

VEGETABLE PRODUCTION AS A PART OF BULGARIAN AGRICULTURE²

The importance of vegetable production for the agricultural sector of Bulgaria is determined by the year-round presence of vegetable crops in household consumption and the strong traditions in vegetable production. The problems in the sector are significant and timely intervention is needed to solve them in order to ensure the country's food security. The purpose of the report is to outline the place of vegetable production in Bulgarian agriculture and the trends observed in the sector for the period 2013-2020. Data from the agrarian reports of the Ministry of Agriculture were used, FAO, Eurostat.

Keywords: agriculture; vegetable production; trends

JEL: Q10; O13; Q18

1. Introduction

Bulgaria is a traditional producer and exporter of vegetable crops. The geographical location and favourable climatic conditions allow the cultivation of a wide range of vegetables with very good quality characteristics. In the 1980s, the export of vegetable crops had an important role in the structure of agricultural exports. After the implementation of the agrarian reform from the nineties of the 20th century, vegetable production began to decline. The main factors for the reduction of vegetable production are the organizational restructuring of agricultural cooperatives, the loss of the Eastern European market, and the limitation of domestic demand for raw materials from the canning industry. Bulgaria is gradually turning from an exporter to an importer of almost all types of vegetable crops and is unable to satisfy the shrunken national market (Valchev, 1999).

With the accession of Bulgaria to the European Union (EU), serious questions arise regarding the future development of vegetable production in the conditions of a single market, with strong competition from products with a higher degree of subsidization (Nencheva-Ivanova et al., 2015). One group of issues is related to the state and the relatively low level of production and competitiveness with which the country entered the EU. The other group of issues is related to the different speed with which individual economic activities in agriculture develop, under the influence of the EU's Common Agricultural Policy (CAP). In-depth

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research is also needed due to the impact that the CAP has had on the sector since the 2003 reform, when the subsidy policy changed from payment for goods produced to payment per unit of area. The result is that the direct payments stimulate significantly more the development of crops such as wheat, which require large growing areas. For crops such as vegetables, income support is not enough and their production continues to decrease (Doychinova, 2017). Therefore, in the second programming period – RDP 2014-2020, the criteria for receiving direct payments are changing (Atanasova-Kalaydzhieva, 2017). During the years of EU membership, the country's agriculture has undergone restructuring in the direction of reducing the number of farms and their consolidation. The farms are divided into large ones – producing most often grains, and small ones – producing vegetables and fruits mainly for personal consumption. The number of large farms is small, while that of small farms is significant. In Bulgaria, the cultivation of crops (wheat, corn, barley) predominates, while vegetable production is reduced to the extent that imports of almost all vegetables are required. In the past, such vegetables have formed a substantial part of the country's agricultural exports (Kostadinova, 2017; Gorcheva, 2016; Dimitrov et al., 2021). Bipolar agriculture is formed, where 1.5% of farms manage 82% of the arable land and mainly grow grains. Traditionally grown crops such as vegetables are noticeably dwindling and there is a danger of cessation of production. For the period 2007-2017 processing of agricultural products has decreased twofold (Nikolova, Linkova, 2020).

There has been a significant decline in vegetable production, which began as early as 2014 and deepened over the years. One of the reasons for this is the insignificant support during the First Program Period 2007-2013 in terms of overcoming structural imbalances in agriculture (Petrova, 2017). In vegetable production, the arable land in 2010, compared to the pre-accession period, it decreased by 47%, and for the same period, the potato area decreased by 37%. The funds from the pre-accession funds of the SAPARD program and other national programs do not arouse lasting interest and do not support the recovery of the sector (Bencheva, 2012).

The growing importance of vegetable crops for the healthy nutrition of the population and also as raw materials for the production of quality processed products are a prerequisite for in-depth research (Branzova, 2019; Krasteva, 2017). The agrarian sector is developed primarily as a resource without adding additional value to the final product. This affects the competitiveness of the sector compared to other sectors of the economy, access to credit and foreign investment. Active state intervention is needed, which could be done through the financing of operating enterprises, provision of guarantee schemes and instruments and implementation of investment programs. It is a paradox that direct revolving financing and lending against subsidies make up about 40% of the total credit resource for agriculture (Vlaev, 2018). Despite the positive return on subsidies in vegetable production for the period 2014-2020, their importance is insignificant (9%) compared to other factors influencing the level of gross production in agriculture (Nikolov et al., 2015).

