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Edible Chickpea (*Cicer arietinum* L.) Variety "ISMETBEY 01"

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ABSTRACT

As a result of the chickpea breeding studies carried out at the Eastern Mediterranean Agricultural Research Institute Directorate, Adana location, the variety was developed and submitted for registration; in the registration trials, yield, anthracnose blight/tolerance, quality values and as a result, it qualified to be a variety and was registered in 2024 with the name "Ismetbey 01".

As a result of chickpea registration yield trials established in different regions of Türkiye, the average yield of Ismetbey 01 variety was 275,1 kg/da, while the highest yield value was 414,7 kg/da grain yield. According to the results of the experiment, flowering period of the varieties was 63-152 days, plant height was 40-70 cm, and hundred grain weight was determined in the range of 30,7-48,6 g. In terms of technological characteristics, protein ratio was determined in the range of 22,3-25,4%.

Gradual seed production of our Ismetbey 01 edible chickpea variety; which was registered in 2024, will be planted as of 2025 and will be offered to our farmers.

Keywords: Edible chickpea, yield, quality

Introduction

Chickpea (*Cicer arietinum* L.), self-fertilized, diploid (2n=2x=16) chromosome, is considered an important protein source and food crop in the world and in Türkiye. Among edible grain legumes, chickpea is the second most resistant to drought and low temperature after lentil. It is not very selective in terms of soil requirements. It is drought resistant thanks to its small vegetative parts, short development period and taproot system. The importance of chickpea plant in crop rotation increases the importance of its ability to utilize the free nitrogen of the air with *Rhizobium* bacteria in its roots. Chickpea plays an important role in promoting sustainable agriculture by maintaining soil fertility through biological nitrogen fixation together with symbiotic *rhizobium* in root nodules. Soil is the foundation of crop production. Without soil, neither food can be produced on a large scale nor livestock can be fed. Because soil is finite, it is a precious resource that requires special care from farmers. Many of today's soil and crop management systems are not sustainable. Sound knowledge of soil health and quality is essential for agricultural sustainability.

The chickpea plant is also indispensable for its contribution to the elimination of nutritional deficiencies, in addition to its protein richness. Chickpea is a very important source of protein. Therefore, in countries where animal protein sources are inadequate and expensive, chickpea is an edible grain legume plant of great importance as a cheap protein source for a healthy and balanced diet. It is inevitable to supply the food deficit in the world and in our country from different sources. Therefore, in countries where animal protein sources are inadequate and expensive, chickpea is an edible grain legume plant of great importance as a cheap protein source for a healthy and balanced diet. It is inevitable to supply the food deficit in the world and in our country from different sources. Chickpea is a protein and vitamin-rich edible grain legume plant that contains 18-31%

vegetable protein in its grain, as well as important essential amino acids such as leucine, alanine, lysine, isoleucine, methionine, tryptophan, valine, which are the basic building blocks of the human body, elements such as K, P, Ca, Mg, S, Fe, Mn and vitamins such as A, B and C.

The data for chickpea in Türkiye for 2022 show a cultivation area of 456.480 ha, a production of 580.000 tons, and a grain yield of 127.00 kg/da per unit area (FAO, 2024). Chickpea is grown as a winter crop in the Mediterranean and Southeastern Anatolia regions. Chickpea plants to be grown as winter crops should be tolerant/resistant to Ascochyta blight disease. The most important biotic factor limiting the winter cultivation and yield of chickpea is *Ascochyta rabiei* (Pass) Labr, which causes anthracnose disease. Anthracnose is a fungal disease. The development and rate of the disease varies according to climatic conditions; it occurs mostly in rainy, hot weather with high relative humidity. Especially rain is an important factor in the spread of the disease. For this reason, it is very important that varieties are tolerant/resistant to diseases and pests in breeding.

Our aim in breeding studies is to determine high-yielding, high market value, good quality, anthracnose tolerant/resistant varieties or variety candidates of chickpea varieties. Our Ismetbey 01 chickpea variety is an edible grain legume chickpea variety registered for this purpose.

