

*Araştırma Makalesi / Research Article*

**THE ROLE OF THE THRACE AGRICULTURAL RESEARCH  
INSTITUTE AND DR. HALİL SÜREK  
IN THE DEVELOPMENT OF RICE IN TURKEY\***

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**Abstract**

Agricultural research institutes have an important role in the development of rice cultivation in Turkey in the 20<sup>th</sup> century. The rice research works in the trial fields of Tosya and Kızılcahamam, Antalya Summer Growing Plant Research Station, Tarsus Irrigated Agriculture Research Institute, Yeşilköy Agricultural Research Institute had contributed to rice until 1970. Rice research activities have continued in Edirne Agricultural Research Institute after 1970. However, rice variety breeding works has extensively conducted by Halil Sürek at Thrace Agricultural Research Institute since 1979. This study claims that Thrace Agricultural Research Institute has a considerable share in the rise of rice production and the development of rice economy in Turkey. Besides, this study deals with the works of Halil Sürek in rice research and the institutional role Thrace Agricultural Research Institute in this topic. In other words, the role public sector in the development of rice is analyzed. Osmancık-97 that was developed by Halil Sürek is explained in detail. The rice works of Thrace Agricultural Research Institute include cultivation, growing, technology, variety breeding, harvest, and rice milling.

**Keywords:** Halil Sürek, Thrace Agricultural Research Institute, Rice Variety Breeding, Agricultural Modernization.

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## TÜRKİYE'DE ÇELTİĞİN GELİŞİMİNDE TRAKYA TARIMSAL ARAŞTIRMA ENSTİTÜSÜ VE DR. HALİL SÜREK'İN ROLÜ

### Öz

20. Yüzyılda Türkiye'de çeltik tarımının gelişmesinde tarımsal araştırma enstitülerinin önemli bir rolü bulunmaktadır. 1970 yılına kadar, Tosya ve Kızılcahamam'daki deneme tarlalarındaki çeltik araştırma çalışmaları, Antalya Sıcak İklim Nebatları İslah ve Deneme İstasyonu, Tarsus Sulu Zirai Araştırma Enstitüsü ve Yeşilköy Zirai Araştırma Enstitüsü'nün çeltiğe katkıları olmuştur. Çeltik araştırma çalışmaları 1970 yılından sonra Edirne Zirai Araştırma Enstitüsü'nde devam etmiştir. Ancak, Türkiye'deki çeltik çeşit ıslahı alanındaki çalışmalar 1979'dan günümüze Trakya Tarımsal Araştırma Enstitüsü'nde Halil Sürek tarafından gerçekleştirilmiştir. Bu çalışma Türkiye'de pirinç üretiminin artışı ve çeltik ekonomisinin gelişiminde Trakya Tarımsal Araştırma Enstitüsü'nün önemli bir payı olduğu iddiasını taşımaktadır. Ayrıca bu çalışma hem Halil Sürek'in çeltik çeşit ıslahı alanındaki çalışmalarını hem de bu konuda Trakya Tarımsal Araştırma Enstitüsü'nün kurumsal rolünü ele almaktadır. Bir diğer ifade ile çeltiğin bilimsel gelişiminde kamunun rolü incelenmektedir. Halil Sürek tarafından geliştirilen Osmancık-97 çeşidi üzerinde ayrıntılı olarak açıklanmaktadır. Trakya Tarımsal Araştırma Enstitüsü'nün çeltik çalışmaları ekim, yetiştiricilik, teknoloji, çeşit ıslahı, hasat ve pirince işlemeyi içermektedir.

*Anahtar Kelimeler:* Halil Sürek, Trakya Tarımsal Araştırma Enstitüsü, Çeltik Çeşit İslahı, Tarımsal Modernleşme.

## Introduction

In the development of rice cultivation, there have been mutual and reciprocal relationships between the government policy and the agricultural characteristics of rice that requires intensive and specialized labor force.<sup>1</sup> In this context, it can be claimed that rice growing makes necessary bureaucratic and political regulations. Furthermore, Braudel said that the expansion of rice cultivation in China increased control mechanism of the government in rural areas in the 14<sup>th</sup> century.<sup>2</sup> Similarly, rice was also under state supervision in the Ottoman Empire, Mamelukes, Karamanids, and Akkoyunlu in the 14<sup>th</sup> century. For example, rice growers were called *Çeltikçi Reaya*. they were both exempt from paying extra ordinary tax and paying *çift resmi* lower in the Ottoman Empire. Besides, the same rice production system was seen in Karamanids. Lala Şahin Pasha was one of the bureaucrats of Murat I played an important role in the beginning of rice farming in Rumelia in the 14<sup>th</sup> century.<sup>3</sup> By the same token, rice farming has been under the control of the Republic of Turkey since 1936. However, the government auditing resulted from malaria threat in the republican era.<sup>4</sup>

In addition to its codes, regulations, and subventions, state takes part in agrarian sector with its institutions and investment projects. In this multi-dimensional work distribution, the protection of public health, receiving the food needs of growing population, the ideal use of cultivated lands<sup>5</sup>, increasing the socio-economic life standard of farmers, providing higher agricultural production, and protecting consumers from high prices constitute the institutional dimension of agricultural policy.<sup>6</sup> In this context, this study mainly focuses on the role of Thrace Agricultural Research Institute (the TARI) in the development of rice farming in Turkey in the 20<sup>th</sup> century. The agricultural research institutes of the Ministry of Agriculture aim to increase agricultural production and yield, do scientific research, produce certified seed, and regulate training and extension programs. As is seen in this reciprocal relation, rice has influenced in the agricultural and socio-economic politics of the state and the state serve the spread and pass down the genes of rice.<sup>7</sup>

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1 Okan Ceylan *A Social History of Rice*, PhD Dissertation, Boğaziçi University, Atatürk Institute for Modern Turkish History, İstanbul, 2020, p. 7.

2 Fernand Braudel, *Civilization and Capitalism 15th and 18th The Structure of Everyday Life*, Collins, London, 1981, p. 149.

3 Halil İnalçık, "Rice Cultivation and the Çeltikçi Reaya System", *Turcica XIV*, 1982, pp. 70-93; Ceylan, *A Social History of Rice*, pp. 86-87.

4 Ceylan, *A Social History of Rice*, p. 16.

5 Ceylan, *ibid.*, p. 104.

6 Okan Gaytancıoğlu, *Türkiye'de Çeltikte Uygulanan Üretim Fiyat ve Pazar Politikalarının Değerlendirilmesi*, PhD Dissertation, Trakya Üniversitesi, Institutes of Science and Technology, 1997, pp. 16-17.

7 Ceylan, *ibid.*, p. 20.

In *Türkiye Çeltik Ziraatının Durumu ve Türkiye Pirinçlerinin Fiziki, Kimyevi Vasıfları ve Pişme Değerleri üzerine Araştırmalar*, Mustafa Uluöz discuss the distribution of rice cultivation areas in Turkey, the varieties of rice in the 1940s, the production of paddy (pirinç), rice trade, and the comparisons of Turkish rice and foreign rice in the world.<sup>8</sup> In *Türkiye Çeltik Ekonomisi*, Turan Güneş deals with rice cultivation in the 1950s and the 1960s in Turkey.<sup>9</sup> In *Çeltik*, Ekrem Kün explains rice farming methods from cultivation to harvest varieties in the 1970s and 1980s.<sup>10</sup> In *Çeltik Tarımı*, Halil Sürek in Thrace Agricultural Research Institute gives information about the biological characteristics and economic conditions of rice farming. He tries to propound analytical perspective on rice agriculture in Turkey.<sup>11</sup> Apart from these studies, this article deals with the academic and intellectual contributions of Halil Sürek in rice research at the TARI.

In the research and development of rice, the TARI has been the most prominent institute since 1970. Therefore, this study tries to explain the institutional role of the TARI and the intellectual success of Dr. Halil Sürek who is the president of rice department in rice research and rice variety breeding in Turkey. In this context, this study is constituted of two parts. In the first part it focuses on the institutional contributions of different agricultural stations to the development of rice in the 20<sup>th</sup> century. Second, it deals with the rice research of Dr. Halil Sürek at the TARI within the scope of rice production and rice yield. This study reveals the development process of the cultivation, research, and economy of rice in Turkey.

