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The rice market in Italy: supply, global competition and the Common Agricultural Policy

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Summary

The aim of this thesis is to examine the Italian rice market through both qualitative and quantitative analyses, focusing on the perspective of primary producers in the sector.

The first chapter explores the historical origins of rice and describes its botany, classification and soil and climate characteristics. The evolution of cultivation techniques and the mechanisation of rice farming is explored, including the advantages and challenges related to economies of scale and the multifunctionality of the sector, thanks to the information in the book "La risicoltura italiana oltre la PAC".

The second chapter focuses on supply side analysis, examining rice production in Italy, Europe and Worldwide. Production trends and prices are analysed, highlighting the role of the Ente Nazionale Risi in regulating the market and stabilising prices, as well as the economic difficulties Italian producers face due to rising costs and increasing international competition.

The third chapter is dedicated to trade flows, with a focus on Italian rice exports to the EU and non-EU countries. It discusses the impact of imports from low-cost countries and the effect of trade policies.

The fourth chapter offers a thorough analysis of Tenuta Colombara and the Acquerello brand, exploring the market strategies, the success of the brand and the positioning of Acquerello as a high quality product, both on the national and international markets. The analysis of this company was conducted with the objective of understanding the value and effectiveness of differentiation in the rice market, highlighting how the adoption of strategies of differentiation can constitute a significant competitive advantage.

The fifth chapter focuses on the preferences and purchasing habits of Italian consumers, describing the product types, main purchasing channels and trends that are influencing rice consumption. The use of new varieties, such as sushi rice, and the introduction of derived products, such as Soju, into the Italian market are also discussed.

The sixth chapter discusses the Common Agricultural Policy (CAP) of 2024 and its implications for the Italian rice sector. The new derogations, premiums,

penalties and derogations for young farmers are analysed, with a focus on sustainability and competitive efficiency.

The conclusions of the thesis highlight the potential and challenges of Italian rice farming, emphasising the importance of sustainable policies, technological innovations and quality differentiation strategies to ensure the sector's competitiveness at national and international level.

Abstract

This thesis examines the rice market from both qualitative and quantitative perspectives, focusing on primary producers. It explores the main players in the sector, global competitive dynamics, and the external context in which the rice farmers operate, with particular emphasis on the Italian market. Additionally, the research investigates how the agricultural industry can differentiate itself through innovation and marketing strategies. The successful positioning of the Acquerello company is analysed, highlighting its blend of tradition and innovation. Furthermore, the study evaluates the changes and reforms associated with the Common Agricultural Policy (CAP) 2024.

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1. The origin of rice

Rice has a history dating back thousands of years, with its origins located in South-East Asia, an area characterised by an abundance of water and a tropical or subtropical climate. Palaeobotanical research has identified fossil remains testifying to the presence of rice more than 10,000 years ago.

Asian culture is rich in traditions related to this plant. A significant example is the Chinese emperor Chin-Nong, who in 2800 B.C. required members of his imperial family to take part in crop sowing ceremonies, reserving the sowing of rice, considered a sacred plant, for himself. This spiritual character of rice still persists in some cultures today; in Indonesia, for example, there are still rice "priests" who are responsible for determining the best times for the cultivation stages.

Starting in the 7th century A.D., rice began to spread to the West. Through Alexander the Great, rice cultivation spreads to Mesopotamia and later to Greece and Macedonia, where ruler Seleucus I promoted its cultivation for food and alcoholic beverages. Egypt also quickly discovered the potential of this plant, with the first evidence of rice trade dating back to the 1st century AD.

The transition from the Greek to the Roman world marks another important development in the history of rice. Horace refers to rice in his writings, especially for its medicinal and cosmetic applications. During the Middle Ages, rice continued its course until the Renaissance, and by the end of the 19th century it was playing an increasingly important role in European food. The first documented attempt to cultivate rice in the United States dates back to 1647 in Virginia.

In Italy, the oldest evidence of rice cultivation is dated 1846 and comes from Florence. In a letter, Leonardo Colto dei colti asks for permission to cultivate rice under the Medici seigniory, suggesting that the practice was already known in the region

1.1 Rice Botany

1.1.1 Oryza L.: Species-subspecies and life cycle

Rice belongs to the Gramineae family, a group of plants that also includes crops such as wheat, barley and oats. The reference genus is *Oryza L.*, which is part of the Oryzae tribe, consisting of 12 genera. However, only two genera are of food interest: *Oryza* and

Zizania. Within the genus *Oryza*, the two commercially cultivated species are *Oryza sativa* and *Oryza glaberrima*, while the others are mostly wild.

Oryza sativa is the most widespread species worldwide and is divided into two main subspecies: *Japonica* and *Indica*. The *Japonica* subspecies is characterised by a rounded grain, while the *Indica* has a longer and sometimes very thin, almost needle-like grain. In Italy, rice cultivation is traditionally linked to the subspecies *Japonica*, and this dates back to when rice farming became established in the country. However, in recent decades, some varieties of the *Indica* subspecies have also been introduced, responding to the growing demand of a European consumer who increasingly uses rice as a side dish as well as a main course.

The cycle of rice, which belongs to the **Oryza sativa** species, follows an annual cycle. After sowing, usually in spring, the plant matures within a period of between 140 and 180 days. Germination of the seed leads to the formation of the embryonic rootlet, which evolves into secondary roots called seminal roots. Approximately 90 to 100 days after germination, the flowering phase begins, in which the flowers, enclosed by "glume" and "glumelle", open and release pollen. The feathery stigma facilitates pollen collection, initiating fertilisation and subsequent formation of the rice grains, a process that lasts between 40 and 60 days.

1.1.2 The seed: anatomy and development

Rice, commonly known as "paddy rice" or "rough rice", consists of a caryopsis covered with a husk called "gluma" (Figure 1.1).

How a grain of rice is composed

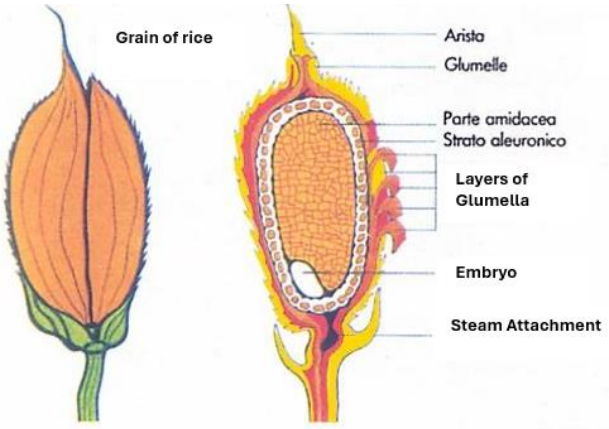


Figure 1.1 – Source: Website

In the most cultivated rice varieties, the ratio between the weight of the husked caryopsis and that of the gluma is generally 80% versus 20%. The rice seed contains a mineral-rich embryo, which provides the plant with all the necessary substances for the initial stages of growth. The formation and ripening of the caryopsis occurs at varying times depending on the genetic variety, but embryo formation is always completed within 15 days after flowering.

For varieties cultivated in Italy, the earliest genotypes take about 30 days to reach maturity, while the later ones can take up to 70 days. Subsequently, the caryopsis fills with nutrient reserves, starting from the swelling of the base until it elongates and then dries out.

1.1.3 Roots: Anchorage and Nutrition

Rice roots perform a dual function: they mechanically anchor the plant to the soil and absorb water and essential nutrients from the soil. The root system is fascicled and consists of a set of roots that grow progressively as the plant develops. After germination, the embryonic rootlet evolves into secondary roots, which enhance the plant's ability to absorb vital resources. During the early stages of growth, these roots remain mainly near the surface; however, with the onset of the tillering phase, in which the plant produces secondary shoots, the roots begin to develop deeper. At the end of this phase, the root system reaches maximum development, constituting approximately 10-12% of the plant's total dry mass on the eve of flowering. In this advanced growth phase, the collector also develops, which will lead to the formation of the primary stem.

1.1.4 The stem: structure and growth

The rice stem, known as the culm, is composed of a succession of nodes and internodes that give structure to the plant. A few days after germination, the main stem is formed, and during the tillering phase, secondary stems develop from the basal internodes. The number of these secondary stems can vary depending on several factors, including climatic conditions, genetic characteristics, nutritional availability and soil oxygenation. Under temperate climatic conditions, a rice plant is capable of producing 1 to 3 stems capable of developing inflorescences. As growth progresses, the stem evolves into a hollow structure with full nodes, similar to other grasses such as wheat. The leaves, arranged alternately along the stem, vary in number from 5 to 7 per stem, depending on the variety.

1.1.5 The Leaves: Photosynthetic Capacity and Adaptation

Rice leaves are arranged alternately along the stem, and their number is proportional to the number of well-developed internodes. Each leaf consists of a sheath that wraps around the stem and a leaf blade. The leaves can vary in colour, ranging from green to purple-red, and have intense pigmentation along the midrib and edges. The first leaves to form tend to dry up quickly, while only 2-3 leaves remain active during the maturing phase of the plant. The last developed leaf, known as the "flag leaf", is the one that retains the ability to carry out photosynthesis for a longer period. In addition, the mature leaves have distinctive features such as the ligule and auricles, which are often covered with small hairs, offering additional protection to the more developed leaves.

1.1.6 The Inflorescence: The Panicle and Flowers

The inflorescence of rice is a branched panicle, called panicle, which develops at the apex of each culm. The branches of the panicle bear the spikelets, which contain the rice flowers. The spikelets are enveloped by glume and glumella, which protect the rice grain, also known as the caryopsis. The arrangement of the branches, the length of the panicle and the number of flowers vary depending on the variety of rice.

The rice flower is hermaphrodite, endowed with a gynoecium and androecium. The feathery stigma of the gynoecium facilitates pollen collection, while six stamens produce the pollen necessary for fertilisation, which occurs mainly in an autogamous manner, so the pollen fertilises the flower itself.

1.2 Pedoclimatic Characteristics

Rice has high requirements in terms of temperature and water availability, which is why it is particularly well suited for cultivation in humid areas of the tropics and subtropics, which are often subject to submersion. In fact, this plant has a good tolerance of water saturation in the soil.

Ideal temperatures must be high and constant, as rice is very sensitive to temperature fluctuations. In equatorial regions, where temperatures remain consistently high, 2-3 harvests per year are possible. In temperate climates, on the other hand, cultivation is limited to the spring-summer season and requires irrigation systems that also perform thermoregulation functions. The growth cycle, from sowing to ripening, varies from 150 to 180 days.

As far as water is concerned, rice can only be grown without irrigation in areas where rainfall averages over 200 mm per month for a period of 3-4 months.

In Italy, where the climate is temperate and rainfall is insufficient, rice is usually grown in submerged soils. In this way, water not only satisfies the plant's high water needs, but also provides valuable thermal support, contributing to direct heating and temperature regulation.

1.3 Classification and varieties

1.3.1 Commercial Classification: Regulations and Main Categories

The commercial classification of rice is regulated by both Italian and EU legislation, with parameters varying according to the physical and compositional characteristics of the grain.

In Italy, rice classification is based on Law No. 325 of 18 March 1958, pending the approval of a new internal market law. Rice is divided into four main groups based on parameters such as the size of the milled grain, the ratio between the length and width of the grain, its consistency and the degree of pearling.

Each year, a Ministerial Decree establishes the names of paddy rice varieties and the corresponding rice varieties, also taking into account new varieties registered.

The subdivision groups are as follows:

- Common or Original: characterised by small grains and a round shape. During cooking, which takes about 12-13 minutes, it releases a significant amount of starch, making it ideal for dishes such as soups, timballi and desserts. Some of the most popular varieties of this type are Auro, Balilla, Cripto, Originario, Pierrot, Raffaello, Rubino and Selenio.
- Semifino: medium-sized grains, slightly elongated and rounded, it is particularly suitable for dishes such as minestrone, supplì, timballi and risottos requiring mantecatura, thanks to its ability to release starch. This rice takes 13-15 minutes to cook and its varieties include Italico, Lido, Maratelli, Padano, Romeo, Rosa Marchetti and Vialone Nano.
- Fino: longer, tapered grains, cooks in about 14 minutes and is prized for its versatility. It is often used for the preparation of timballi and supplì. Varieties include Ariete, Cervo, Drago, Europa, Loto, Razza 77, URB, Ribe, Ringo, Rizzotto, Sant'Andrea, Smeraldo and Veneria.

- Superfino: large and high quality grains characterised by stable cooking and minimal starch release, making it perfect for salads and dishes such as paella, where the grains must remain well separated. Among the best known varieties are Arborio, Baldo, Carnaroli, Corallo and Roma.

1.3.2 European Classification of Rice: Size Parameters and Amylose Content

At the European level, the classification of rice follows EU Regulation 1308/2013, which only considers the length of the milled grain and the ratio of grain length to grain width. Based on these parameters, rice is classified into:

- Round Grains: length of 5.2 mm or less, with a length/width ratio of less than 2 mm;
- Medium Grain: length greater than 5.2 mm and equal to or less than 6.0 mm, with a length/width ratio of less than 3 mm;
- Grain Long A: length greater than 6.0 mm, length/width ratio greater than 2 mm and less than 3 mm;
- Grain Long B: length greater than 6.0 mm, with a length/width ratio of 3 mm or greater.

A further classification of rice can be made according to the apparent amylose content, which distinguishes rice into:

- Waxy rices: apparent amylose content between 0 and 2%;
- Very low apparent amylose rice: 2-10%;
- Low apparent amylose rices: 10-20%;
- Intermediate apparent amylose content rices: 20-25%;
- High apparent amylose content rices: over 25%.

1.4 Mechanization in rice farming: evolution and impact over time

Agriculture is one of the oldest and most fundamental human practices. Since prehistoric times, humans have developed primordial tools to cultivate the land, dig the soil and harvest the fruits of nature.

Archaeological finds show the use of sharp tools to carve the soil and harvest edible plants, with the earliest examples of plough-like tools already in this period. However,

the real agricultural revolution, which led to modern agriculture, developed over centuries and peaked in the 20th century with the introduction of mechanisation.

Until relatively recent times, agriculture was an essentially manual activity, supported by animals. Ancient civilisations, such as the Mesopotamians, Egyptians and Romans, used wooden ploughs pulled by oxen, while much of the agricultural work was done by humans. The tools used were simple but adapted effectively to local needs and the type of crops.

A clear example of the impact of agricultural mechanisation can be observed in rice cultivation, which has undergone a radical transformation thanks to technological innovations. The layout of rice fields, which in the past was adapted to the unevenness of the terrain through the construction of numerous curvilinear embankments, has been revolutionised by the introduction of machines. Today, modern rice fields are organised in large, regular plots, optimising the use of machinery for ploughing, harrowing and levelling.

Modern equipment allows efficient soil preparation, facilitating water management, crucial for rice farming.