Materials and Methods

Our material sources in our edible grain legume breeding studies; We provide our materials from material sharing within the scope of the national project, ICARDA material exchange programs, new variations created from our own hybridization programs or local varieties.

Ismetbey 01 chickpea variety is also a variety developed by selection method. Ismetbey 01 chickpea (*Cicer aritinum* L.) variety was registered by the Eastern Mediterranean Agricultural Research Institute in 2024, suitable for winter cultivation in the Mediterranean, Aegean and Southeastern Regions and summer cultivation in other regions. Ismetbey 01 edible chickpea variety was bred from ICARDA origin (FLIP 09 51C) materials by using Introduction breeding method from breeding methods; in 2021 and was registered with the variety name “Ismetbey 01” in 2024 and offered to the service of farmers.

Results and Discussion

Grain yield is the most important breeding objective in edible grain legumes as in other cultivated plants; in addition, grain size is also a highly demanded trait in chickpea breeding. However, due to the negative correlation between grain yield and grain size and between grain size and Ascochyta blight, the optimum grain size should be determined very carefully according to the regional conditions (Mart et al., 2023).

As a result of the two-year multi-location registration trials carried out, the findings obtained with the “Ismetbey 01” chickpea variety were determined by the Seed Registration Agency. Biological characteristics of Ismetbey 01 chickpea variety vary between 63-152 days for flowering and 119-193 days for physiological maturity. The cultivation method is suitable for winter cultivation. Morphological characteristics; plant height is 40-70 cm, first pod height is 23-38 cm, plant growth form has shown development from semi-erect to upright; it is a variety suitable for machine harvesting. Plant grain characteristics 100 grain weight 30,7-48,6 g, grain color light beige, grain shape angular. Technological characteristics of Ismetbey 01 chickpea variety were determined as water absorption capacity 0,44-0,54 g/grain; swelling capacity 0,42-0,51 ml/grain; water absorption index 1,08-1,33%; swelling index 2,38-2,75%; sieve values 11,0-45,6% for 9 mm sieve; 26,7-47,9% for 8 mm sieve; protein ratio 22,3-25,4% (Mart et al., 2023).

Grain yield value of Ismetbey 01 chickpea variety was 275,1 kg/da on average, the highest yield value was 414,7 kg/da and it was determined that it was tolerant to Anthracnose disease. Cooking time was determined between 40-45 minutes. The registration trial results for 2022 and 2023 (Tables 1-2-3) were taken from the report of 2024 winter sowing chickpea variety registration report of the Variety Registration and Seed Certification Center (Mart et al.,2020; Mart et al., 2020; Mart et al., 2021).

Conclusions

Improving chickpea agriculture in Türkiye through chickpea breeding studies, increasing cultivation areas, narrowing fallow areas by introducing chickpea into fallow areas, supporting sustainable agriculture by introducing it into crop rotation are important for the country’s agriculture future.

The introduction of new registered varieties such as Ismetbey 01 suitable for winter and spring cultivation, high yielding, suitable for machine harvesting, high quality, tolerant/resistant to diseases and pests, with high market value, will carry chickpea agriculture forward.

Figure 1. ISMETBEY 01 Chickpeas (*Cicer arietinum* L.) (Original)

Registration year	2024	
Place and year of breeding	Adana - 2021	
The organization that owns the variety	The Eastern Mediterranean Agricultural Research Institute Directorate– Adana/Türkiye	
Breeding organization	Eastern Mediterranean Agricultural Research Institute Directorate	
Breeding method	induction	
Biological properties	Number of days to flowering Number of days to physiological death	63-152 days 119-193 days
Morphological features	Plant height (cm) First pod height (cm) plant growth form Cultivation method	40-70 23-38 Semi vertical to flat winter sowing
Grain properties	Hundred seed weight(g) grain color grain shape	30.7-48.6 Beige (light) Angular
Technological features	Water absorption capacity (g/ grain) Swelling capacity (ml/grain) Water absorption index (%) Swelling index (%) Cooking time (min.) Protein rate (%) Sieve values (%)	0.44-0.54 0.42-0.51 1,08-1.33 2.38-2.75 40-45 22.3-25.4 9 mm---- 11.0-45.6 8 mm-----26,7-47.9
Agricultural properties	In registration trials; Average yield (kg/da) Highest yield (kg/da)	275.1 kg/da 414.7 kg/da
Places where registration trials are carried out	Diyarbakır, Adana, Manisa, Şanlıurfa, Kahramanmaraş	

Table 1. Yield Results of 2022 Winter Sowing Chickpea Agricultural Values Measurement Trials (kg/da).