## 1. History of Rice Variety Breeding

Rice variety breeding began in the beginnings of the 20<sup>th</sup> century in India, Indonesia, and the Philippines.<sup>12</sup> First, rice variety breeding programs began in India in 1911 and in Japan in 1927. There were 16 seed variety breeding stations in Japan at that time.<sup>13</sup> Second, rice variety breeding started in the Crowley Station of Louisiana Province in the USA in 1927. However, it had developed at limited level until the Second World War. Immediately after the war, rice was regarded as a solution to feed the growing population of Manson Asia.<sup>14</sup>

8 Mustafa Uluöz, *Türkiye Çeltik Ziraatının Durumu ve Türkiye Pirinçlerinin Fiziki, Kimyevi Vasıfları ile Pişme Değerleri Üzerinde Araştırmalar*, Gürsoy Basımevi, Ankara, 1955; Ceylan, *A Social History of Rice*, p. 14.

9 Turan Güneş, *Türkiye Çeltik Ekonomisi*, Ankara Üniversitesi, Ankara, 1971; Ceylan, *A Social History of Rice*, p. 14.

10 Ekrem Kün, *Çeltik*, Türkiye İş Bankası, Ankara, 1985, pp. 1-27; Ceylan, *A Social History of Rice*, p. 14.

11 Halil Sürek, *Çeltik Tarımı*, Hasad Yayıncılık, İstanbul, 2002; Ceylan, *A Social History of Rice*, p. 14

12 N. Parthasathy, "Rice Breeding in tropical Asia up to 1960", In *Symposium on Rice Breeding*, Los Banos, IRRI, 1972, p. 6.

13 S. Okabe, "Breeding for High Yielding Varieties in Japan", *Symposium on Rice Breeding*, IRRI, Los Banos, 1972, p. 47-49.

14 Pathasathy, *ibid.*, p. 6.

Thus, it can be claimed that the Second World War is the turning point in the development of rice farming and breeding programs. Third, with the foundation of the International Rice Research Institute (the IRRI) in 1960, rice varieties that have more qualified and higher yield have been bred. Thus, the average rice yield in the world increased two times.<sup>15</sup> The IRRI has provided an institutional and scientific support for the development of rice at international level. The legal personality of the IRRI was recognized by Turkish government in 1997. It was pressed on the Official Gazette. Thus, the legal recognition of the IRRI increased its collaboration and common educational programs more considerably with the TARI. Behalf of Turkey, Erdinç Erdun who was Turkish Ambassador in the Philippines in 1997 signed the agreement. In addition to Turkey, 19 countries signed this agreement.<sup>16</sup>

In conjunction with the Second World War, the spread of new rice varieties can be succeeded through the Green Revolution. Therefore, to increase rice yield within the scope of the Green Revolution, the chemical industry that was behind of war technology became a chemical agrarian industry. Thanks to the reformulation of chemical molecules of bombs and gases, agricultural inputs such as fertilizer, herbicides, and pesticides were used in agrarian sector in these years.<sup>17</sup> Together with the use of agricultural inputs, agricultural production began to strictly depend upon these chemicals and market conditions.<sup>18</sup> Furthermore, while the Green Revolution and neoliberal policies that means market oriented global capitalism in the second half of the 1970s<sup>19</sup> have supported the crops such as rice, corn, and cotton that encourage farmers to use agricultural inputs and more credits in capitalist mode of production, they have had limited the cultivation of cannabis, hemp, and opium poppy since the second half of the 20<sup>th</sup> century.<sup>20</sup> Thus, new rice varieties that have been bred and developed in the institutes need these agricultural inputs to grow in their plant development. Thus, the socio-economic influence of the Second World War, the Green Revolution, neoliberalism, and the institutional role of the IRRI made a considerable contribution to both the expansion of rice cultivated lands, the rise of rice yield and breeding of new varieties.

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15 Halil Sürek, *Çeltik Tarımı*. İstanbul: Hasad Yayıncılık, 2002, p. 201.

16 T.R Presidency of the Republic of Turkey Directorates of State Archives (BCA) 30-18-1-2/834-793-3; BCA 30-18-1-2-895-24-3; *Official Gazette* 13 September 1997.

17 J. Betz, T. and Siegel, *Seed: The Untold Story*. Eye Film Production, 2016; Ceylan, *ibid.*, p. 12.

18 J. Phillimore, "Seeds of Freedom", *The Gaia Foundation and the African Biodiversity Network, in collaboration with MELCA Ethiopia, Navdanya International and GRAIN*, 2012; Ceylan, *A Social History of Rice*, p. 12.

19 Abdullah Aysu, *Küreselleşme ve Tarım Politikaları*, Su Yayınevi, İstanbul, 2008, p. 13; T.C. Boas and J.G. Moarse "Neoliberalism: From New Liberal Philosophy to Anti-Liberal Slogan", *Studies in Comparative International Development*, No. 44, 2009, p. 143.

20 Okan Ceylan, "Geleneğin Yeniden Hatırlanması: Türkiye'de Ketenin Toplumsal Tarihi", *Ankara Üniversitesi Türk İnkılap Tarihi Enstitüsü Atatürk Yolu Dergisi*, No. 69, 2021, p.141-142; Okan Ceylan, "Cumhuriyetin İlk Döneminde Geleneksel Bir Ürün: Kastamonu Kendirinin (Kenevir) Tarihsel Gelişimi", *Belgi*, No. 22, 2021, p. 197.

Before the beginning of rice variety breeding program in Turkey in the 1980s, rice seed had been imported from abroad such as Italy, Australia, the USA, Russia, and Egypt. They had been cultivated through introduction methods until the end of the 1970s. In this context, to analyze rice farming conditions in Anatolia, the Ministry of Economy invited Italian rice specialist M. Civani Sanpiyetro to Ankara in 1929. As a result of his tour of duty, Sanpiyetro prepared a detailed report. In this report, he underlined the high potential of Tosya Region in rice farming. Thereupon, Harun Aziz Bey who received education in Vercelli Rice Institute in Italy attempted to revive rice cultivation in Tosya on the purpose of solving the rice seed need of Turkey. Therefore, it can be said that the first rice breeding programs through introduction methods began at trial fields of Tosya. Harun Aziz who was very interested in doing a field study tested 44 rice varieties. Furthermore, the Minister of Agriculture Reşat Muhlis Erkmen made a great contribution in this process. Thanks to rice milling industry, rice trial fields, and intensive rice production, Tosya was one of the prominent rice cultivation areas in the early republican era.<sup>21</sup> However, since the widespread climate in Turkey is continental climate, the Ministry of Agriculture needed new trial fields in Kızılcahamam District of Ankara.<sup>22</sup>

In addition to these experiment fields, Antalya Summer Growing Crop Station that was founded in 1937, was interested in rice growing institutionally. In this context, high yield rice varieties were imported from Italy and Australia such as Blue Rose and Caroline. These rice varieties had been tested in Antalya until the 1950s. Especially the role of climate and irrigation water temperature were analyzed in this institute.<sup>23</sup> However, due to the threat of malaria in Antalya Region, many people lost their lives. Furthermore, the people of Antalya were so afraid of contracting malaria that they called rice as bloody agriculture. In addition to public health, since citrus trees, banana, and orange farming began to expand, rice cultivated areas declined in Antalya.<sup>24</sup>

After the rice research in Antalya, Yeşilköy Agricultural Research Institute in İstanbul and Tarsus Irrigated Agriculture Research Institute in İçel (Mersin) were interested in rice growing in first half of the 1960s. First, in the experiment fields of Tarsus, the yield quality of some rice varieties such as Dervish, Arkose, Ambarbu, and Mısır were analyzed. In this context, IR-8 and Blue Rose were regarded as the most suitable varieties for the climate and soil conditions of Çukurova Region. Thus, the seed of these varieties were produced around 20 tons and distributed to the region in 1968 and 1969. Second, although Yeşilköy Agricultural Research Institute was in İstanbul, some of its

21 Ufuk Tidim, "Tosya Pirinci 1929 Tarihinde Anadolu'nun En İyisi Seçildi", *Haber 37*, 25 June 2018.

22 Uluöz, *ibid.*, p. 30.

23 Uluöz, *ibid.*, pp. 16-17; Çeltik, Rahmi, "Türkiye'de Pirinç Ziraatı", *Ziraat Dergisi*, No. 15 (March 1941), p. 28-29.