1.4.1 Ploughing

During the period from winter to spring, generally after mid-March, the soil is ploughed. In the past, this operation was carried out by farmers, initially with the help of oxen and, later, horses. Today, however, tractors are equipped with implements with large steel blades that cut and turn the soil more efficiently.

Ploughing has several purposes: to aerate the soil, facilitate fertiliser incorporation, bury organic matter and remove weeds. After ploughing, it is essential to level the soil to create a perfectly level “chamber”, without irregularities or holes, which could hinder precise water control. A well levelled seed bed is essential for optimal technical and economic results in rice cultivation. Indeed, irregularities in the soil can compromise water management, fertiliser distribution uniformity and regular plant growth.

In the past, in order to level the rice fields, water was poured in, which acted as a leveller to detect any unevenness or depressions. Women took care of smoothing out the unevenness with hoes, while a rider used a “spianone”, a wooden plank pulled by a horse, to level the ground. This practice was particularly tiring, as it took place barefoot in the cold early spring water.

Today, ground levelling is done on dry soil using a laser level. In this method, a stand with a transmitter is positioned in the field, sending a laser signal to a receiver mounted on the tractor. This system automatically raises or lowers the spirit level, ensuring precise ground levelling.

At this stage, it is crucial to consolidate embankments to prevent landslides and keep ditches and canals clean. In addition, it is important to fix the sluices, which allow water to pass through and adjust the difference in level between the various rice fields.

1.4.2 Harrowing

Harrowing is a fundamental step in tillage, aimed at breaking the surface crust that forms after levelling. In the past, this operation was performed using a fixed harrow, pulled by a horse and manoeuvred by a farmer. Women also contributed by hoeing, a method of land clearing that required considerable physical effort. Today, however, they use a harrow pulled by a tractor, which allows the work to be done more efficiently.

The importance of harrowing lies in its ability to aerate and oxygenate the soil, thus improving conditions for plant growth. This tillage is essential not only to facilitate the incorporation of fertilisers into the soil, but also to ensure optimal sowing of rice, creating a favourable environment for seedling development.

1.4.3 Sowing in water - Scattering

Until about forty years ago, rice was grown in small plots called seedbeds, from which the seedlings were transplanted by hand by the mondine. In this process, a farmer or youth would throw bundles of rice into the water, while the mondine planted the seedlings in the moist soil, walking backwards, side by side. This method was labour-intensive and, over time, was gradually replaced by direct sowing, which has become practically the only method of rice cultivation in Italy.

Sowing takes place in April, immediately after the rice fields have been flooded. It is crucial to choose the right time to sow; in fact, if you sow too early, you risk too low temperatures, as the water used for flooding comes mainly from the Dora Baltea, with temperatures around 10 degrees at this time. Water plays an essential role in thermoregulation during the first weeks of seedling growth, preventing extreme temperature changes between day and night. It stores heat during the day and releases it during the night, thus maintaining a constant temperature. In addition, water can be

quickly introduced or removed depending on the weather conditions, helping to manage the development of algae, weeds and pests and to promote the ripening of the rice.

Today, we know exactly how long it takes from sowing to harvest for all rice varieties.

Usually, even for the later varieties, sowing does not extend beyond the first ten days of May in order to avoid having to harvest in late autumn, a period when the risks of rain and bad weather increase.

In recent years, the technique of late sowing, which takes place between the second and third decade of May, has become widespread in order to combat the “crodo rice”, weed. This practice is also encouraged by the increasing rationalisation of water use, which is distributed gradually. Late sowing allows the application of “false sowing”, a traditional technique in which the soil is prepared and irrigated as for normal sowing, but the seed is not actually distributed. This stimulates the germination of weed seeds, such as crocus, which are then mechanically removed with the harrow.

Before sowing, the paddy rice seeds are immersed in water to revitalise them and to increase their weight so that they sink instead of floating. This procedure reduces the risk of floating of the seeds, which might otherwise have difficulty taking root, and ensures an even distribution of future seedlings. Sowing in water, known as “scattering”, is done by scattering the seeds in bulk using a mechanical turntable. Today, this stage is further improved by the use of GPS satellite systems, which allow greater precision and less waste of seed.

1.4.4 Sowing in dry

An alternative to traditional water sowing is “dry” sowing. This method involves the use of a machine attached to the tractor, which prepares the soil by creating spaces for the seeds, which are then distributed in long rows. This is followed by “rolling”, a phase in which the seed is buried. In this way, the seed has the opportunity to emit a “radicle” that develops downwards and a stem that grows upwards.

Approximately one month after sowing, depending on the rice variety and weather conditions, water is injected into the paddy field. From then on, the field is subject to a careful drainage and irrigation regime.

However, dry sowing has a downside: it encourages the expansion of the weed “crodo rice”. This plant, very similar to rice, has distinctive characteristics, such as the tendency of the caryopses to detach from the panicle and fall to the ground before harvesting. The

“crodo” is easily recognisable because it grows taller than rice and its grains have a reddish colour. When ripe, the grain does not remain attached to the ear, but falls to the ground, making harvesting impossible. This pest is particularly dangerous as it matures earlier than rice and its grain, known as crodo, is very hardy and able to reproduce for years, infesting rice fields in an uncontrolled manner. The spread of crodo can lead to a significant loss of production, reducing both the quantity and quality of the harvest.

Despite these risks, dry sowing offers some advantages, especially in paddy fields affected by fermentation problems due to the decomposition of organic matter. Furthermore, this method can limit the proliferation of algae and aquatic weeds such as Alisma, Cyperus difformis and Heteranthera.

Dry sowing can also help reduce the emission of water vapour into the atmosphere and reduce the lodging of tall varieties, such as Carnaroli rice, which tend to reach higher than normal heights.

1.4.5 Rice weeding (monda-manual mowing)

Regardless of the sowing method used, whether in water or dry, rice fields are always subject to the proliferation of weeds. These weeds can compromise rice germination, making their control crucial. Weeds are managed through a combination of approaches: cropping systems such as crop rotation, mechanical practices such as ploughing and harrowing, and the use of chemicals such as herbicides and herbicides. There are also ecological methods, which include the use of natural products and manual mowing.

However, the excessive use of chemicals can lead to resistance and the development of new weed species that are difficult to control. This issue has prompted some companies to restore traditional methods, such as manual mowing.

Traditionally, “monda” work was entrusted almost exclusively to the mondine, or “mondariso”, women who worked seasonally in the rice fields. These workers were responsible for transplanting rice seedlings and removing weeds, an activity known as “monda” (from the verb ‘mondare’, meaning to clean). Monda consists of removing weeds that, if left unchecked, can stifle rice growth.

The work of monda is extremely complex and tiring. The women, bent forward with their feet and hands immersed in water, move side by side to weed out the weeds, many of which can resemble rice seedlings and require an expert eye to recognise.

In the past, the work was done in teams, each of which had a representative, known as a “capo” or “capa, who coordinated the activities.

The monda begins about a month after sowing and can last 45 to 50 days, lasting until the end of June. In some exceptional cases, work may continue even until the end of July.

1.4.6 The Harvest

Choosing the optimal time to harvest rice is crucial and presents several difficulties. These difficulties arise from variations in the speed and uniformity of ripening, which depend on many factors, including different rice varieties. During the ripening process, the starch accumulated mainly in the last two leaves is transferred to the caryopses, the dry fruits of the plant. The complete grain formation occurs gradually, with the maximum length of the caryopsis being reached between 25 and 30 days after flowering, usually between September and October. The width and thickness of the caryopsis, on the other hand, increase rapidly around 30 days after fertilisation.

Until 1950, harvesting was done manually using a sickle. In the 1950s, with the introduction of self-propelled combine harvesters by the Ente Nazionale Risi, mechanisation began to spread, leading to significant improvements in harvesting. Today, the harvesting process is carried out exclusively with combine harvesters, whose technology has reached very high levels of perfection in recent years. In Italy, most harvesting takes place in September and October.

The freshly harvested rice is known as paddy or rough rice. It is covered with glumes, which are rigid, inedible husks that protect the grains during the milling process.

1.4.7 Drying and Storage

Freshly harvested rice has a high moisture content, which must be reduced by a drying process. This step is crucial to minimize microbial activity, reduce product respiration and stabilize the rice itself. In the past, drying took place in the barns of the farms, where the grains, still covered by the husk, were scattered on the soil exposed to the warm autumn sun. To prevent fermentation and ensure a uniform reduction in moisture, the rice was mixed manually every day.

Today, however, modern dryers are used which supply hot air at variable temperatures. These plants can be static, daily or extended cycle, or dynamic, where the product is

moved intermittently or continuously. After harvesting, the rice is transported to the spaces under the porch where it is unloaded and stored.

However, it is not possible to accumulate large quantities of rice due to the high moisture content, which could lead to fermentation. Therefore, drying should be done quickly, within 15-20 hours of harvesting, to avoid fermentation problems.

Before entering the rice dryer, it is sieved and screened to remove straw residues, weed seeds and impurities. The rice then enters the drying body, where the hot air and continuous movement of the product promote a uniform reduction in the moisture content. The drying methods are crucial for the quality of the product: moisture losses too fast can cause cracks or breakage of the caryxids.

At the end of the drying process, the rice undergoes a controlled cooling cycle to bring it back to room temperature without stressing the grains. After cooling, the rice is ready for storage and further cleaned by ventilation and screening to remove any drying residues. The rice is then stored in silos.

1.4.8 Mechanization and uneven development around the world

Despite rapid technological progress, the spread of agricultural mechanisation has not been uniform throughout the world. In western countries, such as Europe and North America, agricultural industrialization has become a well-established reality already in the 20th century.

In contrast, in other regions such as Eastern Europe, South America, Africa and Asia, the high cost of agricultural machinery and lack of infrastructure have limited the spread of mechanisation. As a result, large areas of arable land have remained uncultivated and unable to exploit the full potential offered by mechanisation.

1.4.9 The evolution of mechanization in recent times

The evolution of agricultural mechanization can be effectively illustrated through the analysis of the tractor, considered the main machine of agriculture.

In the 80s of the last century, the tractor, initially built with a mainly mechanical technology, transformed from simple traction machine to mobile power plant, thanks to the introduction of the power take-off and three-point attachment. In 1980, The number of registered tractors in Italy reached 66,000 units, with an average power of 45 kW, while

the number employed in agriculture was about 3 million. At that time, the workforce was still very present and the mechanisation linked to the tractor was technologically underdeveloped, requiring no special skills.

At the end of the 1980s, electronics began to be used in agricultural machinery. Registration fell to about 40,000 units, the average power output increased to 50 kW and the number of agricultural workers fell to just over 2 million. Although the proportion of the workforce remained high, there was an increase in the power output of registered tractors, but without any significant innovations.

In the 1990s, agriculture 2.0 was replaced by agriculture 3.0, thanks to the introduction of mechatronics, the result of the integration between mechanics, computer science and electronics, and digitization. This phase led to the development of proximity and remote sensing, the implementation of satellite geolocation devices (GPS, RTK), and increasingly sophisticated software, powered by an increasing flow of data and information. This information, provided not only by ground-based sensors and machines, but also from other sources such as the Sentinel-2 multispectral images of the Copernicus programme, have enabled the generation of prescription maps and vegetation indices, such as those of vigor and water stress, providing support for decisions for proper smart farming.

Today, the tractor is no longer just a mobile power plant but has become a mobile data acquisition and output station, capable of collecting information on all agronomic parameters and, thanks to remote control systems, to implement field operations.

Mechanisation has radically transformed the agricultural landscape, increasing productivity and changing the way in which people cultivate. Agriculture is today a highly technological and specialised activity, capable of meeting the food challenges of the future. The continuous evolution of mechanization, combined with technological innovation and new sustainable practices, promises to make further progress, with the aim of making agriculture more efficient and environmentally friendly.

1.5 Evolution of Italian rice farming

1.5.1 Economies of scale

The consolidation of areas has reduced production costs, especially for larger farms. They are able to exploit economies of scale, spending around 3,600 euros per hectare, a value

far lower than small farms operating on fragmented land where costs per hectare are higher due to lower operational efficiency and difficulty in introducing mechanisation.

An obvious example is Piedmont, where the largest rice farms manage areas of 60-70 hectares, achieving a significant reduction in operating costs through mechanisation and efficient farming practices. In the areas of Ferrara and Oristano, farm land varies between 30 and 50 hectares, but the advantage of the concentration of property remains evident.

The size of the Italian rice enterprises and their organisational structure are crucial elements for their competitiveness. Although the average size of Italian rice farms is higher than the national average of other countries, they remain small compared to the main international competitors, this leads to fragmented supply and limited coordination capacity throughout the supply chain. In addition, many Italian companies are family-run and operate on a small scale. While this model offers flexibility and professionalism, it limits access to financial resources and reduces the capacity to invest in technologies and innovations.

Farms that have adopted modern resource management practices, such as precision farming, have achieved significantly better results than the industry average. The specialized rice farms achieve a unit yield of about 137,000 euros, a value 4.5 times higher than the Italian agricultural average and about 11 times higher than that of cereal cultivation. This productivity increase is accompanied by high work efficiency, with rice farms requiring only 6 working days per hectare, compared to the 11 days needed in cereal farming. Overall, rice farms employ around 400 working days per year, a much higher value than other crops, but justified by the larger area managed and intensive use of modern technologies.

Improved operational efficiency through mechanisation has reduced processing times, allowing companies to process larger areas with fewer resources. Large farms, which have invested in advanced machinery, have seen a significant increase in productivity, with a yield per hectare that in some areas of Piedmont reaches 2,160 euros, compared to the national average of about 1,900 euros per hectare. This reduction in costs and the increase in productivity have enabled companies to compete more effectively, especially in an increasingly challenging market.

In conclusion, economies of scale are essential for the competitiveness of farms, especially in the rice sector where mechanisation and land consolidation play a key role in cost containment. Larger rice farms are able to maximise the benefits of economies of

scale, improving operational efficiency and reducing production costs, with direct effects on overall profitability.

However, smaller firms tend to be at a disadvantage as they are not always able to implement the same modern practices and benefit from the same economies of scale.

Nevertheless, modern technologies such as precision agriculture offer an opportunity for all businesses, large and small, to improve their economic performance and reduce operating costs.

1.5.2 Multifunctionality

Modern rice farming has adopted the concept of multifunctionality, which is considered essential to meet present and future challenges in the agricultural sector. In the past, agriculture was seen primarily as a food-producing activity; however, over the years its role has expanded to include social, environmental and cultural aspects.

Multifunctionality began to expand in the 1980s, when agriculture was recognised not only as a source of food but also as a provider of goods and services of public and social importance. This innovative approach was formalised in the 1990s, at the 1992 Rio de Janeiro Conference, and found application in European agricultural policies with Agenda 2000, as highlighted in the book of Elena Baici, Cinzia Mainini.