The production of vegetables is a risky undertaking, as it is subject to climatic changes, in Bulgaria, there are the necessary soil and climatic conditions and the experienced workforce, but the sector is shrinking more and more (Nikolova, 2017). Farms sales increase and decrease irregularly, depending on demand and the level of purchase prices from the previous year. In agriculture, the differentiation of individual products is relatively weak, i.e. it is

difficult to distinguish tomatoes, cucumbers or cabbage from different regions of the country. The differentiation is possible on the basis of specific varieties, zoned in a strictly defined geographical location (Yovchevska, 2019).

The vegetable market is characterized by some volatility in terms of consumption and resource specificity (Ruscheva et al., 2022). Unlike grains, changes in the general economic situation affect the volume of consumption of vegetables. At lower prices, consumption increases as consumers extend the consumption season by canning vegetable crops, and vice versa – at higher prices, consumption shrinks. The instability in the supply and the corresponding dynamics in the prices of vegetables are explained by the possibility of using different vegetables interchangeably (Harizanova-Bartos, Terziyska, 2020).

Problems in vegetable production are deepened due to structural weaknesses of specialized farms, such as seasonal fluctuations in demand, i.e. the bulk of the sales are mainly in the period May – November (Nencheva-Ivanova et al., 2015). Therefore, the use of pricing strategies that are consistent with seasonality is of great importance. Market-oriented pricing strategies are determined by factors such as consumer preference, consumer shopping behaviour and income.

The seasonality and short shelf life of most vegetable crops demand an emphasis on marketing. It is necessary that marketing activities reflect the specifics of the sector. In vegetable production, there is a great risk of wastage; therefore, a very good organization is required in order to minimize losses (Radeva, 2021).

There is no mandatory minimum wage in the Vegetable production sector. In the numerous small vegetable farms, cultivation and most of the activities related to the production and sale of the produce are mainly carried out by the members of the household. Programs for investment support are almost absent in the sector. The need for labour in vegetable production is many times greater than in grain production, for example. The reasons are the greater labour intensity and the need for year-round employment. This is a prerequisite for hiring additional personnel, which is an opportunity to overcome the crisis with the lack of employment in the agriculture sector (Hristova, Ilieva, 2013).

The production and sale of the products require certain labour and material costs. The costs for labour, production, logistics and supply of the product are reflected in the price (Yarkova et al., 2017; Kotseva-Tikova, 2018). As the main element of price, the cost is composed of variable and fixed costs. The grouping of expenses by economic elements makes it possible to determine the cost of production of vegetable crops (Stoyanova, 2007). Material costs include: costs of seeds, planting material; auxiliary materials; fuel, energy, water, maintenance of fixed assets, consumables and packaging. External service costs include: advertising costs; rentals; transport services; repair of durable tangible assets (LDA); property taxes; fees etc. The classification of expenses by economic elements also refers to: amortization expenses; labour; social security and allowances; business trips; exhibitions and fairs, etc. The stimulation of the industries, via various support levers, gives partial results. Vegetable production, where the return on investment happens over a long period, suffers severely in terms of financial support. The result is stagnation in the subsector and an imbalance in agricultural production (Hristova, 2014).

2. Analysis of Vegetable Production for the Period 2013-2020

The problem of feeding the world's ever-growing population and the production of agricultural goods is a constant factor driving societal development. Vegetable production, with its great diversity of species, is an important source of products which have a significant role in maintaining the nutritional balance for the population. Being able to grow vegetables in different seasons of the year and different climatic areas contributes to maintaining a natural conveyor belt for supplying consumers with fresh vegetables. According to data from the FAO (Food and Agriculture Organization), the production of vegetables for the market increased and reached 1.148 million tonnes in 2020, which is 17% more compared to 2013. Vegetable production is mainly concentrated in Asia – 879,301 tons in 2019. Approximately the same amount of vegetables was produced in Europe and Africa in 2019, respectively, 84,935 tons and 84,372 tons. China has the leading position in the top ten world producers of vegetables for 2020 with 594.05 million tons, followed by India – 141.2 million tons, the USA – 33.12 million tons, and Turkey – 25.96 million tons. As the world population grows, the demand for vegetables increases, which stimulates the growth of future production.

EU-27 is characterized by highly developed vegetable production. The sector includes a wide variety of different types of vegetables grown in greenhouses and open areas. It demands greater labour costs and uses a greater proportion of seasonal labour than other economic activities in agriculture.