24 "DDT Antalya'da Pirinç Ekimine İmkân Verdi", *Demokrat Keşan*, 22 July 1953; Ceylan, *A Social History of Rice*, p. 312.

experiment fields were in Edirne.<sup>25</sup> Within the scope of the elite and original rice seed production, R. Bersani, Maratelli, and Sezia varieties that were cultivated considerably in Thrace were produced. Besides, Rialto, Roma, Arborio, and Baldo varieties were imported from Italy in 1969.<sup>26</sup> There were suitable plains for rice cultivation in Edirne. Fikret Sezen who was one of the agricultural engineers of Yeşilköy Agricultural Research Institute and a Chinese rice specialist who visit Maritsa Plain said that İpsala was very suitable for rice growing in their research in 1958.<sup>27</sup> Furthermore, the high potential of İpsala Plain was firstly said by Mustafa Kemal Atatürk to Bekir Kara in December 1930 in Edirne Turkish Hearth.<sup>28</sup> The project of rice variety development was transferred to Edirne Agriculture Institute which was the older name of the TARI.<sup>29</sup>

## 2. The Role of Thrace Agricultural Research Institute in the Development Rice

The TARI was founded as the seedling production facility of Edirne Special Provincial Administration in 1924. The institute was assigned to the Ministry of Agriculture in 1949. It took a name of a Directorate for Experiment Fields and a Coordination of Silkworm Breeding in 1959. Its lands were also used as experiment fields of Yeşilköy Agricultural Research Institute for wheat, rice, and barley research. Then it was nominated as Edirne Agricultural Research Institute on 6 January 1970. Finally, it has been called Thrace Agricultural Research Institute since 5 May 1987.<sup>30</sup>

With the foundation of the Edirne Agricultural Research Institute, the number of technic personnel increased from 7 to 14 and the number of total workers (seasonal and permanent) increased from 55 to 76. On the other hand, the number of administrative personnel decreased from 25 to 22 in the 1970s.<sup>31</sup> It employed 15 engineers, 14 technicians, 4 administrative personnel, 28 permanent and 40 seasonal workers in 1999. However, there are around 50 workers and 35 technical personals in the 2000s.<sup>32</sup>

25 Halil Sürek, "Osmançık 97 Pirinç İthalatını Azalttı ve Çiftçisinin Yüzünü Güldürdü", *Hasad*, Vol. 20, No. 237, 2005, p. 68; Halil Sürek, "Ülkemizde Çeltik Çeşit Geliştirme Çalışmaları", *I. Çeltik Sempozyumu*, Tekirdağ, 24-25 Sempتمبر 2009, p. 85.

26 Halil Sürek, "Ülkemizde Çeltik Çeşit Geliştirme Çalışmaları", p. 86; Sürek, H. (2019). "Ülkemizde Çeltik Tarımı ve Çeşit Geliştirme Çalışmalarında Elde Edilen Gelişmeler", (Gülây Selvi Hanişoğlu). *Gönen Vizyon 2023 Tarım Çalıştayı Raporu*, Gönen, 17-19 Sempتمبر 2019, p 79.

27 "Çeltik Ekiminde En Müsait Ova İpsala'dır", *İpsala Doğuya Sesleniş*, 12 November 1958; Ceylan, *A Social History of Rice*, p. 158.

28 Hilmi Dinçer, "Kara Bekir", *Devrim*, 5 Sempتمبر 2017; Ceylan, *A Social History of Rice*, p. 97.

29 Sürek, "Ülkemizde Çeltik Çeşit Geliştirme Çalışmaları", p.86; Sürek, "Ülkemizde Çeltik Tarımı ve Çeşit Geliştirme Çalışmalarında Elde Edilen Gelişmeler", p. 79.

30 *1970-1980 Yıllarının Çalışmalarının Özeti*, Edirne Zirai Araştırma Enstitüsü, Edirne, 1980, p. 4; *Edirne İlinde Tarımsal Sorunlar ve Çözüm Önerileri*, Trakya Tarımsal Araştırma Enstitüsü, Edirne, 1999, p. 3.

31 *1970-1980 Yıllarının Çalışmalarının Özeti*, p. 7.

32 "Define Avcıları", *Milliyet*, 2004, 26 Sempتمبر.

Thanks to its specialists and physical infrastructure, the TARI that is the coordination institute of rice and sunflower research and breeding mainly focuses on variety development, growing technics, cultivation and harvest technology, and pest control.<sup>33</sup> In this context, despite 30 years of rice breeding programs and rice is not a staple food, a substantial advance has been achieved in rice breeding in Turkey. In rice breeding programs, high yield, good grain quality, disease resistance, high milling yield, grain shape, and translucent grain type are aimed. The TARI had bred 76 rice variety until 2020. While 63 out of 77 were Turkish origin, 11 of them were Italian origin.<sup>34</sup> Similarly, the TARI had developed 14 sunflower varieties, 13 rice varieties, 11 wheat varieties, and 3 barley varieties. All the research programs have been carried out in 320-hectare (3200 decare) experiment fields of the TARI.<sup>35</sup>

In addition to agricultural research, TARI has tried to improve the agricultural production and socio-economic welfare of farmers in the light of scientific developments and training and extension programs.<sup>36</sup> Furthermore, the demands of farmers and socio-economic condition became determinant in the breeding activities.<sup>37</sup> It has also collaborated with the International Rice Research Institute (the IRRI), the International Maize and Wheat Improvement Center (the CIMMYT), the Food and Agriculture Organization of the United Nations (the FAO), and Domestic Research Institute.<sup>38</sup>

## 2.a. The Development of Rice Cultivation in Turkey and the Role of the TARI

To understand the importance of the rice research of the TARI, the rice production capacity of Turkey needs to be explained. Based on the table of rice cultivation, production, and yield below, it seems that rice cultivation areas increased considerably in 1953 and 2008. When 1928 is taken as reference, rice cultivation areas increased more three times in 1953 and more than six times in 2008. In terms of production, it increased about five times in 1935 and 36 times in 2008.<sup>39</sup> The increase of rice cultivation areas and production result from the use of technology, the use of agricultural inputs such as fertilizer and herbicides,

33 1970-1980 Yıllarının Çalışmalarının Özeti, p. 4; Edirne İlinde Tarımsal Sorunlar ve Çözüm Önerileri, p. 3.

34 Sürek, H. & Yi, G., "Rice Breeding and Varietal Improvements in Turkey from 1990-2020", *International Journal of Agricultural and Biological Science*, 2020, p. 101-102.

35 Edirne İlinde Tarımsal Sorunlar ve Çözüm Önerileri, p. 3.

36 General Directorate of Agricultural Research, Thrace Agricultural Research Institute, Edirne, 2000, p. 2-4.

37 1970-1980 Yıllarının Çalışmalarının Özeti, p. 4.

38 General Directorate of Agricultural Research, p. 2-4.

39 Republic of Turkey, Prime Ministry General Directorates of Statistics, *Agricultural Statistics 1928-1934*, Ulus Basımevi, Ankara, 1936, pp. 10-11; Soil Products Office (SPO) *Rice Cultivation, Production, Yield, and SPO Purchasing Table in Turkey*, <https://www.tmo.gov.tr/Upload/Document/istatistikler/tablolari/6celtikeuva.pdf> (Accessed on 26 June 2022).

water availability, the breeding of new varieties, organization of farmers, and rice prices, and so on.<sup>40</sup>

However, rice cultivation was limited to specific regions and to big landowners until the mid-1970s. In other words, it was a crop of aghas. Rice began to spread among small peasants thanks to the use of agricultural mechanization, the foundation of irrigation cooperatives, and increasing credit facilities from the mid-1970s onwards.<sup>41</sup> There had been intensive labor force in rice production until 1980 in Turkey. However, since the cost of rice production increased, not only rice cultivated areas decreased but also rice import increased between 1983-1993. The decline of rice cultivation areas in this period also resulted from drought, low imported rice prices, and the cultivation of alternative rice. On the other hand, rice cultivated lands and rice production have increased since the mid-1990s due to the adequate irrigation water, transferring new technologies from cultivation to milling, and the development of new rice varieties.<sup>42</sup>

Besides, to decrease the high cost of rice production, rice growers began to transfer new cultivation and harvest technologies from Italy and Greece. For example, laser guided land levelers provided water control, weed control, and lower production cost.<sup>43</sup> Dr Gürsel Şimşek who was a president of rice producers association (1997-2007) emphasized the major role of technology and science in the rise of rice yield. He said that the rice growing technics in Ipsala Plain in Edirne are very similar to that of Po Plain in Italy and California in the USA.<sup>44</sup> The pioneer rice farmer who brought rice equipment from abroad and started to use in rice cultivation is Sami Dubacı. He first started to use combine harvester for rice harvest and he also used mechanical dryer to dry rice crop in 1986 in İpsala town of Edirne Province. And then he firstly imported laser control leveler from Greece, and he used it for rice field levelling in 1990. He took a leading part in the transferring of new technology from Europe and rice cultivation.<sup>45</sup>

Şimşek who is a medical doctor and politician in Edirne took a leading part in the transferring of new technology from Europe and rice cultivation. He visited the agricultural fairs in Europe, he contributed to modernization of rice cultivation in Edirne. He prepared many reports about the socio-economic problems of rice growers and thus he was called a doctor of rice.<sup>46</sup> From a technological perspective, thanks to the production of new rice varieties and the

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40 Halil Sürek, "Rice Production and Its Constraints in Turkey", *Regional Workshop on Rice Integrated Crop Management Systems for Food Security in the Near Eastern Countries*, Alexandria, 2003, p. 6.