Today, multifunctional farms are valued not only for their ability to produce goods and services for the market but also for generating collective benefits for local communities. This process of diversification has three main dimensions: economic, environmental and social.

The economic dimension remains central to agricultural activity, although there is a growing interest in social and public aspects. In recent years, farms have had to adapt to new consumer preferences by investing in value-added products such as organic and certified. Between 2010 and 2020, these niche productions increased by 30%, opening up new market opportunities.

In addition to food production, multifunctionality extends to non-food sectors such as the supply of raw materials for the textile, cosmetics and pharmaceutical industries, thus contributing to further diversification of income sources for farms.

Regarding the environmental impact, agriculture has a significant influence on the ecosystem, using natural resources and generating both positive and negative effects. In this context, rice farming plays a crucial role in water management and sustainable

practices. In recent years, the pressure to reduce the environmental impact of agriculture has increased significantly. It has been estimated that farms that adopt environmentally friendly practices, such as conservative farming and precision farming, have achieved a 20% reduction in emissions and a 15% improvement in water efficiency.

From a social point of view, multifunctional agriculture offers significant opportunities for welfare in rural areas, helping to maintain jobs and promoting social inclusion. Social farming activities, such as farm holidays and educational projects, have been shown to improve the quality of life in local communities, with a 10% growth in farm activities from 2015 to 2020.

Italian rice farming has already adopted the concept of multifunctionality, although practices vary considerably. Most of these initiatives are focused on the environment, often in response to strict regulations, but awareness of economic and social opportunities is also growing, such as the expansion of rural tourism and direct sales.

One key element of multi-functionality is the service provision, which involves the integration of complementary services such as farm accommodation and educational projects. This phenomenon generates positive effects, contributing to social and environmental well-being, although it presents challenges such as the increase in bureaucracy and difficulties of coordination between different actors.

Diversification of sources of income enables farms to cope better with fluctuations in the agricultural market.

Despite the costs associated with managing negative externalities, the opportunities offered by multifunctionality are immense.

Future agricultural policies will have to address the challenges of this transition, focusing on coordination and sustainability.

Investing in innovation, sustainable development and social inclusion will be essential to ensure a prosperous future for the agricultural sector.

2. Supply analysis

Supply Analysis is a research and analysis done to understand the supply trends and responses to changing market and production variables. This chapter is an update of the analysis initially conducted in the thesis of Riccio Elisa, enriching the data with the latest trends and key developments in the sector.

2.1 Rice production in Italy

Between the 1950s and 1980s, Italian rice farming experienced a significant expansion phase, aided by improved agricultural technologies and the adoption of more efficient production practices. However, as highlighted in the book of Elena Baici, Cinzia Mainini this increase in production has been accompanied by a decrease in the number of farms, due to economic difficulties and increasing costs.

Today, the Italian rice farming scene includes over 4,000 companies, but in the last thirty years there has been a marked decline in the number of companies active in this sector. Between 1982 and 2017, around 1,800 companies closed down, especially in the first decade of this period. The main reasons for this reduction include insufficient profitability, rising production costs and increasing international competition.

Smaller companies have found it very difficult to compete, especially in a context of increasing globalisation. Many of these companies have opted for specialisation and innovation to meet the challenges of the global market. Those that have invested in advanced technologies, such as state-of-the-art irrigation systems and high-yield rice varieties, have outperformed in terms of productivity and profitability.

However, significant territorial gaps remain. Some regions are disadvantaged due to less favourable climatic conditions, inadequate agricultural infrastructure and difficulties in accessing finance. Companies operating in these areas have shown a lower capacity to innovate and a slowdown in the increase of production yields.

Production is increasingly concentrated in the hands of a small number of farms, with an increase in yields per hectare and a growing need for storage and reuse space. This reflects a sector adapting to new market conditions and climate challenges. However, the territorial disparities and the continuous reduction in the number of farms remain crucial issues for the future of Italian rice farming.

In 2022, the area allocated for rice cultivation settled at 218,421 hectares, showing a decrease of 8,617 hectares (-3.8%) compared to the previous year, as can be seen in *Figure*

2.1. The reduction in the area cultivated with Long A rice was offset by an increase in the sector of Round and Long B grains. However, an agronomic trend influenced by the most significant drought in the last 70 years led to a reduction in production, which reached 1,269,218 tons, marking a decrease of 15.2% compared to 2021 (1,496,545 t).

The overall agronomic yield of 2022, at 5.81 t/ha, was lower than that of 2021 (6.59 t/ha), while the quantity of processed rice available for sale, amounting to 746,784 tons, decreased by 19% compared to the previous season (925,818 t), mainly due to a lower processing yield (0.609 compared to 0.637). Producers sold a total of 1,167,495 tons of processed rice to the processing industry and traders, corresponding to 90% of the total availability for sale; this represents a decrease of 273,136 tons (-19%) compared to the previous season. Monthly transfers during the 2022/2023 season were lower than those of the previous season until April, but subsequently, they recorded higher levels until the conclusion of the season.

The decrease in the area allocated to rice cultivation in 2022 is likely to reflect a number of factors, including changes in agronomic practices, adverse weather conditions such as drought, and economic considerations of producers.

Monthly producer transfers 2022/2023 vs 2021/2022

(Tonnes of paddy rice)

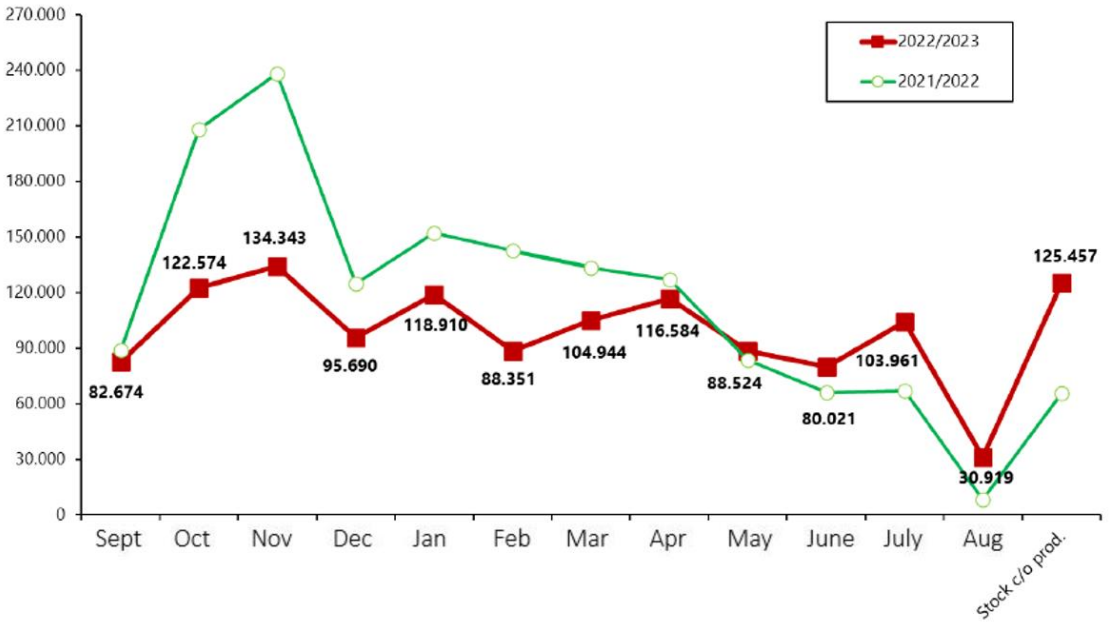


Figure 2.1 - Source: Revised data from Ente Risi

2.1.1 Producers' transfers to industry

The final transfers of the season were lower than the two previous seasons due to reduced product availability. The sales percentage of the production stabilized at a lower level (90%) compared to that recorded in the two previous seasons. Additionally, according to the data presented in *Figure 2.2* the sales percentage of round paddy rice production settled at a lower level (86%) compared to that achieved in the two previous seasons.

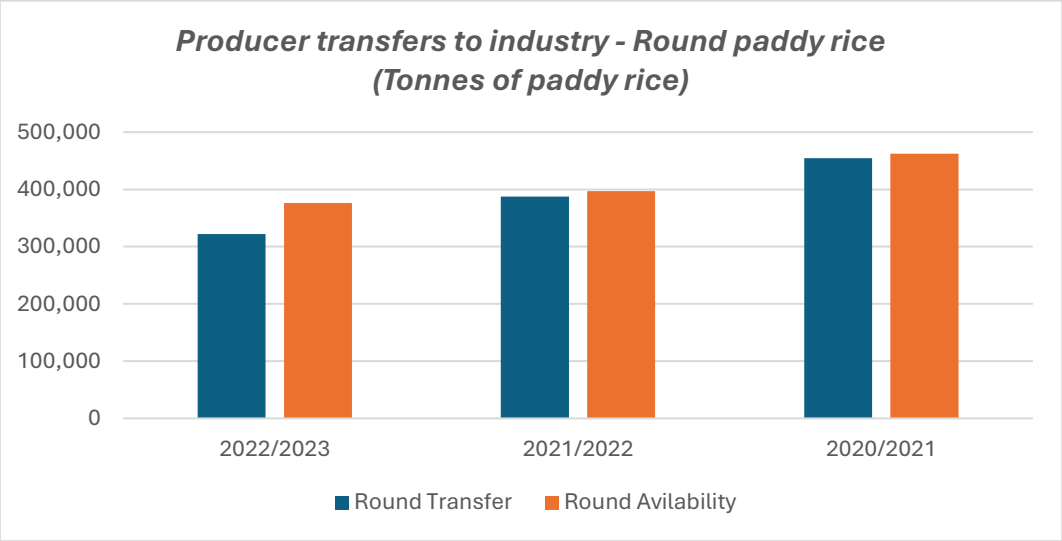


Figure 2.2 - Source: revised data from Ente Risi

Regarding Long Paddy B rice (*Figure 2.3)*, transfers were slightly lower than the previous season but higher than the 2020/2021 season; however, the final sales halted at 93%, a value lower than that of the two previous seasons.

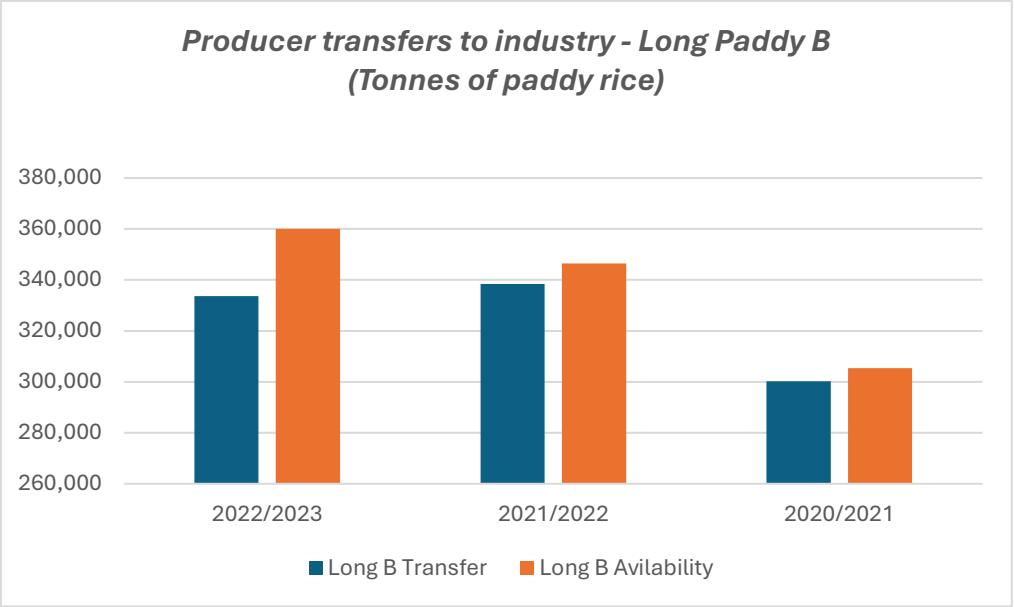


Figure 2.3 - Source: revised data from Ente Risi

As for parboiled paddy rice *(Figure 2.4)*, reduced product availability resulted in lower transfers compared to the two previous seasons, with a sales percentage of 92%, lower than the 98% of the 2021/22 season and the 97% of the 2020/21 season.

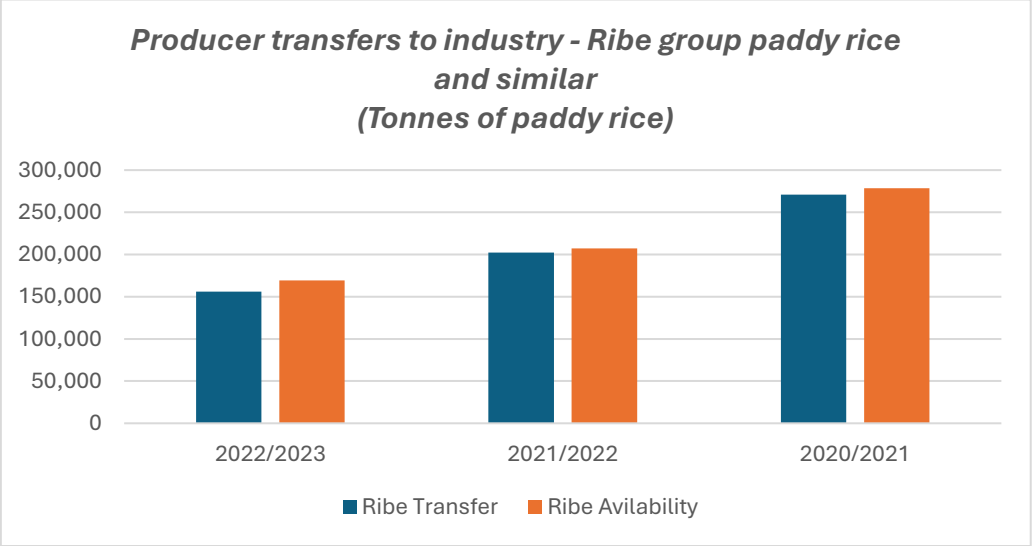


Figure 2.4 - Source: revised data from Ente Risi

Regarding varieties destined for the domestic market, transfers of paddy Carnaroli group (*Figure 2.5)* were lower than the levels of the two previous seasons due to reduced

availability. The final sales halted at 87%, lower than the previous season (91%), and compared to the 2020/2021 season (94%).