According to Eurostat data, there are 11 countries with the largest volume of production. Spain, Italy and France are leading the way. The Netherlands, Poland and Germany are the next three countries in the EU with the highest yields of vegetables. The first two countries show weak growth rates, indicating that they have reached a balance between production capacity and market realization (Table 1).

Table 1

Vegetable production in leading countries in the EU, thousand tons

GEO/TIME	2013	2014	2015	2016	2017	2018	2019	2020	2021	Change 2021:2013, %
Spain	:	:	14520	15381	15400	14878	15790	15099	16305	X
Italy	12228	:	13263	13445	12879	12767	12903	13307	13843	113.21
France	5364	5435	5354	5504	5606	5708	5612	5566	6248	116.48
Netherlands	4900	4972	4980	4890	5405	4661	5403	5344	5683	115.98
Poland	:	5853	5038	5841	5923	5489	5221	5001	5664	X
Germany	3505	3871	3564	3815	4087	3591	4048	4040	4389	125.22
Portugal	1989	2299	2224	2534	2586	2122	2356	2515	2952	148.42
Greece	3452	3226	3154	3027	2853	2728	2275	2535	2330	67.50
Romania	2735	2666	2512	2299	2498	2641	2406	2340	2287	83.62
Belgium	:	:	1990	2057	2152	2088	2269	2231	2263	X
Hungary	:	1518	1606	1631	1661	1525	1498	1430	1351	X
Austria	609	703	573	625	609	573	625	658	689	113.14
Bulgaria	450	393	438	669	561	579	555	459	494	109.78

Source: Eurostat, *Vegetables, production*.

The changes in the production of vegetable crops in the leading member states of the EU for the period 2013-2020 show that the greatest growth occurred in Portugal – 148.42%, meaning

that the production of vegetables in the country increased by 963 thousand tonnes in 2020 compared to 2013. Germany, the Netherlands and France, also experienced a positive trend in the last year compared to the beginning of the period. The change in vegetable production in Germany was 125.22% or 884 thousand tons more in 2020 compared to 2013. Vegetable production in France increased in 2020 compared to 2013 by 116.48% or 884 thousand tons.

Bulgaria is in 13th place and reports insignificant growth in vegetable production compared to the rest of the EU countries. The physical volume increased from 450 thousand tons in 2013 to 494 thousand tons in 2020, which is a 109.78% change. The development of the sector in Bulgaria lags behind in comparison with countries that are close in size and with similar climatic conditions.

Table 2

Ranking of vegetable production in Bulgarian agriculture

Indicator/year	2013	2014	2015	2016	2017	2018	2019	2020
BP from agriculture at producer prices (million BGN)	8713.8	8053.2	7605.6	7319.7	8031.5	8155.0	8319.1	7798
Change 2013r. = 100%	100	92.4	87.3	84	92.2	93.6	95.5	89.5
VAT from agriculture (million BGN)	3313.8	3132.5	3039.1	2961.2	3760.3	3663.4	3727.2	3419.5
Change 2013r. = 100%	100	94.5	91.7	89.4	113.5	110.5	112.5	103.2
BP from vegetables and potatoes (million BGN)	547.3	254.20	266.90	272.8	463.0	521.7	476.5	446.9
Change 2013r. = 100%	100	46.4	48.8	49.8	84.6	95.3	87.1	81.7
Relative share of vegetables in BP of Bulgarian agriculture (%)	6.28	3.16	3.51	3.73	5.76	6.40	5.73	5.73
Relative share of vegetables in BP from crop production (%)	10.35	5.11	5.44	5.51	8.44	9.25	8.27	8.57
Cultivable land in hectares	3462117	3469388	3493688	3480991	3473825	3463370	3461615	3477514
Open areas of vegetables (ha)	39060	30131	43914	58069	39998	41846	37574	33704
Rel. share of vegetable area of arable land (%)	1.13	0.87	1.26	1.67	1.15	1.21	1.09	0.97

Source: Agrarian reports Ministry of Agriculture "Agrostatistics", Own calculations.

The data in Table 2 shows that the gross output from agriculture at producer prices for the period 2013-2020 was the highest in 2013 – BGN 8,713.8 million, and the lowest in the middle of the period – 2016 (BGN 7319.7 million). The trend is decreasing up until 2016, after which a slight increase can be observed. This trend continues in the following years, however, in 2020 the gross output shrinks to BGN 7,798 million. Thus, 2020 turns out to be the third year (after 2016 and 2015) with the lowest values for this indicator. The change compared to the base year of 2013 is negative. Throughout the period, the values varied between 84% and 96%.

