RESEARCH ON CULTIVATION POTENTIALITIES OF 'LOCAL KARACADAG' AND 'OSMANCIK-97' RICE VARIETIES IN ORGANIC AGRICULTURAL CONDITIONS

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Abstract. This research was conducted to determine the potentialities of organic rice cultivation in Karacadag region and to set an example for farmers in transition to organic farming. The Local Karacadag paddy the variety grown in the Karacadag region and the Osmancık-97 breeding variety, the most cultivated variety in Turkey, were used as material. The research was carried out in three replications according to the split parcel trial design in random blocks in the 2011-2012-14 rice growing periods on the farmer field in Karahan village of Karacadag region, in Turkey. As a result of the agricultural researches made, organic values showed superior rates compared to conventional applications in terms of the number of days of flowering (92.3 days) and non-fractured rice yield (65.6%). It was observed that regarding the kernel yield in unit area the Karacadag variety was highest at 4 816 kg ha^{-1} in the conventional application while the organic application of the Karacadag variety was in second place with 4 179 kg ha^{-1}. It is concluded that the organic rice farming is thought to be economical when the organic rice in the market is sold with about 30% more the price compared to the conventional rice.
Keywords: *Karacadag region, organic rice, rice cultivation, yield and yield components*

Introduction

Rice is an important cereal type that is used as a food source for the human nutrition in the world's cereal production with 672 021 180 tons and it ranks second after the corn production. Rice obtained after processing is an important staple food in the far eastern countries especially where it is consumed intensively, it is rich in amino acids even has small amounts of protein in its composition. According to the data in 2010, the countries where rice cultivation is intensively carried out were: 197 million t with China, 120.6 million t with India, 66.4 million t with Indonesia, 49.4 million t with Bangladesh, 40 million t with Vietnam, 70% of total rice production in the world is carried out in these countries (Anonymous, 2013).

According to the agricultural statistics, there are approximately 37.2 million ha of organic farming area in 160 countries in the world in 2009. These areas constitute only 0.9% of the total agricultural land in the world (Willer and Klicher, 2011).

Although the rice cultivation area in our country shows fluctuations from year to year, the rice cultivation area was 115 856 ha, production was 920 000 t and the yield was 7 940 kg ha^{-1} in 2015. Rapid population growth and the difficulty of sowing in certain areas limit paddy production by making imports inevitable. There are about 40 provinces in Turkey which conduct rice cultivation. Some of them are 386 907 t with Edirne, 122 600 t with Samsun, 113 994 t with Balıkesir, 91 880 t with Çanakkale and

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52 298 t with Çorum. The rice production in the country cannot meet the needs (Anonymous, 2015).

In the Southeast Anatolia Region, rice cultivation is 2 356 ha, production is 11 250 t and the yield is 4 770 kg ha^{-1}. All of the rice production in the region takes place in Diyarbakır and Sanlıurfa provinces. The total area of rice cultivation in Diyarbakır is 1 747 ha with 8 514 t of production and in Sanlıurfa the cultivated area is 608 ha with 2 736 t of production (Anonymous, 2015).

According to the organic agricultural statistics, there are approximately 558 837 ha, where production was 922 682 t in Turkey in 2013. Organic paddy production are 49 t with Samsun, 42.5 t with Diyarbakır and 4.38 t with Artvin (Anonymous, 2013).

In Karacadag region, the main sources of livelihood in the villages where rice is grown, are rice production and small ruminant livestock. The local rice is produced based on traditional techniques inherited through hundreds of years. As the fields are stony, no machine tillage is possible and all practices are done by hand. The water for irrigation is used from an artifical lake with gravity, so no energy is used. This variety is only produced and consumed in this area.

Karacadag is in Southeastern Anatolia Region. Its soil is very rich in minerals. But all the surface is full of rocks and stones. The local community has been producing 'Karacadag rice' since hundreds of years with the local knowledge heritage from their fathers. They sow rice once in two or seven years in the stony and sloping field, without tillage.