41 Ceylan, *A Social History of Rice*, p. 2.

42 Sürek, "Rice Production and Its Constraints in Turkey", pp. 1-2.

43 Sürek, "Ülkemizde Çeltik Tarımı ve Çeşit Geliştirme Çalışmalarında Elde Edilen Gelişmeler", p. 76.

44 "Define Avcıları"

45 Halil Sürek, Interview by Author, Bornova, İzmir, 27 June 2022.

46 H. Aybars Şimşek, Interview by Authors, İpsala, Edirne, 5 July 2022.

development of rice technology such as laser guided land leveling, caterpillar-tracked combine harvest, drying and milling technology rice cultivation has improved.<sup>47</sup> Similarly, the use of sortex grader as a processing equipment provided clean and quality rice for consumer.<sup>48</sup>

**Table 1: Rice Cultivation Areas, Rice Production and Rice Yield in Turkey (1928-2018)**

Years	Rice Cultivated Areas (Hectare)	Rice Production (Ton)	Rice Yield (Kg/Decare)
1928	15,200	20,600	175
1933	27,276	46,455	170
1938	20,000	46,310	232
1943	24,759	59,586	241
1948	25,656	59,709	233
1953	50,000	108,700	217
1958	59,000	119,000	202
1963	55,000	130,000	236
1968	45,000	123,000	273
1973	60,000	265,000	442
1978	70,000	316,600	452
1983	70,000	315,000	450
1988	51,000	262,500	515
1993	44,850	225,000	502
1998	60,000	315,000	525
2003	65,000	372,000	572
2008	99,500	753,000	757
2013	110,592	900,000	814
2018	120,137	940,000	782

**Sources:** Republic of Turkey, Prime Ministry General Directorates of Statistics, *Agricultural Statistics 1928-1934*, pp. 10-11; Soil Products Office (SPO) *Rice Cultivation, Production, Yield, and SPO Purchasing Table in Turkey*.

47 M. Özdemir, "Osmançak 97 Çeşidinin Geliştirilme Süreci ve Sektöre Katkıları", *Bizim Market*, 2007.

48 Halil Sürek, "Rice Production and Its Constraints in Turkey", p. 7.

**Table 2: The Factors the Determine Rice Yield in Turkey in the 20<sup>th</sup> century**

Years	Yield Ton/Ha	The Characteristics of rice
1920-1960	2,5	Local rice varieties had been cultivated
1960-1970	3,5	New rice varieties imported from Italy-Russia
1971-1996	4,0	Local and introduced rice varies
1997-2000	5,3	Local developed new high yielding varieties
2001-	8,2	

Sources: Sürek, "The Contributions of Rice Breeding Activities to Rice Productions and Yield Increase in Turkey", p. 2-3

To analyze rice yield with regards to variety in detail, this table indicates various rice varieties by years. Local rice varieties such as Sarıkılıçık, Akçeltik, Derviş, and Karakılıçık had been cultivated between 1920 and 1960.<sup>49</sup> While the average rice yield was 250 kg per decar in the 1920s, it reached to 400 kg in the 1970s. The increase of rice yield in the 1970s, resulted from the cultivation of foreign rice varieties such as Ribe, Maratelli, Baldo, Krosnodarsky-424, Veneria, and Rocca. When the origin of these varieties is considered, it seems that Krosnodarsky-424 was imported from Russia and others were imported from Italy. Furthermore, Ribe was the first foreign rice variety which Turkish rice growers cultivated.<sup>50</sup> In general, since local rice varieties had not been demanded by rice growers, the rice seed needs of the farmers were imported from Italy at limited level until 1980.<sup>51</sup>

Baldo and Rocca were widespread around Turkey, on the other hand Krosnodarsky-424 was limited to local level such as in Black Sea Region and Internal Anatolia.<sup>52</sup> When the distribution of rice varieties is analyzed in the 1980s, it seems that 32,4% was Ribe, 31% was Baldo, 11,8% was Rocca, 5,5% was Maratelli, 5,1%, Mısır 5,0% Gritna, and 9,3% was local varieties in Turkey.<sup>53</sup> From the beginnings of the 1980s, rice breeding and development programs began at the TARI.

49 Halil Sürek, "Trakya Tarımsal Araştırma Enstitüsü'nde Dört Yeni Çeltik Çeşidi Geliştirildi", *Hasad*, Vol.27, No. 314, 2011, p. 54.

50 Halil Sürek, "Son Yıllarda Ülkemiz Çeltik Üretiminde Ulaşılan Verim Seviyesi ve Geliştirilen Bazı Yeni Çeltik Çeşitlerinin Verim Potansiyelleri ", *Hasad*, Vol. 29, No. 346, 2014, p. 72.

51 Sürek, H., et al., "Ülkemizde Çeltik Tohumluk Üretimi ve Sorunları", *Türkiye I. Tohumluk Kongresi*, İzmir, 11-13 Eylül 2022, 88.

52 Halil Sürek and G. Yi, *ibid.*, p. 101.

53 Sürek, "The Contributions of Rice Breeding Activities to Rice Productions and Yield Increase in Turkey", *Scientific Conference Challenges in Modern Agricultural Production*, Skopje, 2015, pp. 4-6.

## 2.b. National Rice Research Program of Thrace Agricultural Research Institute

Rice breeding programs under the supervision of Dr. Halil Sürek within the scope of the research and development studies of the TARI in Edirne make possible the considerable increase of rice yield (Edirne Ziraat Araştırma Enstitüsü, 1980: 11). Halil Sürek who have played an important role in the development of rice variety breeding was born in Kızılağaç Village of Bayındır in İzmir in 1955. He graduated from Field Crops Department of Ege University Agricultural Faculty in 1978. Halil Sürek is a very idealist and hardworking agricultural engineer.<sup>54</sup> He left his mark in Turkish Agrarian History. Sürek was a president of rice research project, a branch chief, department chair, and deputy manager at the TARI.<sup>55</sup> After his rice research in Italy in 1983, he was sent to Guller University in Britain to do master on plant breeding in 1991. He graduated from his doctorate in 1994. Sürek also participated in many congresses and symposiums in abroad such as Egypt, Bulgaria, Kazakhstan, Italy, France, China, South Korea, Philippine, Thailand, Portugal, and Chile etc. He also took part in the networks of rice growing countries in the Mediterranean Basin in 1990 and represented Turkey in the Temperate Rice Research Consortium.<sup>56</sup> He also carried out some projects and activities to improve rice cultivation in some countries such as Bulgaria, Macedonia, Ukraine, Azerbaijan, Kazakhstan, and Uzbekistan etc.<sup>57</sup>

Although rice research had not been developed adequately until the mid-1970s, 1325 rice materials were analyzed by Halil Sürek and his equip in 1980.<sup>58</sup> In addition to the TARI, other agricultural research institutes in Samsun, Adana, Çorum, and Kahramanmaraş that specialized in rice project developed both two candidate varieties and eleven rice varieties in total. Based on the rice yield testing result, Rocca had the highest yield rate. Thus, the production of Rocca variety was decided by a registration commission on 16 May 1978. For example, the first seed production was carried out in 45 dekar of lands. Thus, it was found that Rocca had %46 percent higher yield than Ribe. The scientific research of the TARI was presented at Rice Symposium that was organized in Ege University with the collaboration of CENTO and the Ministry of Agriculture in May 1978. Researchers who took part in national rice research projects began to participate in some scientific research projects. For example, an agricultural engineer was sent to the IRRI for four-month education in the Philippines. Similarly, the

54 "Define Avcıları"; "Bayındırın Ülkemize Kazandırdığı Değer", *Ufuk Çizgisi*, Vol. 2, No. 2, 2012, p. 26.

