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Production Projection of Edible Grain Legumes with Organic Status Grown in Türkiye

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Anahtar Kelimeler

Yemeklik tane baklagiller, Organik tarım, Projeksiyon

Özet

Yemeklik baklagiller tanelerinde %18-36 oranında protein bulundurdukları için insan beslenmesinde önemli bir yere sahiptir. Bu çalışmada, Tarım ve Orman Bakanlığı verilerine bağlı olarak Türkiye'de yetiştirilen organik statüdeki ve geçiş süreci statüsündeki yemeklik baklagillerin üretim projeksiyonunun belirlenmesi amaçlanmıştır. Elde edilen sonuçlara göre projeksiyon katsayısı organik statüdeki yemeklik baklagillerde sadece börülcede negatif, geçiş süreci statüsündeki yemeklik baklagillerde ise sadece fasulyeden negatif değer elde edilmiştir. En yüksek projeksiyon katsayısı organik statüdeki yemeklik baklagiller için 0.37 değeri ile mercimekten elde edilirken, geçiş süreci statüsündeki yemeklik baklagiller için 5.37 değeri ile bakladan elde edilmiştir.

Keywords

Edible grain legumes, Organic agriculture, Projection

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Abstract

Edible grain legumes have an important place in human nutrition because they contain 18-36% protein in their grains. In this study, it was aimed to determine the production projection of organic and transitional status edible legumes grown in Turkey based on the data of the Ministry of Agriculture and Forestry. According to the results obtained, the projection coefficient was negative only for cowpea in organic status edible legumes and negative only for beans in transition status edible legumes. The highest projection coefficient was obtained from lentils with a value of 0.37 for organic status edible legumes and from broad beans with a value of 5.37 for transition status edible legumes.

INTRODUCTİON

Edible grain legumes, which play an important role in human nutrition, have a significant potential in our country both in terms of cultivated area and production volume.Leguminous crops are important in human nutrition due to their protein content, which ranges from 18% to 36% in their seeds, as well as their richness in vitamins A, B, and D, and other vitamins. They also play a significant role in crop rotation and soil improvement because they fix atmospheric nitrogen into the soil through Rhizobium bacteria in their roots (Şehirali, 1988). According to the World Health Organization's records, an individual is considered to have a balanced and quality diet when they meet 60% of their daily protein needs from plant sources and 40% from animal sources (Ozaktan et al., 2023). The protein sources of Turkish cuisine, especially for low-income families, are met by edible grain legumes that can be grown in every region of our country (Adak et al., 2010). In 2023, 874.227 ha of edible grain legumes were cultivated in Türkiye (TUİK, 2023). It is aimed to meet the need for healthy food with population growth and to protect natural resources. People are turning to organic agriculture in order to protect natural resources and to provide access to clean, sustainable and healthy food (Kodaş and Er, 2012).

Organic agriculture is an agricultural system that prohibits the use of chemical fertilizers, pesticides, synthetic plant growth regulators or aims to avoid them to a large extent. It is a production system that is kept under control from the production stage to the packaging and storage stage, using crop rotation and green fertilization, biological and biotechnical control methods. In most of the definitions of organic agriculture, sustainability is prioritized, but the concept of sustainability not only includes long-term conservation of existing natural resources and increase in yield; it also includes establishing a balance between economic and ecological aspects (Demiryürek, 2011). When we look at the importance of legume plants in organic agriculture, it is evaluated in terms of providing organic matter to the soil. Legume plants are among the plants used in green fertilization due to their nitrogen binding properties. It has great importance in reducing the use of nitrogenous chemical fertilizers thanks to the nitrogen it adds to the soil (Karakurt, 2009). To summarize briefly, organic agriculture is a production model in which chemical inputs are not used and each stage from production to consumption is controlled and certified.

Legumes, which are of great importance in terms of vegetable protein intake in human nutrition, are also very important in terms of calcium, phosphorus, iron and other mineral substances (Adak et al., 2015). It is important to realize the production of edible grain legumes, which are so important in human nutrition, with organic agriculture.

In this study, the production amount of organic and transitional status edible grain legumes grown in Türkiye was estimated for the next 10 years by considering the production amount data.

MATERİAL AND METHODS

In this study, the production amount (PA) values of edible grain legumes (broad beans, peas, cowpeas, beans, chickpeas and lentils) with organic status and transition status produced in Türkiye between 2014 and 2023 were used. The material of the study consists of the values recorded by the Ministry of Agriculture and Forestry. The rates of change over the years were calculated by considering the production amounts of edible grain legumes in organic status and in transition status. Projection coefficients were obtained by averaging the rates of change (RC) and the production

amount for the next 10 years was estimated using the projection coefficient. In line with the results obtained, negative projection coefficients are interpreted as a decrease in the amount of production, while positive projection coefficients are interpreted as an increase in the amount of production (Tunç and Yılmaz, 2023).