Organic agriculture, a form of agricultural production that protects human and environmental health, including the use of natural substances and methods instead of synthetic chemical pesticides, hormones and mineral fertilizers, has been gradually increasing in recent years in the world and in Turkey as a result of conventional agricultural practices (Inci and Sonmez, 2006).

The Southeast Anatolia Region has a considerable potential for organic agriculture production when taking into consideration the surplus of agricultural population, climate and soil structure of the area (Gursoy et al., 2009). With the Southeast Anatolia Project (GAP), an irrigation water deficiency which is the biggest bottleneck in the rice farming will be eliminated largely. The soil of the region has not been contaminated with excessive fertilizers and chemicals. As the soil is fertile, productivity can be achieved at low costs in agricultural production. The Karacadag rice variety is the reason for the success of the critical years with bad environmental conditions as well as its quality characteristics that meet the local consumers demands.

Clearing the stony areas which covers large areas and opening these areas to the organic farming will raise the life standards of the local farmers in the Karacadag region. Thus, the non-contaminated areas outside the farming land will be cultivated and high value added products will be manufactured. In addition, appropriate breeding techniques in terms of water, soil and environmental protection will bring display to the local farmers. However, the ecology of the Southeast Anatolia Region is extremely suitable for rice farming.

The Karacadag rice is a high quality local variety that adapts to the ecological conditions of the region. The fact that the region has adapted to the special soil structure and irrigation water distinguishes paddy product from the other varieties. The most important feature of the Karacadag rice variety is that it is the kind that the people in the region look for the most with its colour, flavour and taste. The ability of its kernels to draw water during cooking is high. It does not have lapping and sticky properties. Its

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shape and size are also important distinguishing features. The Karacadag rice variety has medium kernel size. The high amount of protein and starch in the rice makes pilaf (traditional food) delicious. It can be said that it has adapted to the local ecology and it is resistant to some stressful conditions, especially diseases and pests. Because of these properties, it has value as breeding material. This variety is highly resistant to the cold snow waters of Karacadag; it has a stable yield potential. This variety is cultivated for centuries and it has been genetically clarified (Alp, 2011).

Primitive forms and local varieties are important genetic repositories of cultural herbs in resolving future problems or transferring new traits to the culture plants. Because local varieties have been selected for many years in a certain region, they are well adapted to the environment and succeed in extreme climatic conditions of some years. It should be kept in mind that genetically clarified local varieties that have completed their ecological adaptation are genitors that can be used more easily than the wild plant in modern breed development studies.

Recently, with the introduction of the advanced technology-based farming and entrance of highly productive varieties into the production areas, many of the local varieties have disappeared and many of them are still disappearing. Continuity in crop production will only be possible with the protection of the wild and local varieties.

The Karacadag is one of the important planting areas of the endemic and rare crops as well as wild relatives of many Gramineae and leguminous plants. The Karacadag is an extinct volcano in the Southeast Anatolia Region and it is located on the southwest side of the Diyarbakır province. The volcano mass of the Karacadag has a very small slope towards the peak of the surrounding areas and extends in three directions: Diyarbakır, Viransehir and Hilvan. The part of the Karacadag in the direction of the Diyarbakır which is spread over an area of approximately 7.200 km^2 is suitable for plant production (Alp, 2011).

General position, when considering its unpolluted nature and climate, is that Karacadag region has a great potential in organic production. The promotion of organic farming, rice flour, baby food, healthy food will present significant contribution in terms of accessibility and sustainability.

With the help of this work, in the first stage it is aimed to reveal the differences between the conventional and organic farming and to show the potentialities of utilizing local rice varieties in organic production conditions.

Materials and methods

This research was conducted to determine the potentialities of organic rice cultivation in Karacadag region and to set an example for farmers in transition to organic farming. The Local Karacadag paddy the variety grown in the Karacadag region and the Osmancık-97 breeding variety, the most cultivated variety in Turkey, were used as material. The research was carried out in three replications according to the split parcel trial design in random blocks in the 2011-2012-14 rice growing periods on the farmer field in Karahan village of Karacadag region, in Turkey.