55 "2003 Yılı Bilim Hizmet ve Teşvik Ödülleri ve Gerekçeleri" *TMMOB ZMO Haber Bülteni*, 5, January-May 2003.

56 "TAGEM'de İz Bırakanlar Çeltiğin Babası Halil Sürek", *TAGEM E Bülten*, 2021, pp. 18-21.

57 Sürek, Yazar ile Görüşme, Bornova, İzmir, 27 June 2022.

58 *1970-1980 Yıllarının Çalışmalarının Özeti*, p. 11.

other engineer was sent to rice growing courses of the Faculty of Agriculture at Ege University in April and May 1979. In addition to these scientific activities arranged in other cities or countries, the TARI organized a workshop about rice growing and its problems in June 1978.<sup>59</sup>

Similarly, together with rice variety breeding project in 1979, the Edirne Agricultural Research Institute initiated its first breeding programs. While the project had been at the regional level until the 1982, it turned to be the national rice research under the supervision of Dr Halil Sürek who is known as a father of rice in Turkey. Halil Sürek was sent by the government to Italy within the scope of rice breeding. After his return, Sürek started to carry out rice breeding in Turkey. For example, the institute has been interested in three areas such as mutation breeding, aromatic rice breeding, and herbicide resistant rice breeding projects. While the rice varieties such as Ribe, Maratelli, and Baldo had been imported, the TARI has been breeding new rice varieties since the mid-1990s.<sup>60</sup>

The aim of national rice variety breeding program was to develop more resistant and adaptive rice varieties to the climate conditions of Turkey.<sup>61</sup> In this context, national rice research project was a comprehensive workload that included breeding, planting time, growing technics, irrigation methods, agronomy, diseases, pests, harvest period, economy, technology of rice, seed production (elite and original seeds), training and extension programs.<sup>62</sup>

Together with the central role of Edirne Agricultural Research Institute in rice variety breeding project, other agricultural research institutes in Samsun, Adana, İzmir, Antalya, Diyarbakır, and Ankara took part in the project. They studied mainly on yield, mechanization, climate conditions, diseases, and breeding.<sup>63</sup> In this process, many germ plasms were imported from abroad. It can be said that rice seed production began in 1980. Before that time, certified seed needs of rice growers had been imported from Italy. However, thanks to crossing program at the TARI in 1979, 39 rice varieties were released. While 35 of them were developed at the TARI, the rest was developed at the BSARI.<sup>64</sup> These two institutes have specialized in rice breeding in Turkey.<sup>65</sup> In these research

59 1970-1980 Yıllarının Çalışmalarının Özeti, p. 11-13.

60 Sürek, "The Contributions of Rice Breeding Activities to Rice Productions and Yield Increase in Turkey", p. 3; Erdoğan İndelen, "Türkiye'de Ekilen Çeltik Çeşitlerinin Üretimdeki Payları ve Çeltik Tohumluğu Üretim Programı", *Trakya Birlik*, 1983, p.14; Şule Akkoyunlu, *Agricultural Innovation in Turkey*, KSP Books, Suffolk, 2018, pp. 12-13.

61 A. Kadir Kıran, *Güneydoğu Anadolu Bölgesi Çeltik Tarımı, Bugünkü Durumu ve Geliştirilmesi*, Güneydoğu Anadolu Tarımsal Araştırma Enstitüsü Yayını, Şanlıurfa, 1988, p. 2.

62 Sürek, "Rice Production and Its Constraints in Turkey", p. 10; Halil Sürek, "Trakya Tarımsal Araştırma Enstitüsü Çeltik Araştırma Çalışmalarının Dünü ve Bugünü", *Hasad*, Vol. 24, No. 286, 2009, p. 64.

63 Halil Sürek, "Ülkemizde Çeltik Tarımı ve Çeşit Geliştirme Çalışmalarında Elde Edilen Gelişmeler", pp. 79-80.

64 Sürek, "The Contributions of Rice Breeding Activities to Rice Productions and Yield Increase in Turkey", p. 3; Akkoyunlu, *Agricultural Innovation in Turkey*, pp. 12-13.

65 Sürek, *Rice Research Activities in Turkey*, Trakya Tarımsal Araştırma Enstitüsü, Edirne, 2011, p. 2.

programs, rice variety breeding, agronomy and seed production have been also carried out by the two institutes. They have done research on new high yield rice varieties and have developed new local rice varieties since the mid- 1990s. However, the lion share of these research programs have been carried out in the TARI.<sup>66</sup>

**Table 3: Rice Varieties imported and developed at the TARI**

Countries Varieties	Italy	Bulgaria	Russia	The USA	IRRI-The Phillipines
1.	Ribe	Plovdiv (Filibe)	Krasnodarsky-424	Menemen	INGER Material (Aromatic Rice Variety)
2.	Rocca	Rodina		M-9	
3.	Veneria	Ranballi			
4.	CRM-9				
5.	ARGO				
6.	Titanio				
7.	Sicelle				

**Sources: Sürek, "The Contributions of Rice Breeding Activities to Rice Productions and Yield Increase in Turkey", p. 2-3**

Dr. Halil Sürek and his equip have bred and developed 80 rice varieties in the TARI through hybridization and introduction since 1979. They have both produced and sold the seeds of new rice varieties to private seed companies, state hatcheries and rice growers.<sup>67</sup> The research and development expenses of the TARI are received by private sector such as seed companies. The income from sales is used to pay for research and development.<sup>68</sup> In addition to the TARI, Aegean Region Agricultural Research Institute, State Hatchery, and Adana Agricultural Research Institute involved in seed production. For example, while 3,981 ton was produced at the TARI, 178, 926-ton rice in the category of original and elite seed was produced in Turkey in 1982. The seed production of the TARI reached to 50,350 kg in 1999, 70, 200 kg in 2000, and 51,400 kg in 2001. However, private sector entered seed production system in 1998 when the marketing of seed growing sector began.<sup>69</sup> The certified seed production of these rice varieties had been carried out at the TARI. In this context, the TARI have produced 200 tons of elites and original rice seed of more than 20 rice varieties every year. However, because of this import, one million USD had outflow to Italy.<sup>70</sup>

TİGEM produced its rice seed in the Farm of Tahirova. As a matter of

66 G. Manners, "Rice Booms in Turkey". *Rice Today (the IRRI)*, Vol. 12, No. 1, 2013, PP. 26-27.

67 Manners, *ibid.*, p. 26.

68 Akkoyunlu, *ibid.*, p. 11-13.

69 Sürek, "Çeltik Tohumluk İhtiyacımızın Tamamı Yerli Üretim ile Karşılanmaktadır", p. 20-21.

70 Sürek, "Ülkemizde Çeltik Tarımı ve Çeşit Geliştirme Çalışmalarında Elde Edilen Gelişmeler" p. 76.

fact, the use of certified seed and the changing of rice seed in every two or three years prevent rice diseases and the possibility of red rice. Thus, it increased rice quality and yield. However, the use of certified seed is not widespread among farmers.<sup>71</sup> Due to 15 years period and lack of technology, private sectors are not interested in rice seed production too much.<sup>72</sup> In the breeding programs of the TARI, eleven innovative solutions are aimed. These are high yielding varieties with short plant height, lodging resistant for combine harvest, resistant to diseases and pests, cold tolerant at the different growing stages, early or medium maturity time, long and translucent grain types, high mild rice yield, low or medium gelatinization temperature, good response to nitrogen fertilizer, maintaining the purity and the seed production of released varieties.<sup>73</sup>

## 2.c. A Miraculous Rice Variety in Turkish Rice Cultivation: Osmancık-97

However, Osmancık-97 is the most well-known and popular rice variety in Turkish society. Its story started with the suggestion of Osmancık Municipal İ. Avni Kılıç. He demanded a rice variety that is called with the name of Osmancık District.<sup>74</sup> It was produced with the hybridization of Europa (Europe) and Rocca varieties. Then, its adaptation to climate and its resistance to diseases, drought and lodging are tested.<sup>75</sup> Osmancık -97 is high yielding, semi-draft, medium plant height, short, wide, and erect leaves, moderately tolerance to neck and panicle blast, and resistant to endemic diseases. Similarly, it has translucent kernel and high milling yield. The breeding process of Osmancık-97 was between 1982 and 1997. It was selected as pure or candidate for variety with TR-427 code number in 1989 and had tested in nursery in 1990 for three years. Then it was registered to national registration in 1993 and accepted as commercial registration system in 1997.<sup>76</sup> Osmancık has very strong adaptation with regards to climate and soil.<sup>77</sup> From physical characteristics perspective, it has 100 cm of height, its kernel weight is 34-35 gr, its average yield per decar is between 800 and 1000 kg, and its vegetation process is between 130 and 135 days.<sup>78</sup>

71 Sürek, "Rice Production and Its Constraints in Turkey", p. 9; Sürek, et al., "Ülkemizde Çeltik Tohumluk Üretimi ve Sorunları", *Türkiye I. Tohumluk Kongresi*, İzmir, 11-13 Eylül 2022, p. 92.

