2011”. *Roczniki Ekonomii Rolnictwa i Rozwoju Obszarów Wiejskich* 100 (2): 65-74.
- Artyszak Arkadiusz. 2013b: „Zmiany w produkcji buraka cukrowego w województwie kujawsko-pomorskim w latach 2002-2011”. *Zeszyty Naukowe SGGW w Warszawie. Polityki Europejskiej, Finanse i Marketing* 9 (58): 22-33.

- Artyszak Arkadiusz. 2013c: „Produkcja buraka cukrowego w województwie wielkopolskim w latach 2002-2011”. *Roczniki Naukowe SERiA XV* (2): 11-17.
- CEFS. 2010-2015. *Sugar Statistics 2010-2015*. Comite Europeen Des Fabricants De Sucre Bruxelles.
- FAOSTAT. 1995-2014. *Crops and livestock products in the years 1995-2014*.
- Řezbová Helena, Anna Belová, Ondřej Škubna. 2013. „Sugar beet production in the European Union and their future trends”. *Agris online Papers in Economics and Informatics V* (4): 165-178.
- Smutka Luboš, Lenka Rumánková, Josef Pulkrábek, Irena Benešová. 2013. „Main Determinants of Supply and Demand on World Sugar Market in Czech”. *Listy Cukrovarnické a Řepářské* 129 (4): 142-145.
- STC. 1995-2004. *Data in the years 1995-2004*. Association of Sugar Industry Engineers and Technicians.
- TSA (Turkish Sugar Agency). 2017. <http://www.sekerkurumu.gov.tr>.
- TSFC (Turkish Sugar Factories Corporation). 2017. <http://www.turkseker.gov.tr>.
- USDA. 2017. *Foreign Agricultural Service. GAIN Report. Turkey Annual Sugar Report*. Number TR7016. [https://gain.fas.usda.gov/Recent%20GAIN%20Publications/Sugar%20Annual\\_Ankara\\_Turkey\\_4-14-2017.pdf](https://gain.fas.usda.gov/Recent%20GAIN%20Publications/Sugar%20Annual_Ankara_Turkey_4-14-2017.pdf).

### **Streszczenie**

*Porównano zmiany, jakie zaszły w produkcji buraków cukrowych i cukru w Turcji i w Polsce w latach 1995-2014. Powierzchnia uprawy buraków cukrowych w Turcji zmniejszyła się o 7%, a w Polsce o 48%. Zbiory buraków uległy zwiększeniu o 51% w przypadku Turcji i nie uległy zmianie dla Polski. Plony buraków cukrowych wzrosły o 63% w Turcji, a o 97% w Polsce. Z uprawy buraków cukrowych zrezygnowało 71% plantatorów w Turcji, a 87% w Polsce. Średnia wielkość plantacji zwiększyła się w Turcji ponad 2 razy (w porównaniu z 1997 rokiem), w Polsce prawie 4-krotnie. Produkcja cukru Turcji zmniejszyła się o 13% (w porównaniu z 1997 rokiem), a w Polsce zwiększyła się o 29%. W latach 1995-2014 w Turcji uruchomiono 3 nowe cukrownie, a w Polsce zamknięto 58 zakładów. W najbliższych latach należy się spodziewać umocnienia pozycji Turcji jako poważnego producenta cukru, pod warunkiem przyspieszenia koncentracji produkcji oraz wdrożenia nowych technologii produkcji. Zniesienie limitów produkcji cukru w UE spowodowało znaczny wzrost zasiewów buraka cukrowego wiosną w kilku krajach członkowskich, w tym w Polsce. Rozwój sytuacji w 2018 roku i kolejnych latach będzie zależał od opłacalności uprawy buraka oraz produkcji cukru. Znaczny wpływ będzie miała także konkurencja ze strony izoglukozy, której limity produkcyjne także zostaną zniesione.*

Correspondence address  
Arkadiusz Artyszak Ph.D.  
Warsaw University of Life Sciences – SGGW  
Faculty of Agriculture and Biology, Department of Agronomy  
Nowoursynowska Str. 159  
02-776 Warsaw, Poland  
phone: 48 (22) 593 27 02  
e-mail: [arkadiusz\\_artyszak@sggw.pl](mailto:arkadiusz_artyszak@sggw.pl)