Karacadag Local rice variety is a late bloomer and its vegetation duration is over about 130-140 days, it is also resistant to cold and drought. It has poor durability to inclination, it is tall and stringy. The Osmancık-97 rice variety has an Italian origin. Its structure is stemmed, and it is resistant to inclination. The structure of the variety is without strings and it does not spill its kernels.

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The soil samples taken from soil at 0-20 cm depth were analysed and the results were: total salt concentration was 0.011%, soil pH was 7.68, the ratio of phosphorus from the useful nutrients from the plants was 1.75, the organic matter was 1.42%.

The location is approximately 900-1000 m above the sea level. In the province of Diyarbakır where the field experiments were conducted the annual rainfall is almost completely happens between September and June in the summer months, rainfall is almost never seen and the proportional humidity rate is quite low. The annual average rainfall of the zone is 488.1 mm, the relative humidity is 53% and the average temperature is around 14.8 °C (*Table 1*).

In the experiment made, pre-germinated seeds were planted as 400 units per square meter for conventional parcels and 440 units for organic parcels with the spreading sowing method on 23.05.2011, 30.04.2012 and 12.05.2014. The size of the parcel was set on 15 m^2 (3 x 5 m) and 10.0 m^2 (2.5 x 4.0 m) at harvest. Soil cultivation was not applied before the sowing in the stony terrain. Less seeds were used in the local experiment was due to the fact that about 20-30% of the land is stony. That 10% more seeds were used in the organic plot is for fighting weeds.

In the conventional rice parcels, 120 kg/ha pure nitrogen and 60 kg/ha pure phosphorus were dropped. 1/3 of the nitrogen and all of the phosphorus were used at the same time with planting. The second 1/3 of the nitrogen was provided during the tillering and the last 1/3 was given as sprinkles before the earing period.

In the organic rice parcels, the solid fertilizer was planted at 1 400 kg/ha and half the B5A liquid organic fertilizer (4 000 g/ha) was sown at the planting site. The other half of the liquid organic fertilizer was given one month before harvesting through the leaves.

Table 1. *Sum of precipitation, humidity and temperatures in each year and long-term average*

Meteorological data	Years	Months						
		April	May	June	July	August	September	October
Average temperature (°C)	2011	13.0	17.7	25.5	31.4	30.7	25.0	18.1
	2012	15.2	19.6	27.7	31.3	31.1	26.1	16.4
	2014	14.7	19.8	26.6	31.6	31.1	24.7	17.5
	Long T.	13.8	19.3	26.3	31.2	30.3	24.8	17.2
Average max. temperature (°C)	2011	18.4	24.5	33.5	39.5	38.5	32.9	31.0
	2012	22.6	27.1	35.7	38.6	38.6	34.4	24.0
	2014	22.0	28.1	34.1	39.3	39.6	32.2	24.2
	Long T.	20.2	26.5	33.7	38.4	38.1	33.2	25.2
Precipitation	2011	209.0	80.1	13.6	0.6	0	9.2	63.0
	2012	26.2	41.0	7.0	1.6	0	1.8	11.8
	2014	39.9	48.8	21.4	0.6	0	27.4	34.2
	Long T.	68.7	41.3	7.9	0.5	0.4	4.1	34.7
Average humidity (%)	2011	75.7	67.6	38.0	22.5	21.7	30.2	41.6
	2012	58.5	58.0	27.8	20.2	20.8	23.1	55.2
	2014	63.1	53.5	29.2	22.2	21.3	35.5	61.5
	Long T.	63.0	56.0	31.0	27.0	28.0	32.0	48.0

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Chemical herbicide was applied against wild weeds in conventional rice parcels while weeds in organic parcels were picked by hand. Chemical pesticide was applied against grasshoppers in conventional rice parcels while against grasshoppers in organic parcels was applied by NeemAzal organic certified pesticide (active substance 'Azadirachtin A').