72 "Melezleme Çalışmaları Pirince Doyacağız", *Focus*, No. 11, 2005, p. 79.

73 Sürek, "The Contributions of Rice Breeding Activities to Rice Productions and Yield Increase in Turkey", p. 2.

74 Sürek, Interview by Author, Bornova, İzmir, 27 June 2022.

75 "Melezleme Çalışmaları Pirince Doyacağız", p. 77.

76 Sürek, "The Contributions of Rice Breeding Activities to Rice Productions and Yield Increase in Turkey", p.6; Sürek, H. (2005). Osmancık 97 Pirinç İthalatını Azalttı ve Çiftçisinin Yüzünü Güldürdü", p. 68; "Pirinç İthalatına Osmancık-97 Freni" *Dünya*, 8 August 2005.

77 O. Şentürk, "Osmancık-97, İthal Pirinç Kovalıyor", *Ekonomist*. Vol. 15, No. 2, 2005, p. 37.

78 M. Özdemir, "Osmancık 97 Çeşidinin Geliştirilme Süreci ve Sektöre Katkıları", *Bizim Market*, 2007.

Osmancık-97 was distributed to farmers for the first time in 1998 but its spread into rice growers in rural areas had taken five years.<sup>79</sup> Then it began to be popular in the beginnings of the 2000s. Osmancık-97 has the most preferred rice variety by farmers, businessmen, rice millers, and consumers in Turkey since 2002.<sup>80</sup> New rice varieties produced at the TARI in Edirne is sent to Samsun, Balıkesir, Çanakkale, Çorum, Çankırı, Kastamonu, Sinop, and Adana.<sup>81</sup> Besides, Osmancık-97 has been cultivated in Bulgaria, Ukraine, Russia, and Greece. For example, Osmancık-97, Halilbey, Durağan, Kırkıpınar, and Gala varieties were registered with their Turkish names in Bulgaria in 2004. The rice that has been bred at the TARI is also sent to the International Rice Research Institute in the Philippines within the scope of a program for the evaluation of genetic material.<sup>82</sup>

In the production chains of rice from field to meal, the demands of rice growers, rice millers and consumers vary. While the first two groups aim at getting higher yield, consumers consider grain quality of rice.<sup>83</sup> Rice had been sold in sack and quite traditional rice milling methods had been used until 1980. On the other hand, it is sold in packet in the market nowadays. The cleaning and the moisture content of rice had not been considered. Unless the moisture content is %14, it cannot be packed.<sup>84</sup> Local rice varieties began to be produced in the 1990s. The breeding of new varieties has been carried out by the TARI and the BSARI. For example, while approximately 80 rice varieties are developed in the TARI, 4 rice varieties were bred in the BSARI such as Karadeniz, Kızılırmak, Bafrayıldızı, Mevlütbey between 2003 and 2012. Furthermore, Osmancık-97 was the most popular rice variety that provide the increase of yield to 820 kg per decare in average in the 2000s.<sup>85</sup>

Thanks to Osmancık-97, the share of foreign rice varieties such as Ribe, Baldo, and Rocca decreased in the 2000s.<sup>86</sup> Osmancık -97 not only increased rice production and yield but also decreased the outflow of foreign currency depending on lower rice import.<sup>87</sup> In this context, Osmancık 97 competed with Calrose rice of the USA.<sup>88</sup> In other words, thanks to Osmancık-97, Turkey became more self-sufficient in rice production, the people could consume rice cheaper,

79 Sürek, "Osmancık 97 Pirinç İthalatını Azalttı ve Çiftçisinin Yüzünü Güldürdü", p. 68.

80 Manners, *ibid.*, p. 27.

81 "Türkiye Çeltikte Söz Sahibi Olmaya Başladı", *Çukurova'dan Mesaj*, 15 December 2011.

82 Akkoyunlu, *ibid.*, p. 12; Sürek, "Ülkemizde Çeltik Tarımı ve Çeşit Geliştirme Çalışmalarında Elde Edilen Gelişmeler", pp. 82-87.

83 Sürek, "The Contributions of Rice Breeding Activities to Rice Productions and Yield Increase in Turkey", p. 2.

84 "Melezleme Çalışmaları Pirince Doyacağız", p. 79.

85 Sürek, "Trakya Tarımsal Araştırma Enstitüsü'nde Dört Yeni Çeltik Çeşidi Geliştirildi ", p. 54; Sürek, "Son Yıllarda Ülkemiz Çeltik Üretiminde Ulaşılan Verim Seviyesi ve Geliştirilen Bazı Yeni Çeltik Çeşitlerinin Verim Potansiyelleri ", p. 73.

86 Sürek, "The Contributions of Rice Breeding Activities to Rice Productions and Yield Increase in Turkey", pp. 4-6.

87 Şentürk, *ibid.*, p. 36.

88 Özdemir, *ibid.*

and the import rice expense of the government decreased.<sup>89</sup> Besides, thanks to Osmancık-97, the income and entrepreneurships of rice growers increased, and a local brand could be created.<sup>90</sup> However, with the breeding of new varieties its cultivation percent decreased from 83 to 73 between 2010 and 2013.<sup>91</sup> Besides, Osmancık-97 could compete with import rice with regards to price.<sup>92</sup>

**Table 4: The Cultivation Percent of Different Rice Varieties in Turkey**

Years		1990	1995	2000	2005	2007	2010	2013
Variety	Origin							
Ribe	Italy	15	13	10	-	-	-	-
Rocca	Italy	40	40	35	5	-	-	-
Baldo	Italy	25	30	30	15	8	2	-
Krosnodarsky-424	Russia	5	2	-	-	-	-	-
<b>Osmancık-97</b>	<b>Turkey</b>	-	-	<b>10</b>	<b>70</b>	<b>80</b>	<b>80</b>	<b>73</b>
Edirne	Turkey	-	-	-	-	5	10	10
Gala	Turkey	-	-	-	-	-	4	9
Halilbey	Turkey	-	-	-	-	3	2	1
Kızıltan	Turkey	-	-	-	-	-	-	3
Gönen	Turkey	-	-	-	-	-	1	1
Others	-	10	10	12	9	4	3	3

**Source:** Halil Sürek, "The Contributions of Rice Breeding Activities to Rice Productions and Yield Increase in Turkey", *Scientific Conference Challenges in Modern Agricultural Production*, Skopje, 2015.

Based on the intensive labor of the specialists of the TARI, rice yield has increased markedly since the mid-1990s. In the consistent rise of rice production and rice yield in Turkey for the last half century, breeding of new rice varieties, the increase of rice cultivated lands, water availability, better pest control, the use of agricultural technology, the cooperation of farmers, the rise of rice prices, the income of rice growers, and improved harvesting have become influential.<sup>93</sup> However, the contribution of the breeding of local rice varieties to rice production is higher than that of the expanding of rice cultivated lands. The rice breeding programs has brought its clear results after the 2000s. In addition

89 "Pirinç İthalatına Osmancık-97 Freni"; Necati Doğru, "Türk Pirinci Çelmesiz Yumurtasız Şampiyon Oldu", *Vatan*, 23 November 2005; Sürek, "Osmancık 97 Pirinç İthalatını Azalttı ve Çiftçisinin Yüzünü Güldürdü", p. 68.