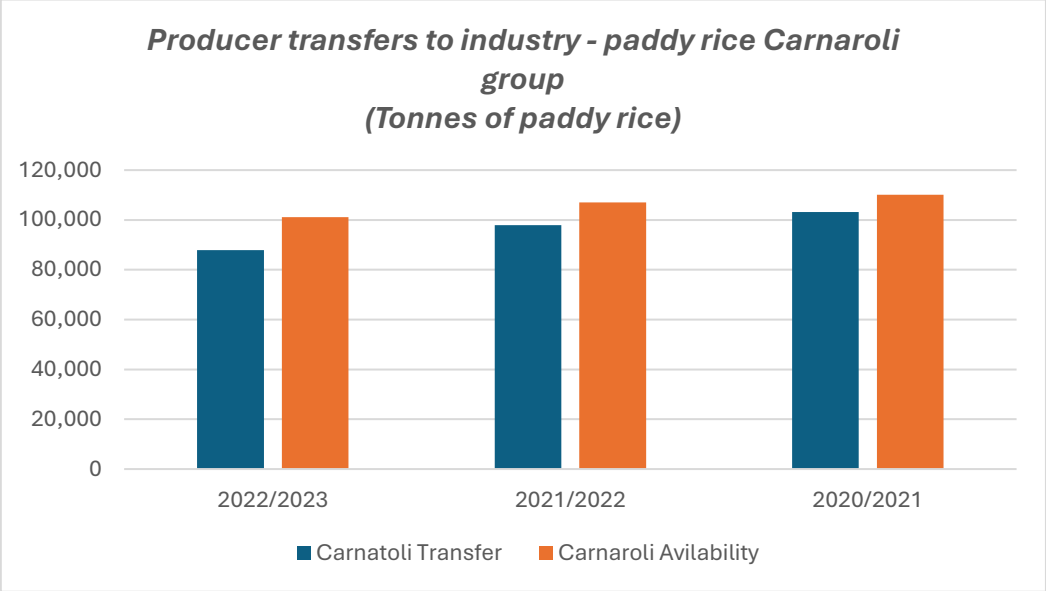


Figure 2.5 - Source: revised data from Ente Risi

The same applies to transfers of Arborio paddy group *(Figure 2.6)*, which remained lower compared to the levels of previous seasons; however, the final sales involved 91% of the availability, a level already reached in the previous season but lower than the 2020/2021 season.

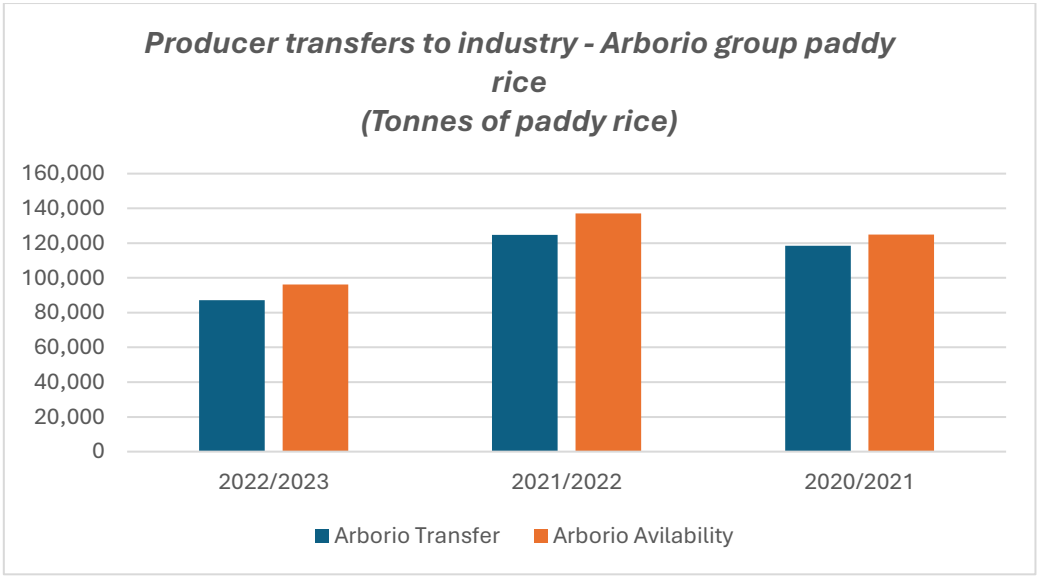


Figure 2.6 - Source: revised data from Ente Risi

End-of-season reserves at producers' facilities were measured at 125,457 tons of paddy rice, corresponding to 10% of the saleable availability, marking an increase of 59,673 tons (+91%) compared to the previous season. 43% of the reserves consist of round rice varieties, while medium-type (Long A) and long-type (Long B) rice varieties represent 36% and 21%, respectively, as represented graphically in *Figure 2.7.*

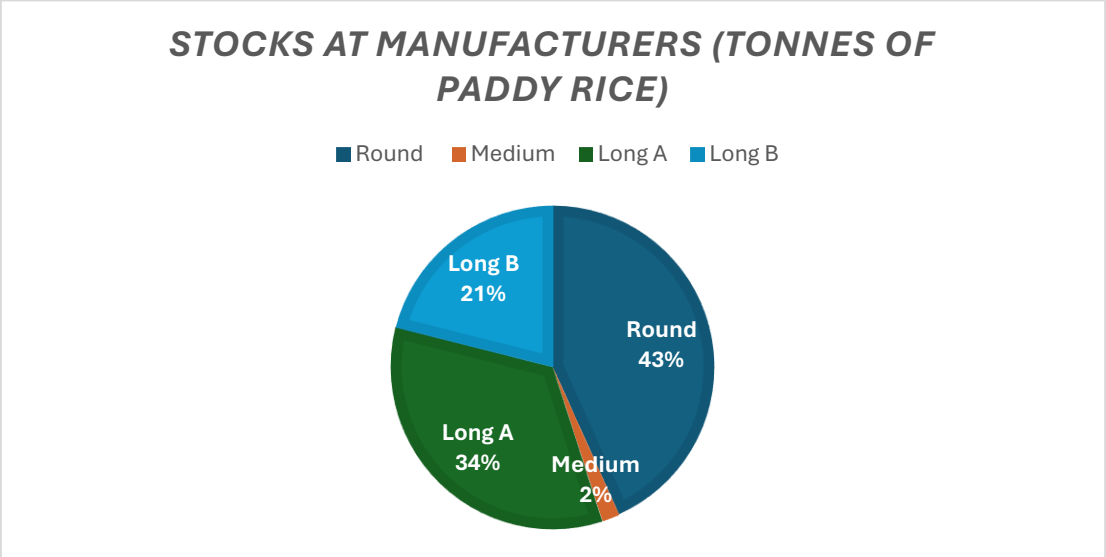


Figure 2.7 - Source: revised data from Ente Risi

Reduced product availability negatively affected end-of-season sales, with sales rates stabilising at lower levels than in previous seasons for several rice varieties. High end-of-season reserves at producer facilities indicate a challenge in meeting market demand for rice and suggest the need for careful management of stocks and resources to ensure economic stability in the sector.

2.1.2 Price Trends and Institutional Prices

The Italian rice market has been strongly influenced by monetary dynamics and international price volatility. Between 1995 and 2023, the average price of Italian exports showed significant fluctuations. In 2012, the average import price peaked at €65/quintale, surpassing the average price of Italian exports. This increase was driven by the increased volumes of rice imported from Asia, which made the domestic market more affordable.

Starting in 2015, import prices began to decline, thanks to increased global production and policies that facilitated the reduction of tariff barriers. However, price volatility continues to be a challenge for Italian producers, who face higher production costs than their international competitors.

The 2022/2023 season started with reference prices for various types of paddy rice ranging from €470.00 to €628.50 per ton, except for the Arborio variety, which was quoted at €783.50 per ton. Prices for the Selenio variety which are represented graphically in *Figure* 8, remained above the values of the previous season until January, then experienced a decline, stabilizing at €425.50 per ton at the end of the season, with an average of €609 per ton, lower than the €724 of the 2021/2022 season. The quotation for Long B rice *(Figure 2.8)* remained above the levels of the previous season until March, with an average value of €454 per ton, compared to the previous season's average value of €420 per ton.

Prices for the Arborio group *(Figure 2.9)* remained above the values of the previous season for most of the season, reaching an average of €855 per ton. The Ribe group recorded values *(Figure 2.9)* higher than those of the previous season until April, with an average of €648 per ton, compared to €517 per ton in the 2021/2022 season.

Comparison of the Selenio's price between 2021/2022 and 2022/2023

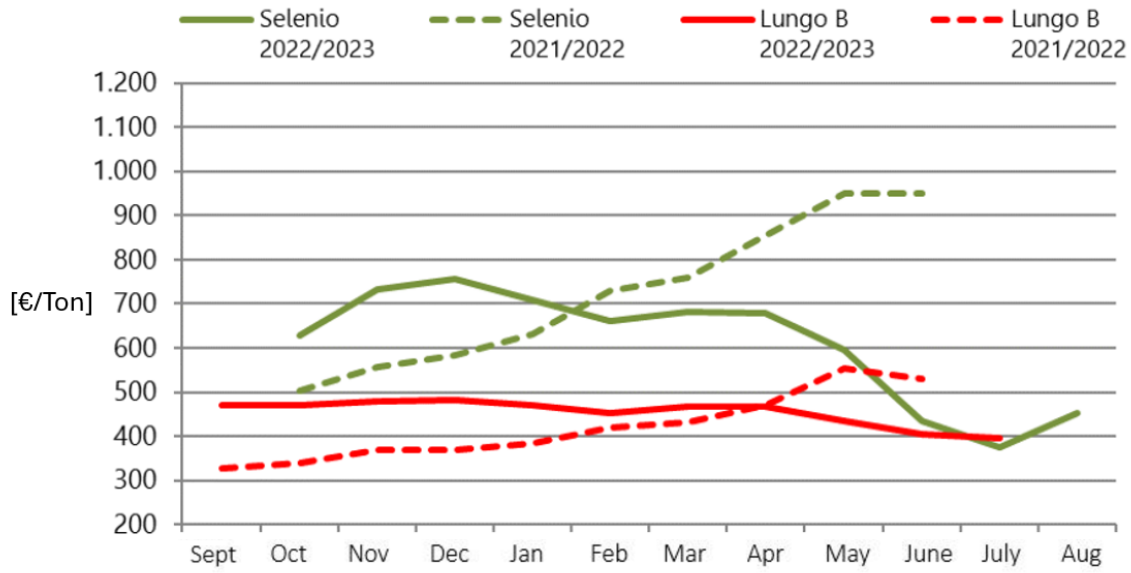


Figure 2.8 - Source: revised data from Ente Risi

Comparison of the Ribe and Arborio's price between 2021/2022 and 2022/2023

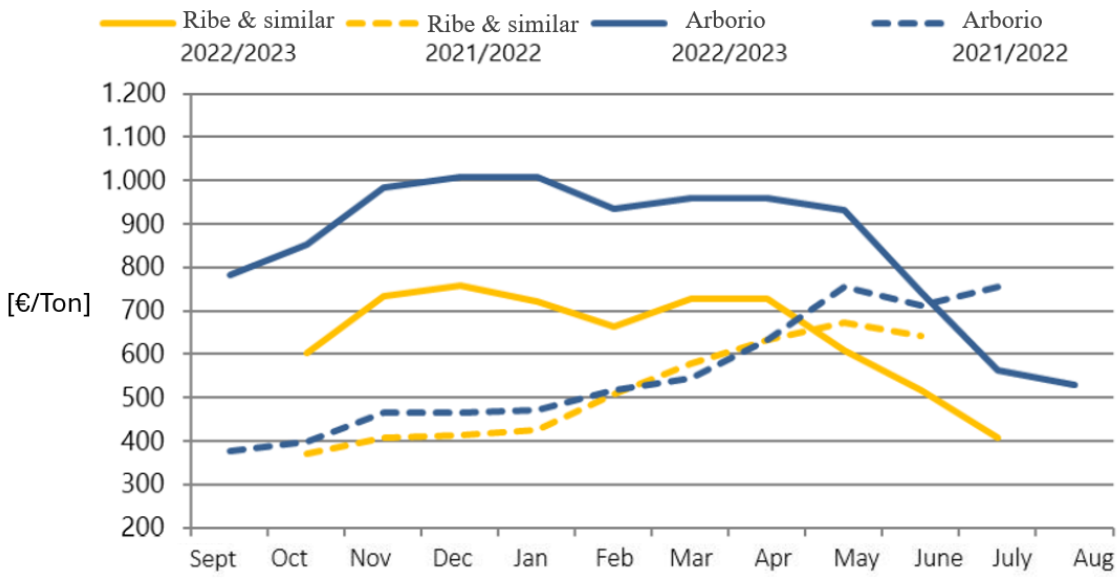


Figure 2.9 - Source: revised data from Ente Risi

Regarding quotations for processed rice, during the season, the quotation for Round rice positioned within a value range of €1,287.5 to €2,132.5 per ton, with an average value of €1,802, significantly higher than the average value recorded in the 2021/2022 year. Long B rice marked an average value of €1,148.5, €108 higher than that of the previous season. Parboiled Long A type rice (Ribe and similar) showed quotations ranging between €1,375 and €1,885, with an average value €435 higher than the previous season. Arborio registered an average value of €2,263 per ton, indicating an increase compared to the average value of the previous season by €1,444.

From the data analysed above, it can be seen that, rice prices during the 2022/2023 season varied significantly from the previous season, with some types of rice maintaining high values, while others experienced price increases or decreases. These variations can be attributed to a number of factors, including supply and demand, weather conditions, production costs and market trends.

2.1.3 Main rice varieties

The sale in the Italian market experienced a reduction of 37,104 tons (-8.4%), decreasing from 441,465 tons in the 2021/2022 season to 404,361 tons in the 2022/2023 season. Compared to the previous season, there was an increase of 2,969 tons (+4.3%) in Round

rice sales and 32,217 tons for Long B rice (+31.9%), while there was a decrease of 72,290 tons of Medium-Long A rice (-26.6%). The following graph, *Figure 2.10,* illustrates the trend of the domestic market over the last nine seasons, divided by rice type.