Irrigation water was provided from the pond in the countryside. Irrigation was done in the form of surface irrigation. Irrigation was interrupted 10 days before full ripening to ensure the dryness of the harvest fields. The harvesting took place on 10.10.2011, 24.09.2012 and 02.10.2014 when the rice plants turned yellow and bunches dangled from trunks.

Observations and the measurements of the following features were made in 10 plants: number of days of flowering (day), number of maturation days (day), plant height (cm), number of tillering in plants (number), kernel number of a bunch (gram), kernel weight of a bunch (gram), thousand kernel weight (gram), length of the bunch (cm), non-fractured rice yield (%), and the measurements were made on 10 m^2: biological yield (kg/ha), unit area kernel weight (kg/ha).

The data obtained from the study were analysed in the JUMP statistical package program. The LSD test was applied and the coefficient of variation (CV) was calculated with the differences between the averages (Yurtsever, 1984; Duzgunes et al., 1987).

Results

In this research, when the average values of varieties were examined in terms of number of days of flowering; 96.7 days in conventional conditions, 97.6 days in organic condition for Karacadag variety; 86.7 days in conventional conditions and 87.1 days in organic conditions for Osmancık-97 variety. The average values of the varieties with regard to the growing conditions were 92.3 days in organic farming and 91.7 days in conventional farming. The average values of the varieties were found to be 97.1 days for Karacadag variety and 86.9 days for Osmancık-97 variety (*Table 2*).

Table 2. *Average values of number of days of flowering (day), number of ripening days (day) and the formed groups according to the LSD (least significant difference) test*

Applications	Number of days of flowering		Average	Number of ripening days		Average
	Karacadag	Osmancık-97		Karacadag	Osmancık-97	
Conventional	96.7	86.7	91.7	141.6	127.2	134.4 a
Organic	97.6	87.1	92.3	140.9	126.6	133.8 b
Average	97.1 a	86.9 b		141.2 a	126.9 b	
CV (%)	0.44			0.35		
LSD variety	0.30**			0.34**		
LSD application	N.S.			0.38**		
LSD interaction	N.S.			N.S.		

*The difference between the averages shown with the same letter is not important (N.S.) at 0.05

When the average values of the varieties were examined in terms of number of maturity days; Karacadag variety was 141.6 days in conventional condition, 140.9 days

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in organic conditions; Osmancık-97 variety was 127.2 days in conventional conditions and 126.6 days in organic conditions. The average values of the varieties with regard to the growing conditions were 133.8 days in organic farming and 134.4 days in conventional farming. The average values of the varieties were found to be 141.2 days for Karacadag variety and 126.9 days for Osmancık-97 variety (*Table 2*).

When the average values of the varieties were examined with regard to the plant height; Karacadag variety was 95.4 cm in conventional conditions and 92.1 cm in organic conditions; Osmancık-97 was 77.1 cm in conventional conditions and 75.1 cm in organic conditions. It is concluded that the average values of the varieties were 83.6 cm in organic application and 86.2 cm in conventional application. The average values of the varieties were found to be 93.7 cm for Karacadag variety and 76.1 cm for Osmancık-97 variety (*Table 3*). Karacadag Local variety showed longer plant height values in both conventional and organic conditions than Osmancık-97 variety.

When the average values of the varieties were examined with regard to the number of tillering in plants, the Local Karacadag variety was 2.61 in conventional conditions and 2.59 in organic conditions; the Osmancık-97 was 1.66 number both in conventional and organic conditions. In terms of growing conditions, the average values of the varieties were 2.12 in organic application and 2.13 in conventional application. The average values of the varieties were found to be 2.60 for Karacadag variety and 1.66 for Osmancık-97 variety (*Table 3*). It has been observed that the Local Karacadag rice variety is more abundant in terms of tillering in both farming conditions than the Osmancık-97 variety.