90 Sürek, "Ülkemizde Çeltik Tarımı ve Çeşit Geliştirme Çalışmalarında Elde Edilen Gelişmeler", p. 81-87.

91 Sürek, "The Contributions of Rice Breeding Activities to Rice Productions and Yield Increase in Turkey", pp. 4-6.

92 Sürek, "Osmancık 97 Pirinç İthalatını Azalttı ve Çiftçisinin Yüzünü Güldürdü", p. 69.

93 "The Contributions of Rice Breeding Activities to Rice Productions and Yield Increase in Turkey", p. 2.

to Osmancık-97, laser guided land levelers, modern agricultural mechanization, and expanding credit facilities made possible the increase of rice cultivated areas, rice production, and rice yield.<sup>94</sup> Thanks to high yield in rice cultivation, rice growers can increase their profit before high agricultural inputs such as fertilizer, electricity, and pesticides.<sup>95</sup>

In addition to high yielding rice variety breeding, the TARI provided new opportunities for the development of rice cultivation and harvest technologies such as laser guided land levelers, combine harvesters and seed dryers. Similarly, the institute informed rice growers about the use of fertilizer and pesticides in rice growing through conferences, seminars, publications, TV programs, field days, festivals, and village visits. Thus, rice yield has increased in the last thirty years. Although most of the time the governments have regarded the expansion of rice cultivation areas depends on dams, the TARI has worked on drip irrigation method for water saving.<sup>96</sup> In addition to subvention, the circulating capital of the TARI is about 1,2 billion TL.<sup>97</sup>

## 2.d. The Rewards of Halil Sürek

Since Halil Sürek made great contributions to the development of rice in his forty-one years career, he had been awarded by some civil societies and public institutions. In this context, he has found solutions for the agricultural, technological, and economic problems of rice growers. Thus, Halil Sürek got 2002 service award of Agriculture Engineers Chambers.<sup>98</sup> Sürek was awarded due to his book *Rice Farming* by Rice Milling Associations and Agricultural Engineers Chamber in 2002 in Edirne Provincial Assembly awarded him with a plaque on 7 July 2011. The Minister of Agriculture Mehdi Eker gave a plaque of success in 2013 and finally he got a plaque of fidelity from the President of the Republic of Turkey Recep Tayyip Erdoğan in 2019.<sup>99</sup>

94 Sürek, *Ülkemizde Çeltik Tarımı ve Çeşit Geliştirme Çalışmalarında Elde Edilen Gelişmeler*, p. 72.

95 Manners, *ibid.*, pp. 26-27.

96 Manners, *ibid.*, pp. 27-28; *1970-1980 Yıllarının Çalışmalarının Özeti*, p. 8-9; Sürek, "The Contributions of Rice Breeding Activities to Rice Productions and Yield Increase in Turkey", p. 2.

97 "Melezleme Çalışmaları Pirince Doyacağız".

98 "2003 Yılı Bilim Hizmet ve Teşvik Ödülleri ve Gerekçeleri", p. 5.

99 "Pirinç Değirmencileri Derneği Çeltik Tarımı Kitabımızın Yazarına Plaket Verdi", *Hasad*, 2002; "TAGEM'de İz Bırakanlar Çeltiğin Babası Halil Sürek", p. 22; "Edirne İli Genel Meclisinden Çeltik Uzmanı Halil Sürek'e Plaket Verildi", *Özgür Rumeli*, 21-27 July 2011.

## **Conclusion**

There are mutual and reciprocal relationships between rice and state. On the one hand the government guarantee the staple food need of its population, decline of foreign currency outflow, and decrease of import, and rise of rice production. On the other hand, rice spread and pass down its genes. In this context, rice necessitates the bureaucratic and political intervention of the government from its cultivation to variety breeding works. For example, the enactment of the Rice Cultivation Law of 1936, the foundation of agricultural research institutes, and the signing of international agreement with the IRRI indicate the directive influence of rice. Although the legal regulations of the government in rice farming in the Rice Cultivation Law of 1936 seem very fixed and immobile, the rice research activities of the TARI as a public institution are very dynamic in terms of new variety breeding and collaborations with the IRRI and Vercelli Rice Research Institute.

Whitin the scope of rice research, this study tries to enlighten the scientific research and the contribution of Halil Sürek and the institutional role of the TARI in the breeding of around 80 rice varieties in Turkey. Halil Sürek has contributed to the development of new Turkish rice varieties systematically since 1979. Although rice research had been carried out until the beginning of the 1980s through testing of foreign rice varieties in the agricultural research institute of Antalya, Tarsus, and Yeşilköy Turkey, the concrete results can have been obtained thanks to the introduction and hybridization research of Dr. Halil Sürek and his equip at the TARI since 1979. Among these varieties, thanks to its yield, adaptation, and resistance, Osmancık-97 should be emphasized.

The TARI has not only bred around 80 rice varieties so far but also has been interested in the rice farming methods from cultivation to harvest, rice milling technology, the use of chemicals (herbicides and pesticides), and irrigation water in rice farming. Thus, it can be said that the TARI deals with rice from very comprehensive perspective. Thanks to the rice breeding of the TARI, rice yield, rice production, and rice cultivated lands has increased since 1980s. Thus, both the socio-economic welfare of rice growers has increased, and the outflow of foreign currency decreased depending on lower rice import. Thanks to the effective workings of the TARI, Turkish rice varieties have been met both in national and international arena, rice consumption of people in Turkey has increased from 2,5 kilograms to 9,5 kilograms for the last seventy years, and public-private partnership in the research and development investment increased. This success belongs to Halil Sürek personally, to the National Rice Research Program scientifically, and to the TARI institutionally.

Appendix 1: Rice Varieties developed through Introduction by Halil Sürek

Variety	Country	Registration Year	Characteristics
Rocca	Italy	1983	High yield and good grain quality
Krosnodarsky-424	Russia	1983	High yield, resistant to cold, and tall plant height
Plovdiv	Bulgaria	1983	High yield, resistant to cold
Rodian	Bulgaria	1983	High yield, resistant to cold
Ranballi	Bulgaria	1983	High yield, medium plant height
Veneria	Italy	1986	High yield, medium plant height and sensitive to cold
Aromatik -I	The IRRI	2007	Thin-long grain and aromatic
Siya-I	Introduced from IRRI	2015	Black paddy, short plant height, and early maturity

Source: Sürek, "The Contributions of Rice Breeding Activities to Rice Productions and Yield Increase in Turkey", pp. 1-6; Sürek and Yi, "Rice Breeding and Varietal Improvements in Turkey from 1990 to 2020", pp. 92-101.

Appendix 2: The Rice Varieties bred by Halil Sürek

Pedigree Number	Varieties	Mother and Father Parents	Registration Year	Characteristics
7919-TR19-1-1-1	Ergene	Delta x Zoria	1990	Early maturity
7906-TR6-33-1-1	Altunyazi	Baldo x Ribe	1990	Tall plant height Good grain quality
7922-TR22-4-1-1	Meriç	Delta x Akçeltik	1990	Good grain quality
7913-TR13-34-1-1	Trakya	Baldo x Komsomol-sky	1990	Good grain quality High yield
7981-TR81-3-3-2	İpsala	Rodian x Delta	1990	Good grain quality High yield
79054-TR54-14-1-1	Serhat-92	Rocca x Krasnodar-sky-424	1992	Good grain quality High yield
82035-TR445-9-3-11	Sürek-95	Rocca x Rodina	1995	High yield, chalky grain
82017-TR427-1-1-1-1	Osmancık-97	Rocca x Europa	1997	High yield Cold resistant Adaptability to various environment
82065-TR475-11-2	Kural	Gitna x Ballila-28	2000	Short plant height Good grain quality
83-017-TR635-1-1-2-1	Yavuz	Rocca x 1979-70-1	2000	High yield Good grain quality
84050-TR778-5-1	Demir	Plovdiv x Lido	2000	High yield Short plant height
85035-TR848-1-1	Negiş	Viole Nano x Sequial	2002	Tall plant height, good grain quality
85038-TR851-1.1	Gönen	Bonni x Shin-ei	2002	Tall plant height, good grain quality