The gross added value from agriculture for the analyzed period was the highest in 2017 at BGN 3,760.3 million, and the lowest in 2016 at BGN 2,961.2 million. The trend, as with gross production at producer prices, is decreasing up until 2016, then an increase, which is maintained in the following years, is observed. In 2020, the gross added value was lower by about BGN 300 thousand compared to the previous year of 2019 (BGN 3,727.2 million). The change compared to the base year of 2013 is negative up until 2016, after which it increases and is in the range between 103% and 113%.

During the period, the gross production of vegetables (including potatoes) did not exceed BGN 550 million per year. In the initial year of 2013, the largest value of BGN 547.3 million was observed. In the following three years the indicator is significantly lower, nearly 50%, respectively BGN 254.20 million; BGN 266.90 million, and BGN 272.8 million. In 2017, there was a significant increase in the production of vegetables compared to the previous year, but the value was smaller than the one at the beginning of the analyzed period (BGN 463 million). An upward trend follows, which slightly decreases at the end of the period and the gross production of vegetables amounts to BGN 446.9 million. The change compared to the base year of 2013 is negative, increasing in the last few years, but remaining around 80% compared to 2013.

The relative share of vegetables in the gross production from agriculture in the period 2013-2020 is in the range of 3% to 7%. In 2013 the relative share was 6.28% and in the following three years it decreased by 3.16%, 3.51% and 3.73% respectively. Since 2017 the indicator has significantly increased compared to the previous years, and this trend is maintained until the end of the considered period. The highest relative share of vegetables in the gross production from agriculture was reported in 2018 – 6.4%.

The relative share of vegetables in the gross crop production in the period 2013-2020 is in the range between 5% and 10%. In 2013 the relative share was the highest at 10.35%, in the next three years, it decreased by almost half and was around 5%. Since 2017, the indicator has significantly increased compared to the previous years and reached 9% in 2018. The increasing trend of the relative share of vegetables in the gross crop production is maintained until the end of the analyzed period. However, the value of the indicator at the end of the period (2020) is nearly 2% lower than at the beginning (2013).

The relative share of gross vegetable production from cultivated land in the period 2013 – 2020 is in the range of 0.8% to 1.7%. In 2013 the relative share was 1.13%. In the following year, the lowest value of the indicator was recorded at 0.87%. Since 2015 the trend has been increasing, with the largest relative share in 2016 at 1.67%. In 2020 the relative share of the area of vegetables from cultivated land was 0.97, making it the second year (after 2014) with the lowest value of the indicator for the period.

The unfavourable trend in vegetable production has and will continue to have a negative impact on the total amount of gross production created in agriculture, since the production per unit area of vegetables is many times higher than the production per unit area of grains, which predominates in the agricultural sector of the country.

Table 3

Dynamics of uncovered cultivated areas (ha) of vegetable crops in 2013-2020

Basic crop groups/Years	2013	2014	2015	2016	2017	2018	2019	2020	Change 2020:2013, %
Fruit vegetables	14892	12112	18067	28543	19232	17821	19393	15751	105.77
Legumes	5579	2439	1452	2582	982	667	1153	1092	19.57
Brassica Vegetables	-	-	1945	3020	1848	2125	2013	1677	-
Leafy vegetables	3725	3926	1039	1131	606	632	695	795	21.34
Tuber and onion vegetables	1987	1736	1869	2270	3869	5779	4326	3712	186.81
Potatoes	12765	10200	11017	8376	12806	14096	9291	9946	77.92
Strawberries	633	672	756	670	655	726	703	731	115.48
Other vegetables	443	20	-	-	-	-	-	-	-
Total	39060	30131	43914	58069	39998	41846	37574	33704	86.29

Source: Agrarian reports Ministry of Agriculture "Agrostatistics".

Table 3 presents the dynamics of uncovered areas of vegetable crops for the period 2013-2020. Vegetable crops are divided into seven main groups, the largest of which is Fruit vegetables, which includes: tomatoes; cucumbers; peppers; pumpkins; watermelons; eggplants, etc. They occupy the most hectares of land in each considered year of the period, with the largest amount in 2016 – 28,543 ha. In the last analyzed year, the areas with fruit and vegetables were 859 ha more than at the beginning of the period in 2013. The change of the uncovered areas with Fruit and vegetables for 2020 compared to 2013 is 105.77%. In 2014, the area shrank to 12,112 ha, the lowest value of the indicator for the period.