Table 3. *Average values of plant height (cm), number of tillering (number) and the formed groups according to the LSD (least significant difference) test*

Applications	Plant height		Average	Number of tillering		Average
	Karacadag	Osmancık-97		Karacadag	Osmancık-97	
Conventional	95.4	77.1	86.2	2.61	1.66	2.13
Organic	92.1	75.1	83.6	2.59	1.66	2.12
Average	93.7 a	76.1 b		2.60 a	1.66 b	
CV (%)	3.59			6.55		
LSD Variety	2.21**			0.10**		
LSD Application	N.S.			N.S.		
LSD Interaction	N.S.			N.S.		

*The difference between the averages shown with the same letter is not important (N.S.) at 0.05

In this research, when the number of bunches in per m^2 was examined, the Local Karacadag variety was 393.9 in conventional conditions and 376.0 in the organic conditions; Osmancık-97 variety was 313.7 in conventional conditions and 307.6 in organic conditions. In terms of growing conditions, the average number of bunches in per m^2 was found to be 341.8 in organic application and 353.8 in conventional application. The average values of the varieties were found to be 384.9 for Karacadag variety and 310.6 for Osmancık-97 variety (*Table 4*). It is observed that the Local Karacadag rice variety yields a larger number of bunches than the Osmancık-97 variety in both conventional and organic conditions.

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Table 4. *The average values of bunch number in square meter (number), kernel number of bunch (number) and the formed groups according to the LSD (least significant difference) test*

Applications	Bunch number in m^2		Average	Kernel number of bunch		Average
	Karacadag	Osmancık-97		Karacadag	Osmancık-97	
Conventional	393.9	313.7	353.8	60.1	63.9	62.0 a
Organic	376.0	307.6	341.8	53.4	60.1	56.8 b
Average	384.9 a	310.6 b		56.8 b	62.0 a	
CV (%)	2.92			8.07		
LSD Variety	7.39**			3.48**		
LSD Application	N.S.			4.02*		
LSD Interaction	N.S.			N.S.		

*The difference between the averages shown with the same letter is not important (N.S.) at 0.05

When the average values of varieties were examined with regard to the kernel number of bunch, the Karacadag variety was 60.1 in conventional conditions and 53.4 in organic conditions; the Osmancık-97 was 63.9 in conventional conditions and 60.1 in organic conditions. In terms of growing conditions, the average number of kernel in bunch was found to be 56.8 in organic conditions and 62.0 in conventional conditions. The average values of the varieties were found to be 56.8 for Karacadag variety and 62.0 for Osmancık-97 variety (*Table 4*).

In this research, when the average values of the varieties were examined related to the kernel weight of bunch; the Local Karacadag variety was 1.79 g in conventional conditions, 1.57 g in organic conditions; Osmancık-97 variety was 2.08 g in conventional conditions and 1.97 g in organic conditions. In terms of growing conditions, the average kernel weight of bunch was 1.77 g in organic conditions and 1.93 g in conventional conditions. The average values of the varieties were found to be 1.68 g for Karacadag variety and 2.02 g for Osmancık-97 variety (*Table 5*).

Table 5. *The average values of kernel weight of bunch (g), thousand kernel weight (g) and the formed groups according to the LSD (least significant difference) test*

Applications	Kernel weight of bunch		Average	Thousand kernel weight		Average
	Karacadag	Osmancık-97		Karacadag	Osmancık-97	
Conventional	1.79	2.08	1.93 a	29.65	32.68	31.16
Organic	1.57	1.97	1.77 b	29.43	32.45	30.94
Average	1.68 b	2.02 a		29.54 b	32.56 a	
CV (%)	9.87			2.14		
LSD Variety	0.13**			0.48**		
LSD Application	0.12*			N.S.		
LSD Interaction	N.S.			N.S.		