Varieties	Manisa		K.Maraş		Adana		Şanlıurfa		Diyarbakır		Average	
1- Aksu (st)	199,5	e	118,6	a	367,9	ab	274,0	ab	128,8	c	217,8	bc
2- Arda (st)	303,8	ab	87,6	b	349,7	bc	233,1	bcd	166,8	a	228,2	b
3- Sezgin (st)	217,0	de	55,3	d	324,1	bc	241,5	bcd	134,5	c	194,5	de
4- Hasanbey (st)	219,8	de	57,6	d	289,0	c	217,3	cd	136,3	bc	184,0	e
5- Azkan (st)	260,0	bcd	77,0	bc	299,4	c	188,2	d	127,5	c	190,4	de
6- Şahrud	273,0	abc	65,3	cd	347,2	bc	300,3	a	113,8	c	219,9	bc
7- Frikya	286,5	ab	63,2	cd	299,5	c	238,2	bcd	131,3	c	203,7	cde
8- Adana 1	235,3	cde	52,1	d	351,2	abc	249,6	abc	158,8	ab	209,4	bcd
9- Adana 2	292,0	ab	52,7	d	364,8	ab	257,8	abc	124,5	c	218,4	bc
10- Adana 3	317,5	a	65,7	cd	414,7	a	299,0	a	174,3	a	254,2	a
F	*		**		*		**		**		**	
CV (%)	11,8		16,2		12,9		15,6		11,1		15,9	
LSD	44,6		16,4		64,0		56,5		22,6		21,0	

*= Significant at the 0.05 level, **= Significant at the 0.01 level.

Note 1: Table 1 values are taken from Variety Registration and Seed Certification Center Directorate, 2024 winter sowing chickpea variety registration report (Anonymous, 2024).

Note 2: Adana 3 line was registered as Ismetbey 01 chickpea variety in 2024.

Table 2. Yield Results of 2023 Winter Sowing Chickpea Agricultural Values Measurement Trials (kg/da).

Varieties	Manisa		Adana		Şanlıurfa		Diyarbakır		Average	
1- Aksu (st)	237,4	ab	277,7	249,9	ab	363,9	bcd	282,2	ab
2- Arda (st)	181,7	d	308,9	181,7	e	359,0	cd	257,8	cd
3- Sezgin (st)	222,8	bc	283,2	230,8	bc	343,0	d	270,0	bc
4- Hasanbey (st)	223,3	bc	253,4	233,2	bc	371,5	a-d	270,4	bc
5- Azkan (st)	199,0	cd	219,7	201,2	de	356,3	cd	244,1	d
6- Frikya	235,6	abc	265,7	235,4	bc	386,7	abc	280,8	abc
7- Adana 1	245,8	ab	296,5	246,3	ab	395,2	a	296,0	a
8- Adana 2	232,5	abc	262,7	213,7	cd	362,2	bcd	267,8	bcd
9- Adana 3	261,7	a	292,1	260,4	a	390,4	ab	301,1	a
F	**		NS	**		*		**	
CV (%)	11,5		21,1	7,4		5,7		12,5	
LSD	38,0		84,1	24,6		30,8		24,1	

*= Significant at the 0.05 level, **= Significant at the 0.01 level.

Note 1: Table 2 values are taken from Variety Registration and Seed Certification Center Directorate, 2024 winter sowing chickpea variety registration report (Anonymous, 2024).