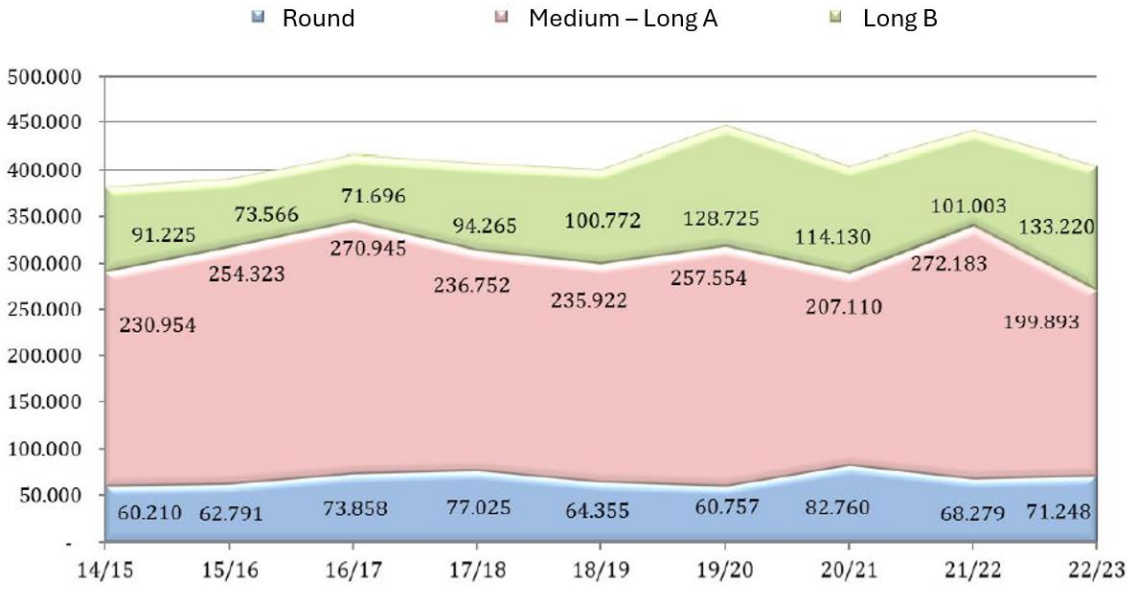


Figure 2.10 - Source: revised data from Ente Risi

2.2 Rice production in the European Union 2022/2023

In 2022, the total land area dedicated to rice cultivation amounted to 355,000 hectares, marking a decrease of 44,000 hectares (-11%) compared to 2021. This decline was primarily attributed to drought, which led to a reduction in cultivated areas both in Spain (-30,000 hectares) and in Italy (-9,000 hectares). Production, estimated at around 1.23 million tons of processed rice, experienced a decrease of 379,000 tons (-24%) compared to the previous year.

Regarding the 2022/23 season, the Commission noted a decrease in rice consumption within the European Union amounting to 377,000 tons (-13%) compared to the 2021/2022 season. This decline could be partially attributed to reduced consumer purchasing power due to high inflation.

2.3 Rice production in Italy, 2023/2024

In 2023, the land area dedicated to rice cultivation amounted to 210,239 hectares, as shown in *Figure 2.11*, marking a decrease of 8,182 hectares (-3.7%) compared to the previous year. Analysing the distribution by category, an increase in the areas dedicated to Long A rice (+11% approximately) and Medium rice (+7.5% approximately) is observed, while a reduction is noted for Round rice (-19% approximately) and Long B rice (-11% approximately).

Area for rice cultivation in Italy from 2006 to 2023

(data in hectares)

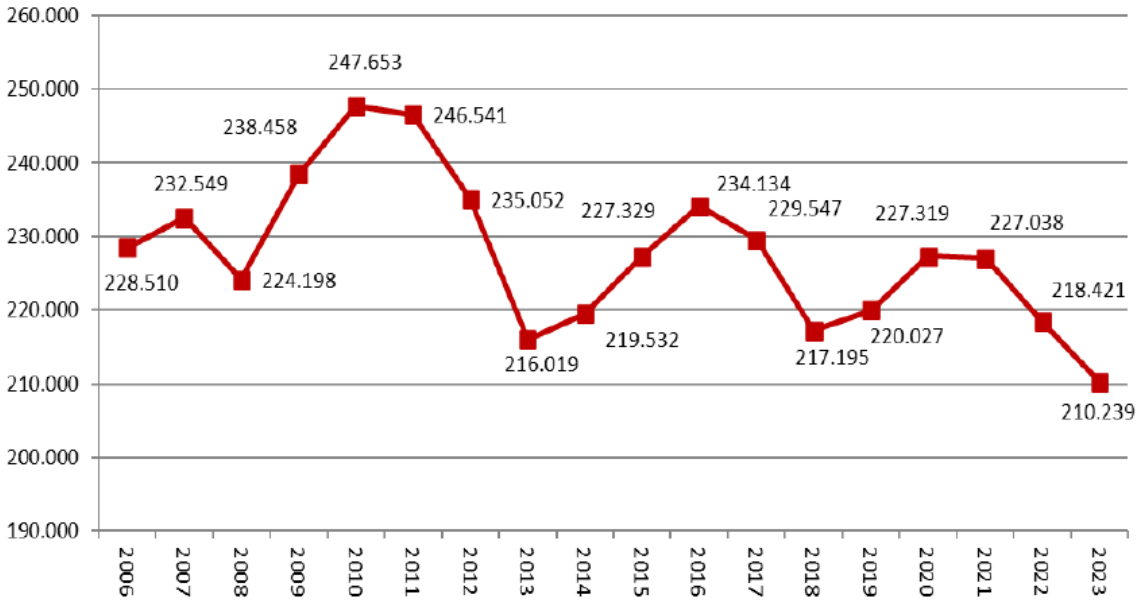


Figure 2.11 - Source: revised data from Ente Risi

In the Round rice sector, there is a reduction in the main varieties, including Selenio (-6,581 hectares), Sole CL (-5,074 hectares), and Centauro (-3,951 hectares), except for Omega CL, which has seen an increase of 29% (+2,879 hectares), reaching approximately 12,800 hectares. Regarding Medium rice types, which have increased globally by 7.5%, there is an increase in the Lido group (+340 hectares) and the Various Medium group (+517 hectares), while a decrease is recorded in the Vialone Nano group (-517 hectares). In Long A rice types, the distinction between varieties destined for parboiling and those for the domestic market is maintained. Varieties destined for parboiled rice production have seen an increase (+4,147 hectares), with decreases for Luna CL (-3,289 hectares)

and Leonardo (-2,024 hectares). It is noteworthy to mention the introduction of new varieties such as CL007, with 6,765 hectares, and Diva PV, with 2,763 hectares. In the context of varieties for the domestic market, there is a decrease in the S. Andrea (-497 hectares) and Roma (-494 hectares) groups, while there is a significant increase in the Carnaroli group (+3,932 hectares), reaching approximately 24,500 hectares, and Arborio group (+2,082 hectares), surpassing 20,000 hectares. In the Carnaroli group, which overall records a 19% increase, the varieties Leonidas CL and Caravaggio show increases of 30% and 24%, respectively, while the Carnaroli variety sees a reduction from 6,739 hectares in 2022 to 6,244 hectares in 2023. In the Roma group, the Barone CL variety constitutes 99% of the cultivated area, while in the Arborio group, the CL 388 variety is the main one with a 14% increase (+2,025 hectares). For the Baldo group, the main variety remains Cammeo, despite a decrease in area (-803 hectares). To complete the overview of Long A varieties, there is a slight increase (+201 hectares) in the Various Long A group. The Long B sector has recorded a decrease of approximately 5,814 hectares (-11%). Regarding varieties, there are increases for the PVL024 variety (+2,460 hectares) and ECCO975FP variety (+1,685 hectares), while the PVL136IT (-2,268 hectares) and CL28 (-4,342 hectares) varieties are decreasing.

From an agronomic perspective, 2023 was characterized by periods of heat that hindered optimal crop development. Due to the prolonged heat, there was increased fragility of grains during processing, affecting the overall yield, which however was slightly higher than in 2022, despite a higher overall product defect rate. The elements of the balance for the 2023/2024 season include:

- Harvest volume: estimated at 1,383,700 tons of rice, with an increase of approximately 114,500 tons (+9%) compared to the previous season, thanks to better agronomic yield;
- Average processing yield: yields were higher than the previous season for all types of rice;
- Net production of processed rice: estimated at around 819,350 tons, an increase of nearly 72,500 tons (+9.7%) compared to 2022;
- Initial stocks: stocks from the previous season amounted to approximately 225,500 tons, a decrease of about 37,100 tons (-14%).
- Imports from the European Union: an estimated volume of 35,000 tons, down from the previous season;

- Imports from external nations: an estimated quantity of 175,000 tons, of which 160,000 tons of Long B rice, showing a reduction of about 37,200 tons (-18%) compared to the previous season.

The projected balance, based on the mentioned factors, brings the total availability to approximately 1,254,900 tons of processed rice, with a decrease of about 12,300 tons (-1%) compared to the availability of the previous marketing campaign. It is expected that the overall quantity of processed rice available for the 2023/2024 marketing season can be distributed to the domestic market (Italy and other EU members) for 945,000 tons and to foreign markets for 125,000 tons. Overall, positioning is estimated at 1,070,000 tons, an increase of about 28,300 tons (+3%) compared to the positioning of the previous season. This increase is attributed to a recovery in consumption in Italy and the rest of the EU, due to the decrease in inflation, and to a lower current demand from countries outside the EU.

Analysing in detail by category, an increase in the distribution of Round rice (+17,000 tons approximately) and Medium/Long A rice (+41,300 tons approximately) is expected, while a reduction in the distribution of Long B rice (-30,000 tons approximately) is anticipated.

We notice that the rice sector faces many challenges and opportunities in a changing economic and environmental environment. It is crucial to adopt a proactive and collaborative approach to address these challenges and ensure a sustainable future for the global rice sector.

3. Trade flows

At global level, Italy represents only a small fraction of world rice production, corresponding to 0.2% of total supply. This data, taken from the book of Elena Baici, Cinzia Mainini shows that the competitiveness of Italian rice is mainly related to its quality and varietal peculiarities, rather than production volumes.

The high quality of Italian rice, combined with a strong link with the territory, is supported by geographical indications and protected designations of origin, factors that make this product particularly competitive on international markets. However, the sector faces significant challenges including sustainable production costs, increased imports and volatile markets. It is essential for the sector to continue investing in innovative technologies and sustainable practices if it is to remain competitive in the long term.

The Italian rice system is influenced by its ability to place its products both on the domestic and foreign markets. The presence of Italian rice in the market is particularly important, not only because of the variety of types cultivated, but also because of the growing international demand for high quality products. In fact, Italian rice is appreciated for its excellent organoleptic characteristics, especially for prestigious varieties such as Arborio and Carnaroli. However, the increasing openness of international markets has increased competition, prompting Italian producers to develop effective strategies for positioning their production and maintaining competitiveness.

Italian rice has a wide use, both for direct consumption and for the food industry. Exports are mainly focused on high quality varieties, very popular for the preparation of typical Italian dishes such as risotto, as well as varieties intended for processing into flour and other derivatives.

The internationalisation and liberalisation of trade have put a strain on the Italian rice sector, especially due to increasing competition from emerging countries such as Cambodia and Myanmar. These countries, benefiting from trade preference schemes such as the EU’s "Everything But Arms" initiative, have flooded the European market with low-cost rice, causing serious problems for Italian producers.

The increasing opening of markets has led to ever-intensifying competition with international producers, particularly those from low cost regions such as Asia. As a result, the Italian sector is facing increasingly difficult challenges, aggravated by the policies of liberalization of international trade.

The data treated in my thesis are an update of those analysed in the thesis of Riccio Elisa, which examined the trade flows of Italian rice. In her analysis, is emerged that in 2020 a large part of Italian exports were destined for the European Union, while imports came mainly from Asian countries with low-cost varieties. Her research also explored the impact of duties on imports from non-EU countries and the consequences of the pandemic, which had affected prices and trade volumes. In my thesis, these aspects are updated with current data to understand how trade dynamics have evolved in the post-pandemic era.

3.1 Export from Italy to the EU market

Italy is one of the leading exporters of rice in Europe, with a commercial position that has strengthened over the years thanks to various competitive factors. Trade relations with European nations such as Germany, France and Switzerland have played a key role in supporting the demand for Italian rice. As a result, the EU market has become essential for the distribution of Italian rice, which has found market opportunities thanks to free trade agreements within the European Union.

During the period between September 1st, 2022, and August 31st, 2023, 497,813 tonnes of processed rice were placed on the European Union market, recording a decrease of 36,448 tonnes (-7%) compared to the previous season. The comparison and analysis of the two seasons highlight a decrease in supplies both to rice-producing countries (-7%) and to non-producing ones (-6%).

France with 149,615 tonnes and Germany with 131,991 tonnes maintain their position as primary trading partners, with France increasing Italian imports by 8,375 tonnes, while Germany reduces them by 9,921 tonnes. The combined imports from these two countries represent 57% of the total supplies to the EU. Following them, the Netherlands with 36,919 tonnes, showing an increase in imports of 8,807 tonnes (+28%). Spain, after increasing purchases from Italy by 17,408 tonnes (+112%) in the previous season, drastically reduced imported volumes, dropping from 32,884 tonnes in the 2021/2022 season to 14,431 tonnes in the 2022/23 season. The Czech Republic also reduced purchases from Italy by 42%, as did Hungary (-30%) and Belgium/Luxembourg (-10%).

Analysing supplies to each individual EU country, as show in the graph of *Figure 3.1* divided by type of rice, it emerges that France imported smaller quantities of both round rice, -3,669t, -11%, and Long A rice, -4,398, -19%, recording an increase in Long B rice

flows of 16,122, +20%. Imports from Germany decreased by 4,949 tonnes, -12%, for round rice and 4,400 tonnes, -8%, for Long B rice. The most significant aspect characterizing the Netherlands is the increase in Long B rice imports, +11,490, +141%. As previously mentioned, among the countries that significantly reduced imports from Italy, Spain stands out, which decreased purchases of medium-grain rice by 3,530 tonnes, -92%, of Long A rice by 10,163 tonnes, -68%, and of Long B rice by 4,473 tonnes, -53%. For the Czech Republic, the most significant decrease concerns Long B rice, -12,663 t, -62%. Analysing in detail by type, there is a decrease in sales of round rice, -16,530 t, -12%, medium-grain rice -3,011t, -23%, and Long A rice -20,560 t, -17%, while for Long B rice there is an increase of 3,656 tonnes, +1%.

Change in deliveries (2022/2023 compared to 2021/2022)	Round	Medium	Long A	Long B	Difference
To producing countries (t)	-2.647	-3.287	-15.767	6.881	-14.82
To producing countries (%)	-6.13	-42.08	-36.44	6.48	-7.39
To non-producing countries (t)	-13.883	276	-4.796	-3.225	-21.628
To non-producing countries (%)	-13.96	5.13	-6.44	-2.09	-6.48
Total variation (t)	-16.53	-3.011	-20.563	3.656	-36.448
Total variation (%)	-11.59	-22.82	-17.46	1.4	-6.82

Figure 3.1 - Source: Revised data form Istat

Despite the overall decrease in EU rice imports, some countries such as France and the Netherlands recorded significant increases, suggesting a diversification of supply sources or changes in consumer tastes.

3.2 Export from Italy to Third Countries

Over the past 20 years, growing world demand for rice has led Italian producers to increase their exports. However, as highlighted in the book of Elena Baici, Cinzia Mainini. international markets present significant challenges as trade opening has intensified competition with low-cost rice countries such as those in South-East Asia. This situation has put pressure on Italian producers, forcing them to adopt quality-based differentiation strategies in order to emerge in global markets.