*The difference between the averages shown with the same letter is not important (N.S.) at 0.05

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In this research, when the average values of the varieties were examined related to the thousand kernel weight it was found that the Local Karacadag variety was 29.65 g in conventional conditions and 29.43 g in organic conditions; the Osmancık-97 variety was 32.68 g in conventional conditions and 32.45 g in organic conditions. In terms of growing conditions, the average thousand kernel weight of varieties was determined as 30.94 g in organic application and 31.16 g in conventional application. The average values of the varieties were found to be 29.54 g for Karacadag variety and 32.56 g for Osmancık-97 variety (*Table 5*).

When the average values of the varieties were examined with regard to bunch length, it was determined that the Local Karacadag variety was 16.3 cm in conventional conditions and 16.1 cm in organic conditions; the Osmancık-97 was 12.7 cm in conventional conditions and 12.4 cm in organic conditions. In terms of growing conditions, the average values of bunch lengths of the varieties were 14.2 cm in organic applications and 14.5 cm in conventional application. The average values of the varieties were found found to be 16.2 cm for Karacadag variety and 12.5 cm for Osmancık-97 variety (*Table 6*).

When the average values of varieties were examined with regard to the biological yield, it was determined that the Local Karacadag variety was 13 514 kg ha^{-1} in conventional conditions and 11 663 kg ha^{-1} in organic conditions; the Osmancık-97 variety was 10 332 kg ha^{-1} in conventional conditions and 9 057 kg ha^{-1} in organic conditions. In terms of growing conditions, the average values of the biological yields of the varieties were 10 360 kg ha^{-1} in organic application and 11 923 kg ha^{-1} in conventional application. The average values of the varieties were found to be 12 589 kg ha^{-1} for Karacadag variety and 9 694 kg ha^{-1} for Osmancık-97 variety (*Table 6*).

Table 6. *The average values of bunch length (cm), biological yield (kg/ha) and the formed groups according to the LSD (least significant difference) test*

Applications	Bunch length		Average	Biological yield		Average
	Karacadag	Osmancık-97		Karacadag	Osmancık-97	
Conventional	16.3	12.7	14.5	13 514	10 332	11 923 a
Organic	16.1	12.4	14.2	11 663	9 057	10 360 b
Average	16.2 a	12.5 b		12 589 a	9 694 b	
CV (%)	6.37			4.64		
LSD Variety	0.66**			37.52**		
LSD Application	N.S.			94.97**		
LSD Interaction	N.S.			N.S.		

*The difference between the averages shown with the same letter is not important (N.S.) at 0.05

When the average values of the varieties were examined with regard to the kernel yield in unit area, it was determined that the Local Karacadag variety was 4 816 kg ha^{-1} in conventional conditions and 4 179 kg ha^{-1} in organic conditions; the Osmancık-97 variety was 3 784 kg ha^{-1} in conventional conditions and 3 234 kg ha^{-1} in organic conditions. In terms of growing conditions, the average kernel yield in unit area was 3 706 kg ha^{-1} in organic application and 4 300 kg ha^{-1} in conventional application. The average values of the varieties were found to be 4 498 kg ha^{-1} for Karacadag variety and 3 509 kg ha^{-1} for Osmancık-97 variety (*Table 7*).

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In this research when the average values of varieties were examined with regard to the non-fractured rice yield it was found that the Local Karacadag variety was 64.9% in conventional conditions and 67.5% in organic conditions; the Osmancık-97 variety was 62.9% in conventional conditions and 63.7% in organic conditions. The average non-fractured rice yield of the varieties in terms of growing conditions was found 65.6% in organic application and 63.9% in conventional application. The average values of the varieties were found to be 66.2% for Karacadag variety and 63.3% for Osmancık-97 variety (*Table 7*). It has been observed that the Local Karacadag variety has a significant superiority over the Osmancık-97 variety both in conventional and organic conditions.