The second largest open area is occupied by the potato crop. For the studied period, the largest areas were in 2018 – 14,096 ha, and the smallest – in 2016 – 8,376 ha. From the beginning of the period, a decrease in the harvested areas was observed until 2016. The following year (2017) recorded significant growth and the areas with potatoes increased to 12806 ha. This trend was maintained in the year after as well. In the last two analyzed years, the areas with potatoes shrank to around 9,000 ha. In 2020 the areas with potatoes decreased by 2819 ha compared to 2013.

Beans, peas, and legumes fall into the Legumes group, which occupied between 667 ha to 5579 of uncovered land in the period 2013-2020. In 2013, the areas with crops in this group were the largest – 5579 ha, in the following years, a significant reduction was observed and 2017 and 2018 were the years with the lowest value of the indicator, 982 ha and 667 ha, respectively. At the end of the period, an increase to about 1000 ha is reported, but this is five times less compared to the beginning of the researched period (2013), or they are 19.57% of the areas in 2013.

Leafy greens include lettuces, artichokes, spinach, leeks, chives, and others. Until 2014, cabbage also fell into this group, but since 2015 another group of vegetables from the Brassica genus has been added and cabbage has been moved into it. This may explain the lack of data for 2013 and 2014 for vegetables from the Brassica varieties, and the subsequent decrease in land cultivated with Leafy vegetables from 2015 to the end of the analyzed period.

The lowest values of the indicator were in 2017 – 606 ha. In 2020 an increasing trend is observed, but compared to 2013, the uncovered areas with leafy vegetables are 21%.

Brassica vegetables include: cabbage, cauliflower, broccoli and brussels sprouts. In 2015, the uncovered areas were 1945 ha, and in 2020 – 1677 ha. A decrease of 268 ha was reported in 2020, which also recorded the smallest size of cultivated land. The largest cultivated area for this group was recorded in 2016 at 3020 ha.

The group of tuberous and bulbous vegetables includes: onions, carrots, garlic and others. In 2013, the uncovered cultivated areas were 1987 ha, and in 2020 – 3712 ha, an increase of 1725 ha was reported. The largest size was recorded in 2018. – 5779 ha, gradually decreasing in the following years. Tubers and onion vegetables saw the most significant increase in the uncovered cultivated land of all vegetable groups. The other two groups that reported an increase were Fruit, vegetables and Strawberries. The rest of the groups shrank their harvested areas during the analyzed period.

The uncovered cultivated areas with strawberries for the period 2013-2014 were in the range between 633 ha and 756 ha. In 2013, the areas with strawberries were the smallest – 633 ha. In the following years, an increase was observed. At the end of the period, the areas were 731 ha, which is 98 ha more compared to the beginning of the research period (2013), or they are 115.48% in comparison to 2013.

The total uncovered cultivated areas of vegetable crops for the period 2013-2020 are in the range between 30,000 ha and 60,000 ha. If we compare the end of the period (2020) with the beginning (2013), we can see that the cultivated areas are 86.29% or the trend is decreasing. The year with the largest size of the areas was 2016 – 58069 ha, and the smallest size was reported in 2014 – 30131 ha.

Table 4

Average yields of main vegetable crops by year (kg/ha)

Year/Crop	Tomatoes	Peppers	Cucumbers	Onions	Cabbage	Potatoes
2007	19 710	14 400	16 220	8 400	22 060	13 320
2013	23 871	14 734	13 914	10 407	23 694	14 610
2014	26 603	16 340	19 661	11 920	21 779	12 999
2015	26 635	16 936	13 689	8 311	22 668	14 965
2016	25 555	19 050	10 668	10 931	26 265	15 150
2017	23 434	16 031	16 220	11 298	24 715	17 782
2018	21 815	17 083	15 353	11 374	24 090	18 558
2019	20 568	18 726	18 809	11 953	26 242	21 244
2020	26 881	18 221	17 045	10 856	21 959	19 338
Change 2020:2007, %	136.4	126.5	105.1	129.2	99.5	145.2
Change 2020:2013, %	112.6	123.7	122.5	104.3	92.7	132.4

Source: Agrarian reports Ministry of Agriculture “Agrostatistics”.