During the 2022/2023 campaign period, international sales from Italy to countries outside the European Union totalled 135,328 tonnes, marking a decrease of 35,792 tonnes compared to the previous 2021/2022 season, in conclusion, *Figure 3.2* significantly highlights these values.

International sales from Italy to countries outside the European Union (data in tonnes)

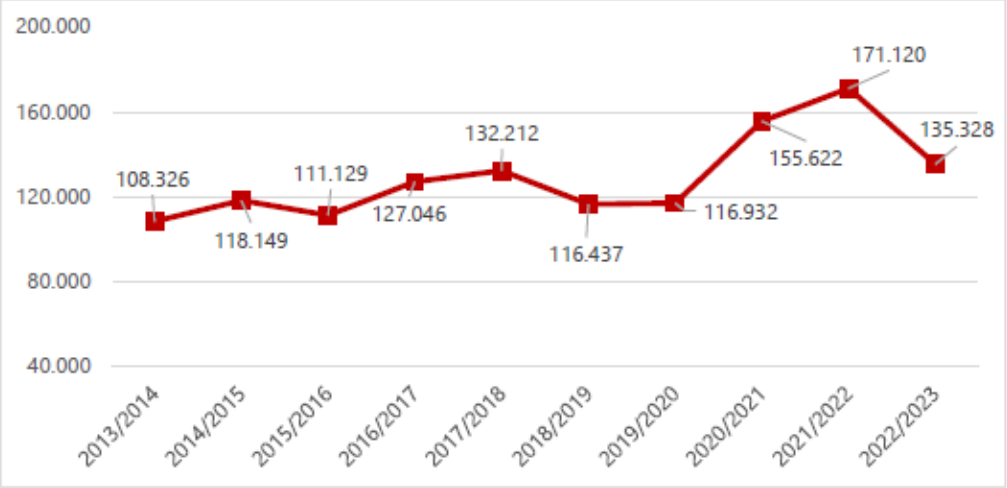


Figure 3.2 - Source: revised data from Ente Risi

Exports to non-EU countries, amounting to 90,110 tonnes, show a decrease of 16,560 tonnes (-15.5%), mainly due to reduced exports to the United Kingdom (-9,928 t; -15%), which nevertheless remains Italy's primary trading partner outside the EU. Other extra-EU destinations also experience a negative trend in exported volumes, especially towards Ukraine, with a reduction of 1,804 tonnes (-42.8%). For the second consecutive year, there is a decline in flows to Albania (-60.3%) and Kosovo (-38.4%), with Bosnia and Herzegovina also showing a decrease of 33.2%. This negative trend, even though with smaller quantities, involves all destinations. Exports to Asian countries have undergone a reduction of 15,790 tonnes (-43.4%) compared to the 2021/2022 season, with a total volume loss of 34,620 tonnes (-62.7%) compared to the 2020/2021 season. The decline in exports has affected all destinations, particularly countries in the Mediterranean Basin, as shown in *Figure 3.3,* traditionally Italy's main trading partners. The most significant decrease occurred in exports to Jordan, with a loss of 9,736 tonnes (-79.8%), followed by Lebanon (-2,149 t; -54%), Israel (-1,206 t; -35.4%), Turkey, expressed in *Figure 3.4,* (-

910 t; -9.2%), Saudi Arabia (-890 t; -25.3%), and the United Arab Emirates (-400 t; -39.9%). During the 2022/2023 season, exports to the African continent reached 2,732 tonnes, showing a slight increase in sales (+355 t; +14.9%) compared to the previous 2021/2022 season. Morocco and South Africa maintain their positions as the main destinations. Sales to the Americas, totalling 17,933 tonnes, decreased by 2,071 tonnes (-10.4%). Exports to the United States decreased by 982 tonnes (-10.1%), to Brazil by 703 tonnes (-10.8%), while exports to Canada, the third main trading partner, remained essentially stable (around 2,000 t). Compared to the previous season, exports to Oceania, totalling 3,935 tonnes, decreased by 1,726 tonnes (-30.5%). The most significant decrease concerns sales to Australia, which experienced a contraction of 1,650 tonnes (-31.7%).

Trade Exports to the Mediterranean Basin Countries

(Data expressed in tonnes of basic milled rice)

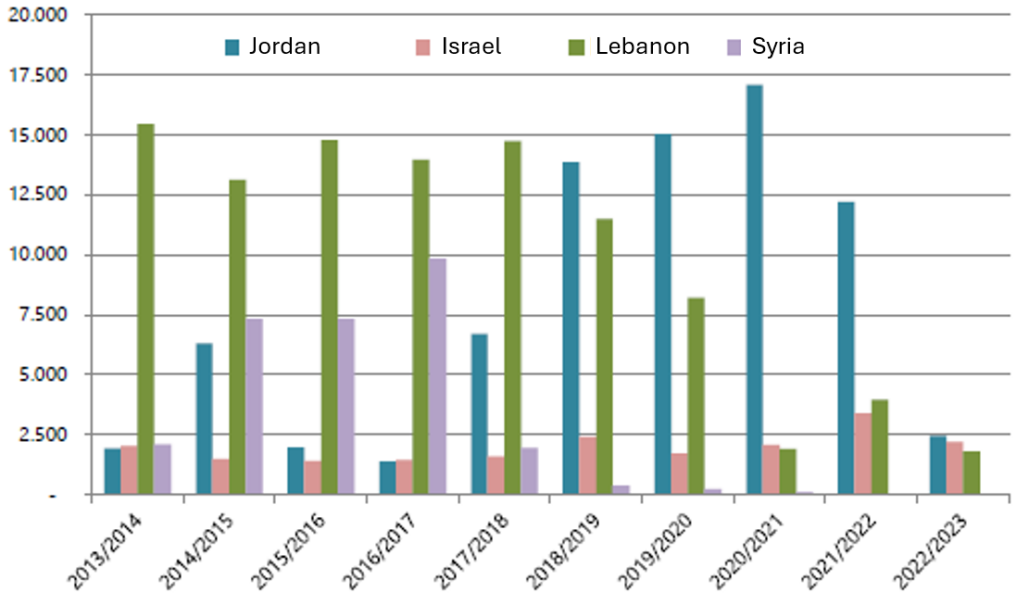


Figure 3.3 - Source: revised data from Ente Risi

Trade exports to turkey

(Data expressed in tonnes of basic milled rice)

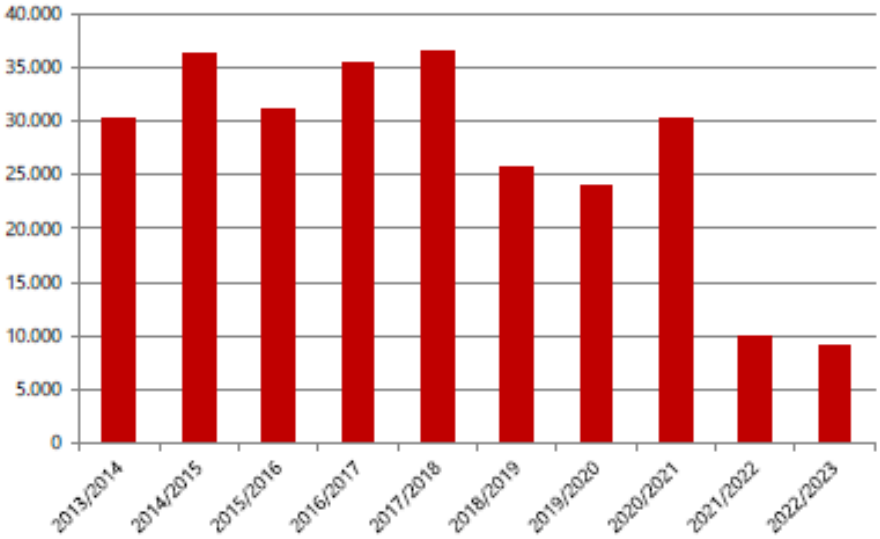


Figure 3.4 - Source: revised data from Ente Risi

Regarding the distribution among rice varieties, decreases are observed for round rice, which records a decrease of 4,185 tonnes (-7.7%), and for long A rice, with a decrease of 32,603 tonnes (-36.9%). Conversely, long-grain B rice shows an increase of 1,439 tonnes (+7.3%). Exports in small packages experience a decrease of 6,808 tonnes (-16%), representing 26% of the total exported volume.

The decrease in exports to the UK, traditionally one of Italy's main trading partners outside the EU, was particularly noticeable, suggesting possible impacts of post-Brexit dynamics or other economic variables. The decrease in exports to countries in Oceania and the Americas highlights the need to explore new strategies to maintain and strengthen Italy's presence in these markets, considering the challenges of logistics and competition.

3.3 Imports to Italy from EU counties and Third Countries

During the 2022/2023 campaign period, Italian imports, including paddy rice, totalled an overall volume of 257,763 tonnes of processed rice, as indicated in *Figure 3.5*, showing a decrease of 35,448 tonnes (-12%) compared to the peak volume of the previous campaign. The cause of this phenomenon is attributed to the fact that consumption has contracted both in Italy and in the rest of the European Union due to inflation, which more

than doubled in 2022 over eight months; in January 2022, the inflation rate in Italy was 4.8%. With the conflict in Ukraine, the consumer price index began to rise rapidly, reaching a peak of 11.8% in October 2022, which is why, according to ISTAT data, the price of rice on the shelf increased by 35% from November 2021 to November 2022. Imports from EU countries stopped at 45,502 tonnes, recording a decrease of 4,343 tonnes, -9%.

Import trends from EU and non-EU countries

(Data expressed in tonnes of basic milled rice)

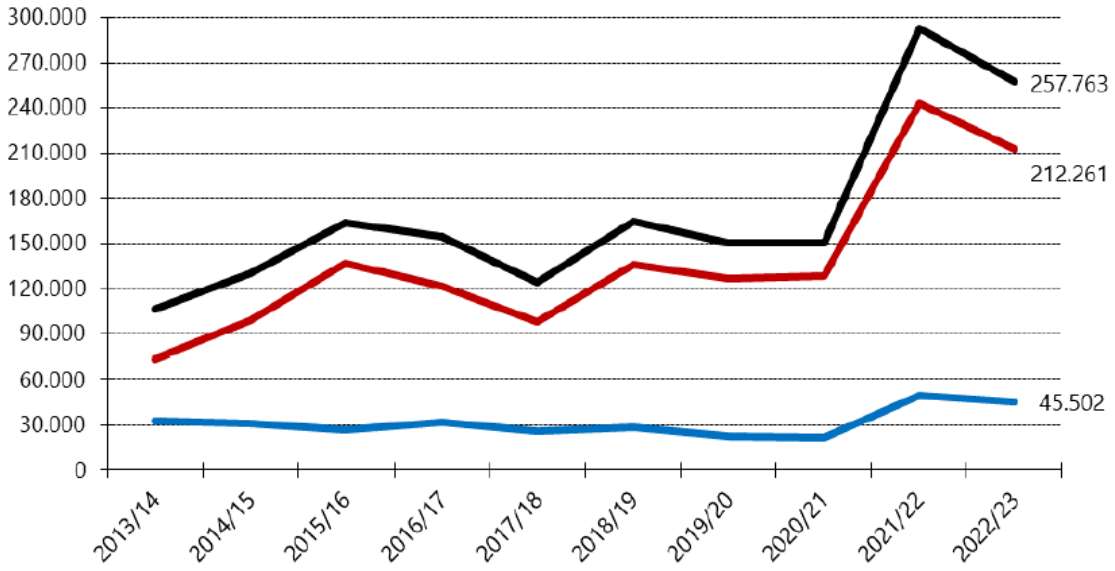


Figure 3.5 - Source for imports from EU Member States: Revised data from Istat Source for imports from third countries: Import licenses issued by the Ministry of Foreign Affairs and International Cooperation up to the 2019/2020 marketing year and Eurostat from the 2020/2021 marketing year onwards.

Imports from non-EU countries amounted to 212,261 tonnes of processed rice, as illustrated in *Figure 3.5*, showing a decrease of 31,105 tonnes, -13%, compared to the previous campaign. Pakistan confirms its position as the main rice supplier with 69,289 tonnes, although there was a slight decrease in flows to Italy of 1.3%. Myanmar follows with 46,177 tonnes, undergoing a 48% reduction in exports to our country. Noteworthy are the main suppliers, including India (+16,145, +143%), Cambodia (+8,796, +104%), and Mercosur countries (Uruguay, Argentina, and Paraguay), where imports rose to 4,265

tonnes from the 583 tonnes of the previous campaign. Also notable are the 5,020 tonnes imported from Australia, considered a record.

The graph below, *Figure 3.6* shows the various import percentages for each third country, also breaking down between countries with duty-paid and duty-free.

Details of Imports into Italy from Third Countries
(Data expressed in tonnes of basic milled rice)

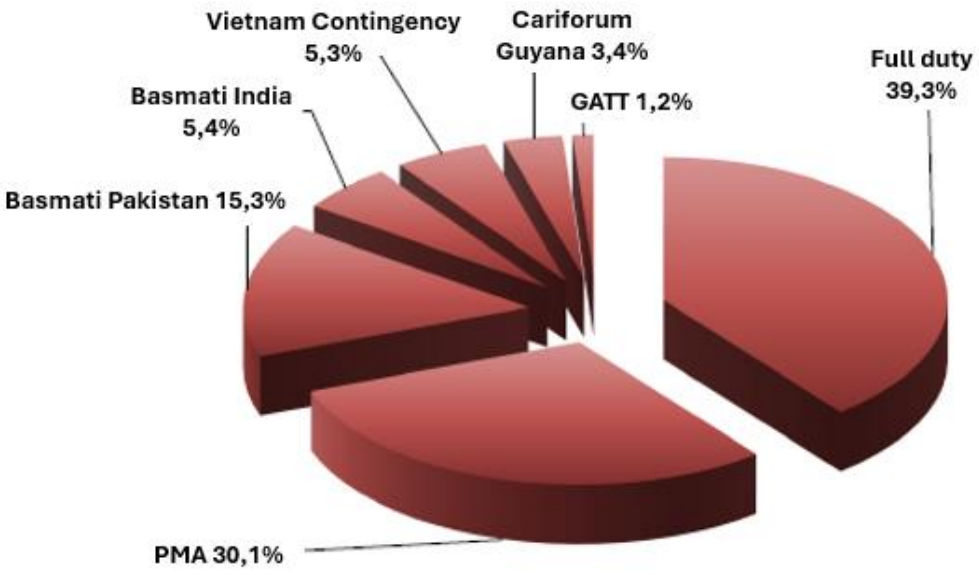


Figure 3.6 - Source: MAECI for husked and milled - Eurostat for paddy rice

Analysing the breakdown by rice type there is a reduction in imports of Medium/Long A and Round rice by 36,254 tonnes (-64%) and 6,418 tonnes (-34%), respectively, while those of Long B increased by 11,567 tonnes (+7%).