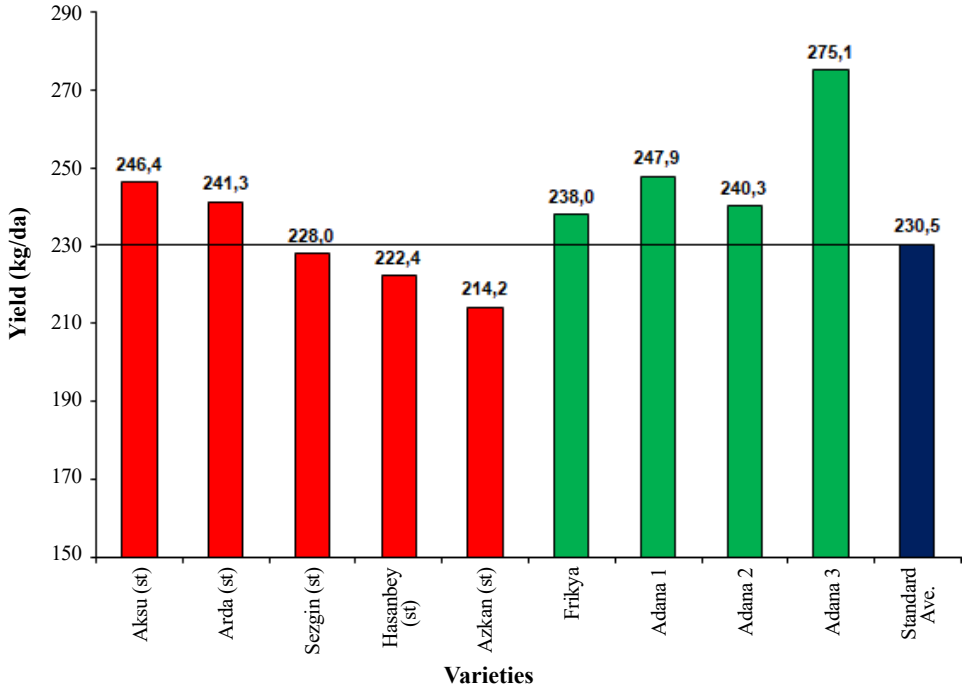
Note 2: Adana 3 line was registered as Ismetbey 01 chickpea variety in 2024.

Table 3. Yield Results of 2022-2023 Winter Sowing Chickpea Agricultural Values Measurement Trials (kg/da).

Varieties	Manisa		Adana		Şanlıurfa		Diyarbakır		K.Maraş	General Average	
	2022	2023	2022	2023	2022	2023	2022	2023	2022		
1- Aksu (st)	199,5	237,4	367,9	277,7	274,0	249,9	128,8	363,9	118,6	246,4	b
2- Arda (st)	303,8	181,7	349,7	308,9	233,1	181,7	166,8	359,0	87,6	241,3	bc
3- Sezgin (st)	217,0	222,8	324,1	283,2	241,5	230,8	134,5	343,0	55,3	228,0	cd
4- Hasanbey (st)	219,8	223,3	289,0	253,4	217,3	233,2	136,3	371,5	57,6	222,4	d
5- Azkan (st)	260,0	199,0	299,4	219,7	188,2	201,2	127,5	356,3	77,0	214,2	d
6- Frikya	286,5	235,6	299,5	265,7	238,2	235,4	131,3	386,7	63,2	238,0	bc
7- Adana 1	235,3	245,8	351,2	296,5	249,6	246,3	158,8	395,2	52,1	247,9	b
8- Adana 2	292,0	232,5	364,8	262,7	257,8	213,7	124,5	362,2	52,7	240,3	bc
9- Adana 3	317,5	261,7	414,7	292,1	299,0	260,4	174,3	390,4	65,7	275,1	a
F										**	
CV (%)										13,6	
LSD										15,2	

Note 1: Table 3 values are taken from Variety Registration and Seed Certification Center Directorate, 2024 winter sowing chickpea variety registration report (Anonymous, 2024).

Note 2: Adana 3 line was registered as Ismetbey 01 chickpea variety in 2024.



Note 1: Graph 1 values are taken from the 2024 winter sowing chickpea variety registration report of the Central Directorate of Seed Registration and Certification.

Note 2: Adana 3 line Ismetbey 01 was registered as chickpea variety in 2024.

Graph 1. Yield Graph of 2022-2023 Winter Sowing Chickpea Agricultural Values Measurement Trials.

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