Table 7. *The average values kernel yield in unit area (kg/ha), non-fractured rice yield and the formed groups according to the LSD (least significant difference) test*

Applications	Kernel yield in unit area		Average	Non-fractured rice yield		Average
	Karacadag	Osmancık-97		Karacadag	Osmancık-97	
Conventional	4 816	3 784	4 300 a	64.9	62.9	63.9
Organic	4 179	3 234	3 706 b	67.5	63.7	65.6
Average	4 498 a	3 509 b		66.2 a	63.3 b	
CV (%)	2.63			3.64		
LSD Variety	7.65**			1.71**		
LSD Application	39.92*			N.S.		
LSD Interaction	N.S.			N.S.		

*The difference between the averages shown with the same letter is not important (N.S.) at 0.05

Discussion

Kıran (1992) found that the number of days of flowering in Diyarbakır was between 64-118 days. Savsatlı and Gulumser (2006) stated that in the ecological conditions of Samsun, the number of days of flowering rice changes between 79-89 days with the broadcast seeding method according to the variety used. Savsatlı et al. (2008) determined the number of days of flowering in rice between 82-110 days.

Savsatlı and Gulumser (2006) stated that the number of ripening days in rice is between 120-136 days with the help of broadcast seeding method among the varieties used. Kıran (1992) found that the number of ripening days in Diyarbakır conditions ranged between 96-143 days. Genctan et al. (1994) reported that the number of ripening days varies between 119-143 days in a research conducted on a total of 10 different rice varieties.

The plant height affecting rice farming indirectly depends on the level of fertility of the soil, the method of sowing, the amount of applied fertilizer, environmental conditions and the genetic structure of the variety. Alp et al. (2010) stated that plant height of rice farming in the conditions of Diyarbakır changes between 81.82-99.50 cm. Taşer (2011) stated that the average plant height varied between 67.5-110.3 cm in the Southeast Anatolia Region and Karacadag Local rice variety is longer than any other variety.

The number of tillering in plants depends on the genetic characteristics of the varieties and it is greatly influenced by the environmental conditions (Kun, 1988). Lin (1974) stated that the number of tillering per plant decreased when the rice was planted frequently in the field, and the companions that formed after the maximum period of

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tillering decreased because of their inability to complete their development. Gevrek (2000) pointed out that the average number of tillering between applications in the rice plants varied between 1.3-2.9.

In a research Choi et al. (2002) conducted in South Korea, they stated that the number of bunches per m^2 was found to be 364 in conventional application and in organic application it was 420-444. Kıran and Oktar (1994) stated that the number of bunches in m^2 varies between 372-639 in Diyarbakır conditions and the number of bunches in m^2 of Karacadag variety is higher than other varieties and lines.

In a research conducted in South Korea, Choi et al. (2002) found that the kernel number of bunches was 79.6-88.0. Kıran and Oktar (1994) found that the kernel number of bunches varies 52-147 with Diyarbakır conditions. Alp et al. (2010) stated that the kernel number of bunches in rice farming varies 42.08-99.50 with Diyarbakır conditions. Sahin et al. (2012) determined the kernel number of bunches to be 43.6 to 113.1. Taser (2011) stated that the kernel number of bunches changes between 89.33-164.0 and the values of local rice samples were higher than those of many breeding varieties with regard to the kernel number of bunches.

Alp et al. (2010) stated that the kernel weight of bunch varies between 1.22-2.69 g in Diyarbakır conditions. Taser (2011) stated that the kernel weight of bunch varies between 1.463-1.942 g under the conditions of the Southeast Anatolian Region.

Taser (2011) determined that the bunch length changes between 12.40-23.20 cm, the bunch length of Osmancık-97 variety was 14.17 cm and the average of Karacadag population lines was around 21.06 cm. Sahin et al. (2012) determined that the bunch length varies between 11.7-18.5 cm.

It has been observed that the Local Karacadag variety has a significant superiority compared to the Osmancık-97 variety with regard to the biological yield in both conventional and organic conditions. It can be said by looking at the results of the research that biological yield decreases significantly under organic conditions.