60.7% of the total import volume was duty-free, while the remaining 39.3% paid duty, a percentage increase compared to the previous campaign, which recorded 23.9%.

The increase in imports subject to duties could reflect changes in trade policies or consumer preferences, highlighting the need to closely monitor the impact of duties on the Italian rice market and consider possible strategies to mitigate their negative effects.

3.4 Imports to the European Union from Third Countries

During the 2022/2023 season, imports into the European Union settled at 1,631,365 tonnes, recording a decrease of approximately 35,300 tonnes (-2%) compared to the previous season. Acquisitions of Indica rice variety, totalling 1,304,664 tonnes, constitute 80% of the total imported and show a modest increase (+1%) compared to the previous year, while imports of Japonica rice variety, amounting to 326,701 tonnes and representing 20% of the total imported, have undergone a contraction of 13% compared to the previous season.

Further analysis explained in detail in *Figure 3.7* reveals a decrease in imports of parboiled rice by 725 tonnes (-4%), a decrease in imports of brown rice by 73,005 tonnes (-12%), and an increase in imports of processed rice by 38,473 tonnes (+4%).

Import into the European Union from third countries

(Data in tonnes of processed equivalent)

Processing stage	2022/2023	2021/2022	Difference (%)
Japonica	2.978	263	1032%
Indica	13.826	17.266	-20%
Paddy rice	**16.804**	**17.529**	**-4%**
Japonica	67.848	60.822	12%
Indica	478.672	558.703	-14%
Husked rice	**546.52**	**619.525**	**-12%**
Japonica	255.875	314.582	-19%
Indica	812.166	714.986	14%
Semi-finished/processed	**1.068.041**	**1.029.568**	**4%**
Japonica	326.701	375.667	-13%
Indica	1.304.664	1.290.955	1%
Total	**1.631.365**	**1.666.622**	**-2%**
Rice ruptures	520.985	605.371	-14%

Figure 3.7 - Source: Revised data from Eurostat

Among the countries that have recorded a significant volumetric increase in imports are Portugal (+25,744 t; +26%), France (+16,534 t; +8%), Romania (+12,883 t; +168%), Czech Republic (+9,224 t; +25%), and Hungary (+6,336 t; +175%). Among the countries that have reduced imports are the Netherlands (-67,723 t; -23%), Italy (-31,105 t; -13%), and Belgium/Luxembourg (-18,984 t; -11%).

To get a complete view of all imports into the EU, we can look at the graph below, *Figure 3.8*, which gives us a clearer understanding of the view

Imports into the European Union - breakdown by importing country
Quantities actually cleared through customs
(Data expressed in tonnes of basic milled rice)

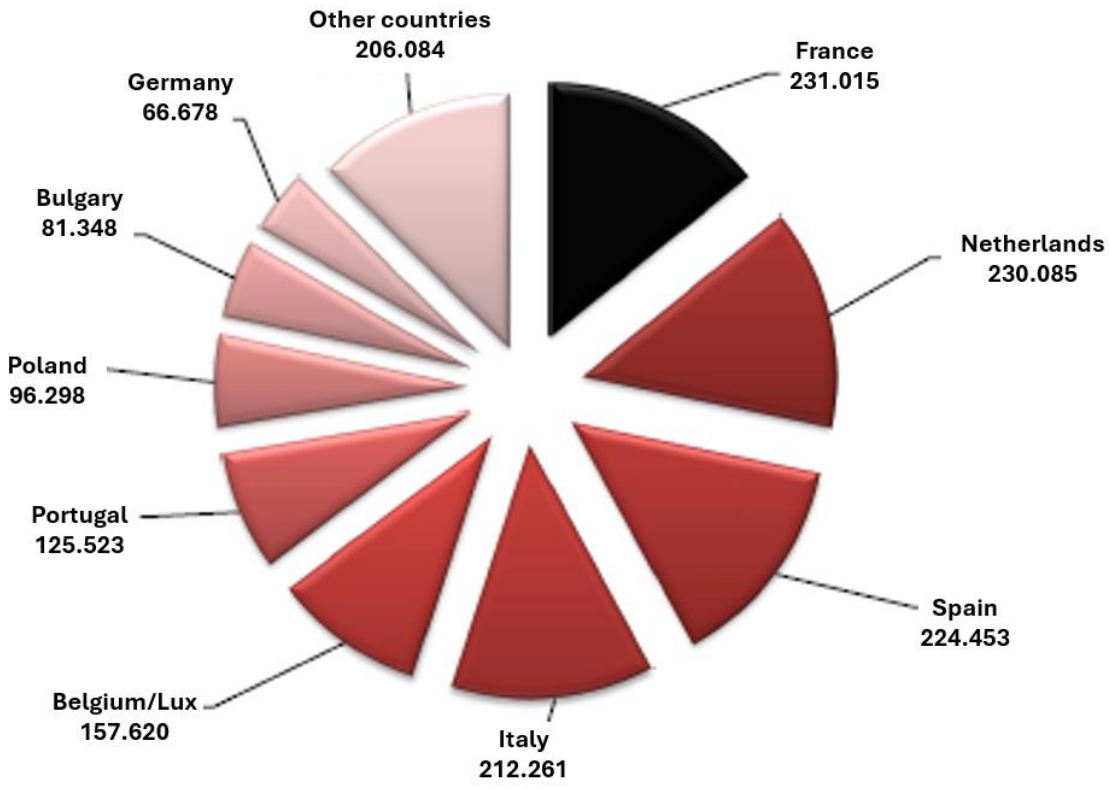


Figure 3.8 - Source: revised data from Ente Risi

Acquisitions of partially processed rice, brown rice, amount to 760,993 tonnes, registering a decrease of 101,794 tonnes (-12%) compared to the previous year. Imports of partially processed Basmati rice totalled 284,022 tonnes, with 194,324 tonnes from Pakistan and 89,698 tonnes from India, showing a reduction of 47,129 tonnes (-14%)

compared to the 2021/2022 season. There is also a decrease of 54,665 tonnes (-10%) in imports of non-Basmati partially processed rice.

Significant increases in rice imports recorded by some European countries could be the result of efforts to diversify supply sources and ensure greater food security, while decreases could be influenced by factors such as price changes, trade policies or consumer preferences.

3.5 Import into the European Union from LDC

During the 2022/2023 season, the importation into the European Union of unprocessed product (paddy rice + partially processed + semi-processed + processed + rice processing waste) from Least Developed Countries (LDCs) amounted to 900,840 tonnes, showing a decrease of approximately 61,620 tonnes (-6%) compared to the previous season. However, it is important to note in *Figure 3.9,* that this result still represents the second-highest value ever recorded.

EU imports from LDCs by stage of processing
(data expressed in tonnes of rice and broken rice)

Type	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23
Paddy rica	96	683	5.221	5.526	747	71	123	93	44	5
Husked rice	1.067	847	1.286	4.43	2.528	23.094	81.405	32.869	37.121	22.135
Semi-finished/processed	275.150	345.178	370.028	338.547	367.96	350.982	328.506	203.11	473.916	491.036
Rice ruptures	124.320	166.554	135.113	315.022	346.698	327.55	362.843	226.517	451.379	387.664
Total	**400.633**	**513.262**	**511.648**	**663.525**	**717.933**	**701.697**	**772.877**	**462.589**	**962.460**	**900.84**

Figure 3.9 - Source: Revised data form European Commission – Eurostat from the 2019/2020 campaign

During the 2022/2023 season, imports from Cambodia increased by 24,881 tonnes (+12%) compared to the previous year, marking one of the lowest values since the 2013/2014 campaign. Imports from Myanmar decreased by 85,663 tonnes (-11%), although they remained at the second-highest level ever reached. The quantities of

damaged rice imported from Myanmar (387,664 t) still represent 43% of the total flows from Least Developed Countries, as in the previous season.

It is clear that it is important for the European Union to continue to maintain stable and sustainable trade relations with the Least Developed Countries, while guaranteeing the quality and safety of the imported product and promoting economic and social development in the partner countries.

3.6 Amount of duties

From September 8, 2022, the Commission established new tariffs for semi-raw rice, increasing them to a minimum value of €30 per tonne at the maximum level of €65 per tonne, following an issuance of import certificates in the 2021/2022 campaign involving 531,635 tonnes of non-Basmati brown rice.

During the first half of the 2022/2023 campaign, the Commission noted an issuance of import certificates for non-Basmati brown rice totalling 188,232 tonnes; therefore, the duty was lowered to the minimum level of €30 per tonne starting from March 8, 2023.

From September 7, 2023, the Commission set the duty at €42.50 per tonne, after recording imports of non-Basmati semi-raw rice totalling 476,971 tonnes throughout the campaign.

The duty on semi-processed/processed rice remained constant throughout the campaign at the maximum value of €175 per tonne.

The Commission's adjustment of tariffs during the 2022/2023 marketing year reflects a dynamic response to market fluctuations and the needs of the rice industry. The introduction of new tariffs and their subsequent modification in response to changes in imports highlight a commitment to maintain a balance between protecting European producers and promoting international trade, while, the continued imposition of the maximum tariff of €175 per tonne on semi-milled/milled rice throughout the marketing year underlines the desire to maintain a level of protection for European milled rice producers while promoting the economic sustainability of the sector.

3.7 Imports into the European Union 2023/2024

There is a reduction in the purchase of 46,310 tonnes (-15%) compared to the same period of the previous season. The most significant decline is observed in the purchase of

unrefined rice, which falls from 95,810 tonnes in the previous season to 52,796 tonnes at present, showing a decrease of 43,014 tonnes (-45%). Also decreasing is the purchase of milled rice, which is close to zero compared to approximately 7,296 tonnes in the 2022/2023 season.

The near absence of milled rice purchases indicates a dramatic reduction in demand for this type of product during the current period, suggesting a possible reduction in consumer demand or limited availability of milled products on the market.

4. Tenuta Colombara Analysis

The Rondolino family, originally from Turin, has owned Tenuta Colombara, renowned for its fertile and abundantly irrigated land, ideal for growing rice, since 1935. In 1971, their son Piero, who had never heard the call of the land but felt the importance of his involvement in the company, after completing his studies in architecture, began working in the company and later in 1991 started the production of Acquerello rice.

From his earliest years, Piero left his mark on the company. Initially oriented towards mixed farming, the family later focused its energies exclusively on rice cultivation techniques.

Among the first innovations introduced, a few years later, was the adoption of laser technology, previously only used in the United States. This technology was mounted on bulldozers to level the land and has now become a standard tool on tractors. Another significant innovation has been the use of refrigeration to improve crop preservation. As well as ensuring an increase in product quality, as the product is able to retain more moisture, this process has resulted in an energy advantage, with 30% cost savings compared to the traditional drying method.

Piero's intention was to distinguish himself and ensure a “future survival” for the company, as he believed that the individual farmer could only survive with vast expanses of land to cultivate, and furthermore, the prevailing trend was to arrive at a few large industries, probably also foreign-owned, as in many sectors there is a strong tendency to aggregate, and in this way there would be fewer and fewer buyers who would then gain more power at the time of negotiation.

Therefore, he went to France to learn more about what was not yet present in Italy. He discovered perfumed rice, which exuded an aroma of boiled rice, but he doubted that it would appeal to the Italians, who were mainly known for eating risotto. He felt that this variety was more suited to Asian tastes. Another option was red or black brown rice, which was aesthetically appealing but had a cooking time of forty minutes, unsuitable for a fast-paced world.

Back in Italy, he decided to create the best rice in Italian gastronomic culture.

4.1 Birth and Innovation of Acquerello

The first choice of diversity was to focus on a single variety: Carnaroli. Piero considered it the ultimate representative of Italian cuisine, perfect for risottos but still little known at the time.

By the end of the 1980s, the cultivation of Carnaroli covered only a thousand hectares across the country, giving the company the opportunity to become a leader in a sector without competition. As expected, today there are twenty thousand hectares devoted to Carnaroli.

With the changing times, the Rondolino company was well placed to adopt new strategies. In 1991, after optimising production processes, they decided to create a short supply chain, integrating processing and sales within the farmstead. Thus Acquerello, the Rondolino family's new brand, was born. This choice reflected a desire for independence, avoiding dependence on commodity prices or EU aid and protection.

The second, even more innovative choice was the introduction of paddy rice ageing. After harvesting, the rice is sent to a very old dryer that removes the moisture gradually to be less impactful on the rice grain. Afterwards, it is put into storage, which are ageing silos with the aim of stabilising the starch, which allows the grains to hold together better during cooking and better absorb flavours, the hallmarks of Italian gastronomic culture. 99% of the rice is aged for one year, while 1% is aged for 7 years.

After this time, the actual processing takes place, which includes a set of 20 steps. Unlike an industrial rice mill, which normally works with 5 quick and inexpensive steps, but which can cause fractures on the surface of the rice, which are generally repaired during the initial roasting to eliminate processing defects.

Acquerello, on the other hand, is characterised by a very delicate processing, with many passes, using old and new machinery; it is the mix of them that creates the quality.

After the first year, the outer part, the husk, is removed and used as processing waste to create animal bedding and energy. Once the brown rice is obtained, processing begins by separating the broken grains and unripe grains. The latter are separated by an optical machine that removes the differently coloured stubs. The rest of the processing is mainly mechanical. During these processes, the rice bud is also removed, 1% of which will be reintegrated into the white grain at the end of the process by means of a helix that causes it to dissolve and be reabsorbed by the grain on the outside as the process shows us in *Figure 4.1*

Gem reintegration

Figure 4.1 - Source: Website

This technique, developed in 2007, was the crucial sixth choice of differentiation, which led to the company obtaining a patent. The only patent obtained on white, uncooked rice, shown in *Figure 4.2.*

Patents – Acquerello

Figure 4.2 - Source: Website

Once the processing is complete, the product is ready to be packaged. Here lies the third decisive choice of innovation, the use of the can, as we can see in *Figure 4.3*. Vacuum packaging was necessary for two reasons: perfect preservation over time and exclusive identification by differentiating the product's image. Piero sensed that this packaging would give Acquerello a huge competitive advantage, and he was sure that no one else would follow him, because it was something too expensive. There are three packaging machines in the factory that produce the cans. During this process, air is removed and nitrogen is inserted, which ensures that the remaining 1% of air remains on top, not in contact with the rice.

Can and packaging machine

Figure 4.3 - Source: Website

After the can is created, it goes through a machine that adds a diskette. These discs represent Acquerello's Instagram followers, people who follow the page and post pictures of the dishes to promote the brand. This gives the company the opportunity to show how others talk about them, without being the ones to extol their qualities.

The stock consists of various packages of 2.5 kg, 1 kg, 0.5 kg and 0.25 kg, which are stored and not yet sold, ready for shipment.