Table 4 represents the average yields for the main vegetable crops by year for the period 2013-2020. The selected vegetables are traditionally consumed in the country and their production is important for the national food supply. A comparison was made between the last analyzed year (2020), the first year of Bulgaria’s membership in the EU (2007), and the initial year of the study (2013) in terms of average vegetable yields. The change for all main

vegetables is positive compared to 2007, with the exception of cabbage, where an insignificant decrease of 101 kg/ha is reported. The biggest change is recorded for the average yields of potatoes – 145.2% or 19338 kg/ha in 2020 compared to 13320 kg/ha in 2007. In second place is the average yield for tomatoes – 136.4% or 26881 kg/ha for 2020 compared to 19710 kg/ha for 2007, followed by onions – 129.2%, pepper – 126.5% and cucumbers – 105.1%.

The change reported of average yields for all main vegetables, compared to 2007 and 2013, is positive, with the exception again of cabbage, where a decrease of 1735 kg/ha was observed. The largest change in the average yields was reported for potatoe crops – 132.4% or 19338 kg/ha in 2020 compared to 14610 kg/ha in 2013. In second place is the average yield of pepper with a change of 123.7% or 18221 kg/ha for 2020 compared to 14734 kg/ha in 2013, followed by cucumbers – 122.5%, tomatoes – 112.6% and onions – 104.3%.

The average yield for the tomatoe crops for the studied period increased until 2015 (26635 kg/ha), in the following years, the trend decreased. In 2020, the value of the indicator increased by about 6000 kg/ha compared to 2019. In all analyzed years, the average yield of tomatoes ranged from 20000 kg/ha to 27000 kg/ha.

The average yield for peppers at the beginning of the period was 14734 kg/ha and increased every year up to and including 2016 (19050 kg/ha), which was also the year with the highest yields for the crop. In 2017, there was a decrease of 3019 kg/ha compared to the previous year, however, the average yield gradually increased in the following years by over 1000 kg/ha per year. For the last year of the analyzed period, an insignificant decrease in the average yield of pepper was reported at 18221 kg/ha.

The average yield for cucumbers for the period 2013-2020 was in the range of 10000 kg/ha to 20000 kg/ha, sharp changes in the values of the indicator are observed every year. In 2014, an increase of over 5,000 kg/ha compared to 2013 was reported, and in the following year, 2015, yields fell again and reached those from the beginning of the period. The decrease continued in 2016, but in 2017 a significant increase was reported and average yields reached 16220 kg/ha. In 2018, there was another decrease (15353 kg/ha), and in 2019 – an increase (18809 kg/ha). In the last year of the period, the average yield for cucumbers decreased again to 17045 kg/ha.

The average yield for onions during the studied period did not change significantly. The values were preserved in all years and ranged from 10400 kg/ha to 11960 kg/ha, except for 2015, when they sharply decreased and reached the lowest value for the analyzed period – 8311 kg/ha. The highest yield was reported in 2014 and 2019 (11920 kg/ha and 11953 kg/ha, respectively).

The average yield for cabbage was the highest in 2016 and 2019, 26265 kg/ha and 26242kg/ha respectively. The values are the lowest in 2014 and 2020, 1779 kg/ha and 21959 kg/ha, respectively. Cabbage and tomatoes had the highest average yields of all the selected for the research vegetable crops. The values of the indicator varied between 21000 kg/ha and 26500 kg/ha for the period 2013-2020.

The average yield for potatoes for the analyzed period was in the range between 12000 kg/ha and 21300 kg/ha. At the beginning of the period, a decrease was recorded and in 2014, the

yield shrank to 12999 kg/ha, which is the lowest value for all the years considered in the research. After 2014 the trend was positive; yields gradually increased up until 2019, when they reached 21244 kg/ha, which is the highest value of the indicator for the period 2013-2020. In 2020, the average yield for potatoes decreased by 1906 kg/ha compared to 2019 and reached 19338 kg/ha.

Table 5

Dynamics of total vegetable production from uncovered areas by selected vegetable crops by year (thousand tons)

Year	Total Vegetables	Tomatoes	Peppers	Cucumbers	Onions	Cabbage	Potatoes
2013	547 280	77 390	59 452	8 237	12 748	45 090	186 499
2014	431 545	80 448	46 994	6 783	13 327	42 316	132 594
2015	516 164	71 541	65 039	4 230	8 926	42 411	164 866
2016	699 151	92 330	68 143	2 635	14 921	75 512	126 897
2017	685 836	102 548	52 455	4 574	23 499	41 817	227 713
2018	710 172	85 232	48 755	7 216	41 798	47 240	261 594
2019	651 308	95 722	57 263	26 502	31 376	46 449	197 382
2020	559 030	69 515	47 319	8 352	28 443	32 060	192 331
Change 2020:2013, %	102.1	89.8	79.6	101.4	223.1	71.1	103.1

Source: Agrarian reports Ministry of Agriculture "Agrostatistics".