Formula 1: Rates of changes = (2015 years PA-2014 years PA) / 2015 years PA

Formula 2: Projection coefficient = (RC1 +RC2+…….+RCn) / n

RESULTS AND DİSCUSSİON

The production amounts of edible grain legumes with organic status grown in Türkiye between 2014 and 2023 are given in Table 1. The highest production amounts of edible legumes with organic status were realized in 2018 with 112.40 tons of broad beans, in 2020 with 939.38 tons of peas, in 2014 with 34.41 tons of cowpeas, in 2020 with 1949.00 tons of beans, in 2023 with 19671.45 tons of lentils and in 2020 with 9302.16 tons of chickpeas. (Table 1).

Table 1. Production amount of edible legumes with organic status cultivated in Türkiye for the years 2014-2023 (tons)

Years	Broad bean	Peas	Cowpeas	Beans	Lentils	Chickpeas
2023	42.09	417.57	9.00	804.29	19671.45	2533.20
2022	41.62	819.58	7.96	1931.00	4275.34	3131.95
2021	49.94	565.00	8.75	1182.59	6030.35	6751.67
2020	46.32	939.38	7.96	1949.00	6223.75	9302.16
2019	42.23	648.31	18.09	1924.45	6061.96	6060.39
2018	112.40	137.20	12.20	1598.60	8040.30	6336.30
2017	36.47	227.88	27.13	1622.63	10225.56	4875.07
2016	64.40	231.90	18.10	1782.90	14110.00	3852.30
2015	28.13	278.09	16.78	1064.41	7294.76	2011.35
2014	48.18	331.46	34.41	899.74	9314.47	3495.69

Table 2 shows the rates of change and projection coefficients for organic status edible grain legumes. Considering the calculated projection coefficients, the highest value was obtained from lentil with 0.37, followed by peas, broad beans, beans and chickpeas. The projection coefficient of cowpea was negative with -0.05, the projection coefficient of broad bean, pea, bean, lentil and chickpea plants were positive. According to the projection coefficients, the production amounts for the next 10 years between 2024 and 2033 are estimated in Table 3. It is projected that the amount of beans, which was 804.29 tons in 2023, will be 816.19 tons in 2033, chickpeas, which was 2533.20 tons, will be 2548.60 tons, lentils, which was 19671.5 tons, will be 20402.07 tons, peas, which was 417.57 tons, will be 431.67 tons, broad beans, which was 42.09 tons, will be 43.00 tons and cowpeas, which was 9.00 tons, will be 8.96 tons. Berk and Uçum (2019) reported the change in chickpea production in Türkiye in the next 5 years. They used the data between 1985-2018 and predicted an increase in the amount of production between 2019-2023. Şin et al. (2023) studied on the projection estimation of agricultural mechanization level and plant protection machinery of Sakarya province. Considering the data between 2013-2022, the situation of agricultural mechanization and plant protection machinery for 10 years between 2023-2032 was evaluated. While increases were observed in some of the agricultural and plant protection machines subject to the study, an increase occurred in others. Aydoğan et al. (2015) reported the current status of dry bean production in

Türkiye and forecasts of future production. They reported that there may be a decrease in production amounts and export values for 5 years between 2015-2019, while there may be an increase in imports and domestic consumption. Şengül et al. (1999) examined the situation of cotton in the next 10 years using cotton production values. They reported the increase and decrease in cotton production amounts, export and import values between 1998 and 2009.

Table 2. Change rates and projection coefficients of organic status edible legumes cultivated in Türkiye between 2014-2023 (%)

Years	Broad bean	Pea	Cowpea	Beans	Lentil	Chickpea
2023-2022	0.01	-0.49	0.13	-0.58	3.60	-0.19
2022-2021	-0.17	0.45	-0.09	0.63	-0.29	-0.54
2021-2020	0.08	-0.40	0.10	-0.27	-0.03	-0.27
2020-2019	0.10	0.45	-0.56	0.53	0.03	0.53
2019-2018	-0.62	3.73	0.48	-0.04	-0.25	-0.04
2018-2017	2.08	-0.40	-0.55	0.30	-0.21	0.30
2017-2016	-0.43	-0.02	0.50	0.27	-0.28	0.27
2016-2015	1.29	-0.17	0.08	0.92	0.93	0.92
2015-2014	-0.42	-0.16	-0.51	-0.42	-0.22	-0.42
Projection coefficient	**0.21**	**0.33**	**-0.05**	**0.15**	**0.37**	**0.06**

Table 3. Estimates of the production amount of organic status edible legumes cultivated in Türkiye for the years 2024-2033 (tons)

Years	Broad bean	Peas	Cowpeas	Beans	Lentils	Chickpeas
2024	42.18	418.96	9.00	805.47	19743.32	2534.74
2025	42.27	420.35	8.99	806.66	19815.45	2536.27
2026	42.36	421.75	8.99	807.84	19887.84	2537.81
2027	42.45	423.15	8.98	809.03	19960.50	2539.35
2028	42.54	424.56	8.98	810.22	20033.43	2540.89
2029	42.63	425.97	8.97	811.41	20106.62	2542.43
2030	42.72	427.39	8.97	812.60	20180.08	2543.97
2031	42.81	428.81	8.97	813.79	20253.80	2545.52
2032	42.90	430.24	8.96	814.99	20327.80	2547.06
2033	43.00	431.67	8.96	816.19	20402.07	2548.60

Table 4 shows the production amounts of edible grain legumes grown in Türkiye in the 10-year period between 2014 and 2023. In 2023, lentil has the highest production amount among the edible grain legumes produced with a value of 13319.48 tons. This value was followed by chickpea with 3802.9 tons. There have been changes in production amounts over the years and there has not been a steady increase or decrease.