It has been observed that the Local Karacadag variety has a distinctive superiority with regard to the kernel yield in unit area compared to the Osmancık-97 variety in both conventional and organic conditions. It can be said that the Osmancık-97 variety showed a lower kernel yield in unit area than the Local Karacadag variety due to the fact that the ripening period corresponds to high temperatures and it does not adjust to the Diyarbakır's ecological environment. In a research conducted in South Korea, Choi et al. (2002) found the kernel yield of the hairy vetch as 5 680-5 870 kg ha^{-1} in organic conditions and 5 760 kg ha^{-1} in conventional conditions. They also stated that in farmyard manure application, the kernel yield was 5 340-6 660 kg ha^{-1} and 6 210 kg ha^{-1} in conventional application. They pointed out that farmyard manure can be used in the production of hairy vetch. In an organic research conducted in South Korea, Lee et al. (2003) stated that the application of 100 kg nitrogen and 30 kg phosphorus per hectare yielded the highest number of yield with 5 690 kg ha^{-1}, 20 t of hairy vetch application for hectare yielded 5 290 kg ha^{-1}, 12 t compost application for hectare yielded 4 380 kg ha^{-1}. In a research conducted in Malaysia, Abu Bakar et al. (2003) reported that they achieved a yield of 1 760-4 100 kg ha^{-1} with organic applications, the average yield value was obtained as 3 200 kg ha^{-1}, and the rice yield in the region was around 5 000 kg ha^{-1}. Beser and Genctan (1999) stated that the yields of rice vary according to the ecological conditions, variety and technology used.

Savsatlı and Gulumser (2006) stated that the factors affecting the rice yield are kernel length, kernel shape and thousand kernel weight; for instance K-424 rice variety is

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shorter and fuller than the other varieties which leads the variety to have high rates of fractured and non-fractured rice yield. Therefore, they expressed that the genetic properties of the varieties affect rice yield to a great extent. Taser (2011) stated that the yield values of rice samples varied between 51.67-68.67% in the conditions of the Southeast Anatolian Region, and the highest non-fractured rice yield was found in the samples of the Local Karacadag rice variety.

Conclusions

As a result of agricultural research, organic and conventional applications; organic application showed higher values compared to the conventional application with regard to the number of days of flowering (92.3 days), and non-fractured rice yield (65.6%). However, it was observed that following values fell behind in organic conditions compared to the conventional conditions: the number of ripening days, plant height, number of tillering, bunch number in m^2, kernel number of bunch, thousand kernel weight, kernel weight of bunch, bunch length, biological yield and kernel yield in unit area.

Local Karacadag rice paddy variety which is cultivated under the organic conditions performed superior values compared to the Osmancık-97 breeding variety in terms of number of days of flowering (97.6 days), number of ripening days (140.9), plant height (92.1 cm), number of tillering in plants (2.59), number of bunches in m^2 (376.0 piece), bunch length (16.1 cm), biological yield (11 663 kg ha^{-1}), yield for unit area (4 179 kg ha^{-1}) and non-fractured rice yield (67.5%).

The Local Karacadag rice variety cultivated in conventional and organic conditions showed superior values compared to the Osmancık-97 variety in terms of number of days of flowering, number of ripening days, plant height, number of tillering in plants, bunch number in m^2, bunch length, biological yield, kernel yield in unit area, and non-fractured rice yield. However, it was observed that the Local Karacadag variety fell behind the Osmancık-97 variety with regard to the kernel weight of bunch, kernel number in bunch and thousand kernel weight.

When all the features examined in the research were taken into consideration, in addition to many features of the Karacadag variety, it was observed that the kernel yield in unit area was highest at 4 816 kg ha^{-1} in the conventional application while the organic application of the Karacadag variety was in second place with 4 179 kg ha^{-1}. It is concluded that the organic rice farming is thought to be economical when the organic rice in the market can be sold with about 30% higher price compared to the conventional rice. It is concluded that the use of Karacadag variety in organic agriculture may extend the organic agriculture in the region.

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