Table 5 represents the dynamics of the total vegetable production as well as the produce from uncovered cultivated land of selected vegetable crops for the period 2013-2020. The data shows that the total vegetable production at the end of the period has increased compared to the beginning, the change from 2013 to 2020 was 102.1%, or 11,750 tons. 2018 was the year with the largest volume of vegetable production – 710,172 tons. The lowest values of the indicator were reported in 2014 – 431,545t. A decrease was observed until 2014, after which the total production of vegetables gradually increased for four consecutive years and reached its maximum in 2018. By the end of the analyzed period, the trend was decreasing and in the last year (2020), the production amounted to 559,030 tons.

Changes in open area production of selected vegetable crops for the period 2013-2020 showed that onions reported the largest growth – 223.1%, meaning that the production area for onions more than doubled in 2020 compared to 2013, the difference nearing 15695t. Cucumbers and potatoes also recorded a positive trend in the last year compared to the beginning of the research period. The change in the production from open areas with potatoes was 103.1% or 5832 tons more in 2020 compared to 2013. The production of cucumbers increased insignificantly in 2020 compared to 2013 – 101.4% or 115 tons more. The production from open areas of vegetable crops: tomatoes, pepper and cabbage for 2020 had a negative change compared to 2013. For tomatoes, the change was 89.8% or 7875 tons less in 2020 compared to 2013. The values of the indicator for pepper were 59452 tons in 2013 and 47319 tons in 2020, the change is 79.6% or 12133 tons less. In the production of cabbage from open areas, the most significant decrease was reported in 2020 compared to 2013, the change was 71.1% or 13030 tons less cabbage produced.

Potatoes have the highest production from uncovered cultivated areas in all the years analyzed in the research. At the beginning of the period, there was a drop to 132,594 tons

(2014), and in 2015, there was an increase in production by about 30,000 tons. The next year (2016), the value of the indicator significantly decreased and reached 126,897 tons, but in 2017 the largest increase for the period was reported at 100,816 tons and production from open areas reached 227,713 tons. The increasing trend was maintained in 2018 to a lesser degree, in the last two years, a gradual decrease was reported, and in 2020, the production of potatoes reached 192331 tons.

The quantities of tomatoes produced from open areas for the period 2013-2020 are in the range between 69,000 tons and 103,000 tons, the most produce was reported in 2017 – 102,548 tons, and the smallest amount was in the last year of the study (2020) – 69,515 tons. From the beginning of the period to 2017, an increase in the produced quantities was reported, with the exception of 2015, when the production fell to 71541 tons. In the second half of the studied period, the trend was negative, the produced quantities of tomatoes from open areas decreased, and in 2020 the smallest volume for the period was recorded.

The produced quantities of pepper from open areas for the period 2013-2020 were between 46000 tons and 69000 tons. The largest quantities were in 2016 – 68143 tons, and in 2014 the lowest values of the indicator for the period were recorded at 46994 tons. The trend at the beginning of the studied period was upward and continued until 2016, with the exception of 2014, when the volume of production was the lowest. After 2016, a decrease was observed, which continued until the end of the period, and in 2019, a momentary increase of pepper production of 8,508 tons was recorded, compared to the previous 2018 year. For 2020, the production of pepper amounted to 47,319 tons.

During the analyzed period, the amount of cabbage produced from open areas was about 40,000 tons, but in 2016, a significant increase in production by 33,101 tons was observed. 2016 was also the year with the highest value of the indicator for the period – 75512 tons. A sharp decline in the volume of cabbage produced followed, and the negative trend continued until the end of the researched period when the produced quantities of cabbage from open areas amounted to 32,060 tons, the lowest value for the reviewed years.

The volume of cucumbers produced from open areas for 2013-2020 decreased by about 2000 tons every year from the beginning of the period until 2016, when the volume of production reached its lowest value at 2635 tons. Since 2017, the trend has been in a positive direction and the volume grew, and in 2019, it reached 26502 tons. However, in 2020 the production of cucumbers shrunk to 8352 tons.