Table 4. Production amount of edible grain legumes in transition status cultivated in Türkiye for the years 2014-2023 (tons)

Years	Broad bean	Peas	Cowpeas	Beans	Lentils	Chickpeas
2023	5.00	142.47	2.43	367.20	13319.48	3802.89
2022	111.49	214.13	3.79	298.00	1699.21	1164.00
2021	36.90	534.90	7.69	751.00	7103.08	2677.45
2020	8.86	200.85	6.92	652.00	14883.56	12039.51
2019	110.27	343.33	3.47	981.95	7669.37	8104.92
2018	12.40	394.60	5.40	2073.00	5802.30	4482.40
2017	115.21	32.46	3.65	1536.94	24084.72	2358.55
2016	3.00	85.00	2.00	989.00	1941.00	2008.00
2015	17.37	9.81	4.18	747.38	3146.16	1508.81
2014	7.09	18.82	1.51	925.37	1044.99	1556.60

The rates of change were calculated by using the production amount values of edible grain legumes grown in our country in transition status and projection coefficients were obtained with these values. According to the values in Table 5. the projection coefficients of other edible grain legumes except beans gave positive results. The highest projection coefficient belongs to broad bean with a value of 5.37, this value was followed by peas with 2.12, the negative projection coefficient was obtained from beans with a value of -0.01, beans with a negative projection coefficient are projected to decrease in production in the next 10 years.

Table 5. Change rates and projection coefficients between 2014-2023 for edible legumes in transition status cultivated in Türkiye (%)

Years	Broad bean	Pea	Cowpea	Beans	Lentil	Chickpea
2023-2022	-0.96	-0.33	-0.36	0.23	6.84	2.27
2022-2021	2.02	-0.60	-0.51	-0.60	-0.76	-0.57
2021-2020	3.16	1.66	0.11	0.15	-0.52	-0.78
2020-2019	-0.92	-0.41	0.99	-0.34	0.94	0.49
2019-2018	7.89	-0.13	-0.36	-0.53	0.32	0.81
2018-2017	-0.89	11.16	0.48	0.35	-0.76	0.90
2017-2016	37.40	-0.62	0.83	0.55	11.41	0.17
2016-2015	-0.83	7.66	-0.52	0.32	-0.38	0.33
2015-2014	1.45	-0.48	1.77	-0.19	2.01	-0.03
Projection coefficient	**5.37**	**1.99**	**0.27**	**-0.01**	**2.12**	**0.40**

Table 6 shows the 10 year production forecasts for the edible grain legumes grown in Türkiye in the transition period between 2024 and 2033. Broad bean showed the highest increase in production in 2024, broad beans were estimated at 5.27 tons, while this value increased to 8.44 tons in 2033, when the values in terms of production amount are analyzed, broad bean plant is followed by lentil and pea plants. Bars et

al. (2018) studied hazelnut production projection in Turkey. They evaluated the current situation of hazelnut production in Turkey and the production amount in the next 5 years. While the amount of hazelnut production in 2018 was 639 thousand tons, they estimated that it will be 648 thousand tons in 2022. Uçum (2016) studied the amount of soybean production and import projection in Turkey. It estimated the current situation of soybean production and its situation in the next 5 years. He predicted that there would be an increase in the amount of soybean production in the next 5 years.

Table 6. Estimates of the production amount of edible legumes in transition status cultivated in Türkiye for the years 2024-2033 (ton)

Years	Broad bean	Pea	Cowpea	Beans	Lentil	Chickpea
2024	5.27	145.30	2.44	367.18	13602.07	3818.07
2025	5.55	148.20	2.44	367.16	13890.65	3833.32
2026	5.85	151.14	2.45	367.14	14185.36	3848.62
2027	6.16	154.15	2.46	367.12	14486.31	3863.98
2028	6.49	157.22	2.46	367.10	14793.66	3879.41
2029	6.84	160.35	2.47	367.08	15107.52	3894.90
2030	7.21	163.54	2.48	367.06	15428.04	3910.45
2031	7.60	166.79	2.48	367.04	15755.37	3926.06
2032	8.01	170.11	2.49	367.02	16089.63	3.941.73
2033	8.44	173.50	2.50	367.00	16430.99	3957.47

CONCLUSİON

Projection coefficients were calculated for the production amounts of edible grain legumes in organic and transition status in Türkiye. The 10 year production amount between 2024-2033 was estimated by ignoring the effects of changing climatic conditions on the plant. According to the projection coefficients of edible grain legumes in organic agriculture status, it is estimated that the production amount of cowpea may decrease, while the production amounts of beans, chickpeas, lentils, peas and broad beans may increase.

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