88022- TRI047-6-2-1	Kargı	Baldo x Balilla	2002	Tall plant height, good gain quality, tolerant to blast disease and cold
88029- TRI 054-6-1-1	Edirne	Baldo x Calendal	2004	Tall plant height, good gain quality
89019- TRI139-1-1-1-1	Halilbey	İpsala x Veneria	2004	High yield, good grain quality, heat tolerant
90059- TRI251-4-1-227	Ece	8203- TR413-6-1-1 x8260TR470-6-1-1	2004	High yield Short plant height, susceptible to blast disease
91048- TR1323-5-1-2	Kırkpınar	İpsala x 80110-TR253-4-1	2004	Tall plant height, good gain quality
90002-TR1194-5-2-3	Şumnu	Rialto x Korol	2006	High yield Short plant height Tolerant to blast
İpsala Mutation	Beşer	İpsala Mutaion	2006	Short plant height Good grain quality
94010-TR1579-1-2-2	Kızıltan	Veneria x Thainato	2007	Short plant height susceptible to blast disease
4038-TR1607-4-3-1	Durağan	Panda x Baldo	2007	Good grain quality High yield
Selection from Osmancık-97	Gala	Selection from Osmancık-97	2009	Good grain quality High yield
96009-TR1748-1-1-1	Tunca	Rocca x Thainato	2009	Short plant height High quality Good grain quality
98028-TR1943-4-1-1	Çakmak	Trakya x N1-41T-1T-0T	2011	Medium plant height Good grain quality Resistant to blast

96026-TR1765-3-1-1-1	Efe	Baldo x Demir	2011	High yield Moderate resistant to blast High head rice yield
97010-TR1830-4-1-1	Hamzadere	Demir x 83013 - TR631-4-1-2	2011	High yield Moderate resistant to blast
96026-TR1905-3-2-1	Paşalı	Osmancık-97 x 82070- TR480-1-1-1-1	2011	Good grain quality, early maturity
99014-TR1981-5-1-1	Tosya Güneşi	Savio x Baldo	2013	High yield Medium early maturity
99035-TR2002-2-2-1	Manyas Yıldızı	IR66160-5-2-3-2 x Veneria	2013	Fine grain size High head rice yield High yield
2000001-TR2024-5-1-1	Biga İncisi	Baldo x Koral	2013	Long and large grain, early maturity.
2000005-TR2028-2-1-1	Küplü	Baldo x IR25571-31-1	2013	Short plant height, good grain quality
2000064-TR2087-2-1-1	Mis 2013	YRF-204 x Osmancık-97	2013	Aromatic grain, short plant height, good grain quality
2001008-TR2100-1-1-1	Kale	DEMİR X 82079-TR- 489	2013	Short plant height, High yield, high head rice yield
2001061-TR2153-1-1-1	Yatkın	Sürek-95 X 92057- TR467-12-1	2013	Good grain quality High yield
Sürek-Mut-2007-7-1-1	Sürek M711	Sürek-95 Mutation	2013	High yield High head rice yield
2000028-TR2051-3-1-1-1	Balaban	Krasnidarsky-424 x Osmancık-97	2015	High yield Short plant height, medium tolerant to blast
2001002-TR2094-4-2-1	Ülfet	Baldo x Rus Çeşidi	2015	High yield Early maturity

2001047-TR2139-2-1-1	Sarhan	Osmancık-97 x TR765	2015	High yield, high head rice yield.
2004039-TR2330-3-1-1	Boyabatkalesi	Gönen x Ariete	2017	Early maturity, Good grain quality High yield
2004044-TR2335-3-2-1	Gemici	Kırkpınar x Kural	2017	Large grain size, High yield Medium plant height
2007041-TR2521-1-2-1	IMI2521 CL	IMI Çeşit x Durağan	2017	Short plant height, Clearfield variety
2007074-TR2554-2-2-1	IMI2554 CL	IMI Çeşit x Hailibey	2017	High yield Clearfield variety
2007041-TR2521-5-3-1	Sur CL	IMI Çeşit x Durağan	2017	High yield Clearfield variety
2007044-TR2524-4-1-1	Köprü CL	IMI Çeşit x Ece	2017	High yield Short plant height, good grain quality Clearfield variety
2007050-TR2530-4-1-1	Özgür CL	IMI Çeşit x Edirne	2017	Large and long grain, Clearfield variety
2007050-TR2530-2-1-3	Güneş CL	IMI Çeşit x Edirne	2018	Large and long grain, Clearfield variety
2011154-TR3093-1	Rekor CL	Hailibey x IMI Çeşit	2018	High yield Medium early Clearfield variety
IR995586-3-7-14-B	Aslı	O s m a n c ı k - 97xIR83260-1-1-1-5- B-3-1-2-B	2018	High yield Good grain quality, resistant to blast disease
IR99598-2-8-10-1	Zeybek	O s m a n c ı k - 97xIR83260-1-1-1-5- B-3-1-2-B.	2018	High yield Good grain quality, resistant to blast disease

IR99599-1-12	Bereket	HalilbeyxIR83260-1-1-1-5-B-3-1-2-B	2018	High yield resistant to blast disease
2005043-TR2386-2-1-1-1	Yıldız	O s m a n c ı k - 97xThainato	2018	Short plant height High yield Susceptible to blast disease
YRF-204 Mut.19-1-1-3-1	İnci	YRF-204'ten mutasyon	2018	Medium plant height, Thin and long grain Aromatic grain
2011153-TR3092-1	Turbo CL	IMI çeşit x Kızıltan	2019	Shor plant height, High yield, Susceptible to blast disease, Clearfield variety
2007020-TR2500-4-2-1	Değirmen CL	Osmancık 97 x IMI Çeşit	2019	Long grain, medium plant height, Clearfield variety
2011150-TR3089-3	Efsane	IMI Çeşit x Ece	2019	High yield, Short plant height, Clearfield rice
2007083-TR2563-4-1-2	Aga	Rocca x Kızıltan	2019	Short plant height, long grain, high yield, Clearfield rice, susceptible to disease
2007122-TR2602-3-1-1	Haziran	Negiş x Sandora	2019	Very early maturity, good grain quality
2011020-TR2959-1-5-2	Hasat	Kızıltan x IR83260-1-1-1-7-1-2-B	2019	High yield, Resistant to blast
200843-TR2659-2-1-1	Kirişhane	20040TR2343 / Edirne//Osmancık-97/Savio	2020	Short plant height, High yield High head rice yield
20100131-TR2901-1-1-1	TARI 2020	IR83260-1-1-1-2-1-1/Kırkpınar	2020	Long and large grain Tolerant to blast

IRRI 99589-12-1	Yanmaz	Halilbey/IR83260-1-1-18-1-1-3-1-1	2020	High yield Medium early maturity Resistant to blast disease
2011020-TR2959-21-2	Alıço	Kızıltan/IR83260-1-1-7-1-2-B	2020	Short plant height, High yield, Resistant to blast disease
2007044-TR2424-4-2-1	Kristal CL	IMI Çeşit /Ece	2020	Short plant height, long and thin grain, Clearfield variety
2007043-TR2523-1-2-1	Damla CL	IMI Çeşit/Halilbey	2020	High yield Early maturity Tolerated to blast disease, Clearfield variety
2013164-TR3451-1	Ormanlı CL	IMI Çeşit / Osmancık-97	2020	Osmancık 97 type High yield Good grain quality, Clearfield variety
2013167-TR3454-1	Pınar CL	IMI Çeşit/Negış	2020	Long and large grain, medium early maturity, Clearfield variety
2012180-TR3274-6	Reis CL	Osmancık-97 / IMI Çeşit	2020	Osmancık 97 type High yield Good grain quality, Clearfield variety
2013170-TR3457-6	İskender CL	IMI Çeşit/Halilbey	2020	Halilbey type High yield Good grain quality, Clearfield variety

2007047-TR2527-8-1-1	Yaprak CL	IMI Osmancık-97	Çeşit/ Creso	2021	Short plant height Short and wide leaf, Clearfield variety
2008020-TR2636-3-1-1	Kosa	Osmancık-97x	Creso	2021	Short plant height, Osmancık 97 type, high yield,
2009067-TR2742-5-1-1	Kumru	Kızıltan x Tsenf Tao	Chiang	2021	Short plant height, Early maturity
ABT2	Payidar	Kızıltan x Bereket		2022	Short plant height, High yield, early maturity, good grain quality
ABT6	Çakabey	Kızıltan x Saesangju		2022	Resistant to blast disease High yield, good grain quality Medium plant height, Resistant to blast disease

Source: Sürek, "The Contributions of Rice Breeding Activities to Rice Productions and Yield Increase in Turkey", pp. 1-6; Sürek and Yi, "Rice Breeding and Varietal Improvements in Turkey from 1990 to 2020", pp. 92-101.

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