The volume of onions produced from open areas for the period 2013-2020 was in the range between 8000 tons and 42000 tons, the most produce was harvested in 2018 – 41798 tons, and the least in 2015 – 8,926 items. From the beginning of the period to 2018, an increase in the onions produce was reported, with the exception of 2015, when production fell by 4,401 units compared to the previous year, 2013. In the last two years of the research period, the trend was negative, the volume of onions produced from open areas was decreasing and in 2020, it amounted to 28443 tons.

3. Conclusion

Bulgaria is a traditional producer and exporter of vegetables, but over the past thirty years, vegetable production has constantly been shrinking in volume and becoming uncompetitive both on the European and world markets. In the case of vegetable crops, negative trends are forming. Cultivated land and production are decreasing, and in individual planning areas, some types of vegetables are no longer being produced. The acreage and production curve is extremely steep and such a trend continuing into the future would lead to further shrinking of production to economically insignificant volumes, onions and leafy greens could disappear as cultivated crops. These trends do not correspond to the potential opportunities and traditions in vegetable production in Bulgaria, they are not a reflection of the world and European markets, which increase in vegetable production.

Vegetable production in Bulgaria has a decreasing role in the gross production of the agricultural sector, in the structure of the total agricultural export, and in the satisfaction of the national market. Vegetable production lags behind consumer demand and the result is an ever-increasing need for imported vegetables. The negative trend is also exacerbated by the rising import prices, which means that more expensive vegetables are offered on the domestic market and the Bulgarian consumer has to spend more from their budget in order to buy the same amount of vegetables. Rising imports are a stark indicator of the depth of the problems in this sector of Bulgarian agriculture.

The supply of vegetables on the domestic market is determined by the level of production. The drastic contraction of basic traditional produce such as tomatoes, pepper and onions, which for decades were the main export for the county, to the extent that they cannot satisfy even half of the consumer demand in the domestic market, shows that the Bulgarian vegetable industry has deep structural and strategic problems that cannot be solved by means of foreign trade policy.

Many factors of production have seen a steep decline, those include: aging of the population in vegetable-producing areas; low degree of organization and specialization of production; predominance of numerous small vegetable producers; destruction of hydro-melioration fund (expensive water, insufficient irrigation equipment); lack of financial means for technological modernization in the sector. The most significant problem which affects vegetable production is the inability of small producers to agree on higher purchase prices. Keeping prices at a very low level makes production loss-making.

The main guidelines for the improvement and sustainable development of vegetable production in Bulgaria are:

- accelerated creation of producers' organizations and their transformation into a key factor for consolidating production;
- increasing labour productivity and competitiveness of the sector;
- increasing the average yields of vegetables. They are lower both compared to the average yields obtained in the main vegetable-producing countries in the EU and to the levels

reached for the country in past periods. Low average yields result in high unit production costs and low competitiveness;

- reduction of production costs, by optimizing the production structure, regionalization and specialization, technological renewal and innovative production;
- increasing the quality of finished products and restoring the traditional flavours of Bulgarian vegetables;
- redirection of unused financial resources from less attractive measures to measures that can be applied in vegetable production;
- more targeted use of financial resources at the regional and municipal levels.

Vegetable production occupies an important place and plays a key role in the development of Bulgarian agriculture. It is defined by the fact that vegetables are produced using the country's natural and production potential, some of which are used as raw material for the processing industry and for consumption by the population. The exposed and substantiated problems in this sector of Bulgarian agriculture lead to significant consequences: a decrease in the produced quantities, the emergence of imbalances in relation to the produced and required quantities, strengthening the role of vegetable imports to cover their shortage, disrupting the balance between supply and demand and the impact on the country's food security level. Vegetables occupy an important part in people's diet, which is why they are also important from the point of view of achieving food security in feeding the country's population.

Guidelines for the improvement and sustainable development of vegetable production can be derived in terms of: accelerated creation of producers' organizations and their transformation into a key factor for consolidating production, increasing labour productivity and the competitiveness of the sector; increasing the average yields of vegetables, which are lower not only than the main vegetable-producing countries in the EU, but also lower than the levels maintained by the country in past periods. Low average yields result in high unit production costs and low competitiveness. Solutions could include reduction of production costs, through optimization of the production structure, regionalization and specialization, technological renewal and innovative production; quality improvement, restoring the traditional tastes of Bulgarian vegetables; redirection of unused financial resources from less attractive measures to measures that can be applied in vegetable production; more targeted use of financial resources at the regional and municipal level.

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