The name of the brand, Acquerello, which was the fourth fundamental choice, derives from its product, the cultivation of rice is the only one to be carried out in submergence, governing the water that is the life of the rice and is the most difficult and important thing for its growth, hence the idea of the brand was born from this care. While the image printed on the can represents the farmhouse, the landscape and the surrounding mountains, the whole world of the Rondolino family.

4.2 Strategy and Success

The annual growth in weight, net of list increases (kg) is around 14,5% (average from 98), which implies the need to plan production at least three years in advance. The company has chosen not to expand too much, preferring to focus on quality and positioning, as well as having to deal with a production limit.

At present, sales are split approximately 40% in Italy (of which 50% is destined for restaurants and the remaining 50% for the end consumer) and 60% abroad, with an accentuated presence in restaurants, excluding large-scale distribution by choice. In Italy, the company prefers to handle customers directly and relies on about two distributors, while abroad, distribution is mainly through distributors, such as five in New York to cover the area effectively. Exports involve some 68/70 countries worldwide, including markets such as China, India and Mongolia.

This widespread diffusion was achieved thanks to the product's recognition and reputation for quality, which originated mainly through word-of-mouth among cooks, the first to appreciate and position Acquerello at a high level due to its uniformity and consistency, a product that always behaves the same when cooked. Despite costing more than other types of rice, the quality of the product more than compensates for this cost.

Currently, the company means 300 hectares cultivated with rice, has 25 employees, equally divided between office and production, with a 60% prevalence of women with an average age of around 43 years.

4.3 Acquerello market

The Rondolino family's rice market is distinguished by two key elements: list increases and the price that the customer is willing to pay for Acquerello.

Typically, the price list is revised every three years, although exceptionally it has been kept unchanged for seven consecutive years twice in history. The “rule” of three years stems from the fact that Acquerello does not buy rice to resell it, but mainly produces it in-house, so there is no close connection with fluctuations in the cost of the raw material. During these three years, the company expands, consolidates its market presence, builds customer loyalty on a price that may be considered high in the first year, but that, in the third year, gets considered as not expensive.

In the supermarkets, the price of Carnaroli is very fluctuating, it can both rise and fall, whereas the price of Acquerello never falls, it can only rise more frequently or more slowly. There are two main reasons behind this behaviour. The first is related to production costs, as the product is made in-house, after reaching the best level of optimisation, the production cost cannot decrease. The second, on the other hand, is purely related to the brand image; in order to remain part of Altagamma, the price cannot be lowered.

Therefore, it is possible to state that the production of Acquerello is mainly disjointed from the rules of the market and from stock market trends. What is related, however, is the general increase (as happened in recent years) of the cost of energy, transport and raw materials for packaging. Thus, having a minority of the product tied to external trends, the company can afford to make price increases with a different logic from the industry, always taking into account the costs, but above all, how much the customer is willing to pay. This last factor is of considerable importance, because on a product that has its own market, the customer may be willing to pay a higher price, that varies differently from other types of products on the industrial market.

The unique relationship between product and market is the “dream” of all entrepreneurs, because in this case price follows different rules, it is not determined by the market, it is imposed by the importance of the brand. Obviously, this applies as long as the price does not exceed the customer’s willingness to pay.

This was precisely the core of Piero's project: arrive at a product decoupled from market cost fluctuations.

Normally, the mentality of a rice grower is that when a variety such as Carnaroli rice, for example, is well priced, perhaps because it is scarce, the following year everyone sows it, even for two years, but this creates an excess of production and consequently a significant price drop. This process occurs with an historical average cyclicity of five years, every five years it reaches a peak and after other five years it reaches a minimum, what varies is that the peak can be higher or lower than the previous one.

If the price of Carnaroli rice is going up a lot, the price of Acquerello rice, on the other hand, will not increase until the price of the former has finished rising and reached his peak. When this situation occurred, Rondolino can also implement its strategy, making an increase that must be the maximum sustainable for the customers, even when the market price falls. This mechanism leads to non-constant list increases over time.

To give a practical example, last year (T1), Carnaroli was priced at €140 per quintal, while today (T2) it is worth €60 per quintal. Piero, in T1, followed the strategy described above: he increased the price of his product, trying to not exceed his customers' willingness to pay and to not create a too wide a gap between the imposed price (which, as explained above, cannot be lowered) and the market price (which would instead go down). The strategy proved to be successful, in fact, if Piero had relied on the price of 140 to make his increase, he would have made an increase that would have become unsustainable once the price of rice had started its decrease (which was quite predictable because this high price had been achieved mainly due to the pandemic and the outbreak of war), and thus would have destroyed the brand.

When there are list price changes too far in time (which also implies a greater % price increase), a problem arises: the presence of internet. Nowadays it’s used as a “market-discount” and allows the customer to buy at the lowest possible price. It may happen that someone (shop or distributor), after the announcement of the price list change, which usually takes place two months earlier (with the exception of situations where, due to external circumstances, the price increase must be done “instantaneously”), purchases strategically larger quantities (creating its own stock). This means that after the price increase, this entity is able to sell the product at a price lower than the new market value, spoiling the brand's market.

This phenomenon occurred due to the list price increase which took place after seven years in 2009.

Even recently, there was a change in the price list after seven years, from 2016 to 2023, the reason being that there was too much uncertainty in the market in managing the price, due to Covid Pandemic and the outbreak of war in Ukraine.

The forecast was to be a 25% increase in January 2023, but the situation in the autumn of 2022 was tragic, so the decision was made to make the expected increase only in markets linked to the dollar, (because the currency had undergone a revaluation of 30%). For the rest of the world, it was decided to wait for a period of greater calm and clarity. However, in April/May, there came a time when it was realised that it would not have been possible to wait any longer to postpone the increase. Piero, thanks to his experience, understood that the price of Carnaroli would have fallen soon and so, in June 2023, decided to introduce the price increase, but reducing the value of the percentage, which would no longer be 25% but 16%. After this increase there have been relatively few complaints from customers/distributors, who have remained loyal to the product. The missing eight per cent increase, will be announced at the beginning of November 2024, to be implemented by the beginning of January 2025.

Analysing the numerical data in practical terms, we find the above to be true. From the beginning of the sale of Acquerello in 1992, six price list changes are shown up to today.

It is possible to consider, in agreement with the owner, that the years up to 2008 are considered settlement years.

The quantity initially sold by the company in its first year is 17.436 kg, for a total turnover of 62.539€ and, in just two years, there has been an increase in annual kg sold of 77.1% (one of the largest increases seen to date) and in the turnover of 45.2%. These data show how the product developed became known and appreciated in a short time, hence the need to increase production.

In Figure 4.4, we can observe the changes in quantities sold, by type and year, from 1992 to the present.

It is interesting to note that at the beginning, in 1992, the company only produced 1kg cans. The following year it introduced the 2.5kg pack because chefs were the first to take an interest in the product, saying that it would be the most convenient pack for a restaurant's needs. This evidence is still true today and confirmed by the data related to the last two/three years shown below. The increase in quantities sold of this product can be seen in *Figure 4.4*, this occurred thanks to the acquisition of new foreign distributors which reached a peak of 14 distributors in 2023, compared to 10 in 2022.

In 1994, the 0,250 kg can was introduced for the first time, while it was not until the 2000s that the half-kilo can was introduced to the market.

Since the beginning of the introduction of each product, there has always been a growth in the demand and sale of the product over the years. In particular, the product that most reflects this statement, due to the different type of market demand is Product B, the 2.5 kg rice pack.

The latter declined compared to other products in 2009, the reason being that an increase in price of 18% was imposed on 1 January 2009 and communicated to everyone in November 2008, so everyone made sure they had an adequate supply for the whole year. The biggest drop occurred in 2020 where the decrease amounted to about 50% compared to the previous year, from 637.763 kg sold in 2019 to 320.825 kg sold in 2020. Unfortunately, these data were strongly influenced by the pandemic, especially by the closing of restaurants.

This manifested differently in Italy and abroad. In Italy, many restaurants are family-run, so they are subject to fewer fixed expenses (they are owners of the premises and not tenants, the employees are mainly family members etc.). Abroad there is no such culture, which is why they were much more prone to economic problems and with the prospect of closure very close if the situation did not change in the short term.

Regarding the other three products, there are no critical anomalies as in product B, the small growth/decreases cannot be associated with any obvious reasons. The interesting thing we can see is that while in the years 2019 and 2020 the quantities sold of the 2.5 kg pack dropped dramatically, all other products, on the other hand, experienced an increase in sales of an average of 17.6%. In particular the biggest increase was in product C, the 0,25 kg can. This happened because people during Covid, not being able to leave home and eat at the restaurant, were somehow trying new dishes and experimenting with something new.

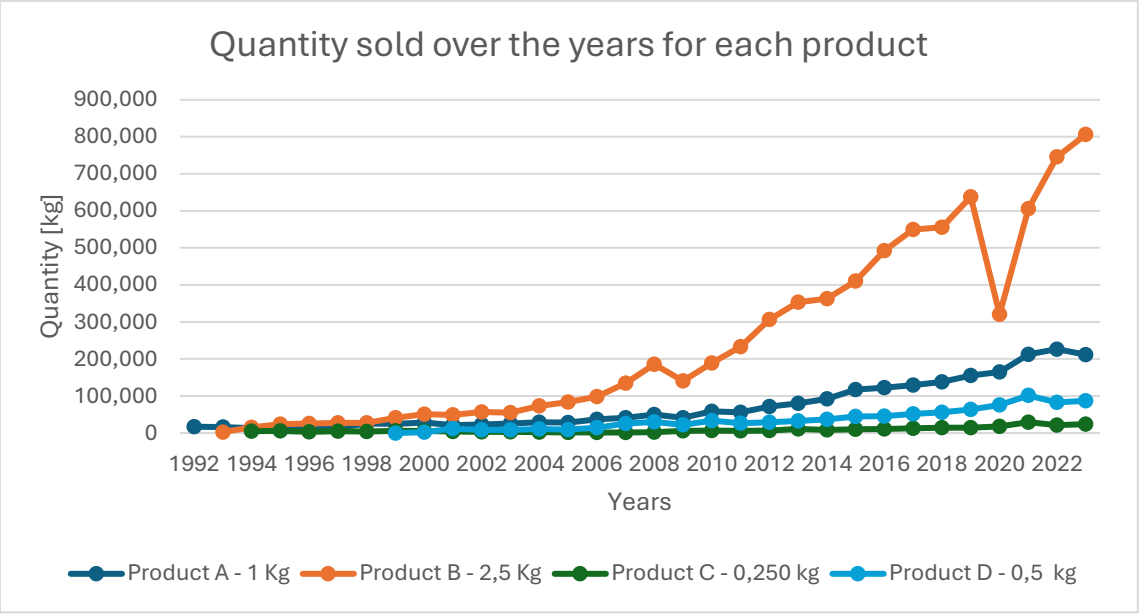


Figure 4.4 – Source: Revised data from Interview

An update dated 10/01/2024 shows us which peaks were reached in 2023 compared to 2022. Product A (the 1 kg can) reached its peak of 226.733 kg sold in total in 2022. Product B (the 2.5 kg pack), as shown in *Figure 4.5*, reached its highest quantity sold per month in November 2023, with a quantity of 99.017,5 kg during the whole year, for an overall annual total of 806.072,5 kg, a record compared to 2022, which recorded a total annual quantity of 746.297,5 kg. The same database shows that the amount of Acquerello rice sold in Italy in 2023, 479.495,3 kg, is higher than the 450.276 kg sold in 2022.

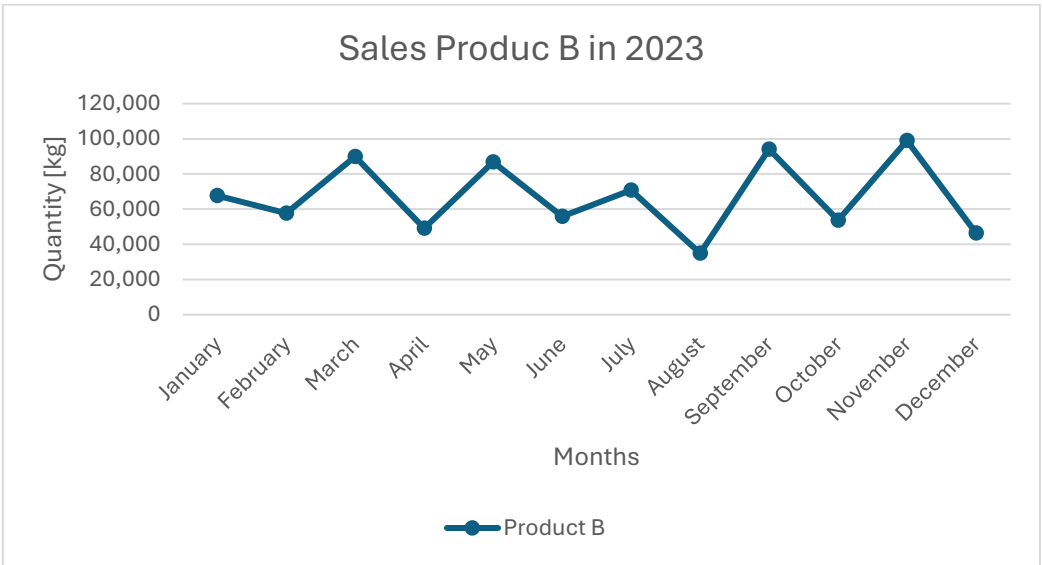


Figure 4.5 – Source: Revised data from Interview

Up to this point, we have observed the changes in quantities sold *(Figure 4.6)*, below, *Figure 4.7,* we analyse the respective changes characterising turnover.

The list increase that took place in 2009 can be compared to the increase that took place in June 2023, the fundamental difference is that the latter did not lead to any negative repercussions in terms of turnover/quantities sold, while the first did. On the contrary, overall, both parameters increased, this shows that Acquerello's value as a brand is more recognised than it was 14 years ago.

Considering the years up to 2008 as previously mentioned, of "settling down", in 2009 a turnover of one million was reached and, just after three years and thanks to a lot of export work, it increases up to two million. Since these years, the turnover had started to increase a little faster and Piero, who had waited until now to complete the investment in the rice mill, decided to invest 4 million euros (in addition to the three already invested since the beginning), to optimise the packaging process, the only process that remained to be perfected. It is also thanks to this investment, and continuous quality refinement for its customers, that Acquerello was able to exceed 5 million in annual sales within the next 10 years.

In conclusion it is possible to notice, that following the initial period, characterised by a low growth trend, since 2008, the year-on-year increase has been considerable (with the exception of the year 2020 which was strongly influenced by the external factors mentioned above) and this does not seem likely to change in the short term. In fact, the forecast that can be made today is to achieve a turnover of 10 million euros by 2025.

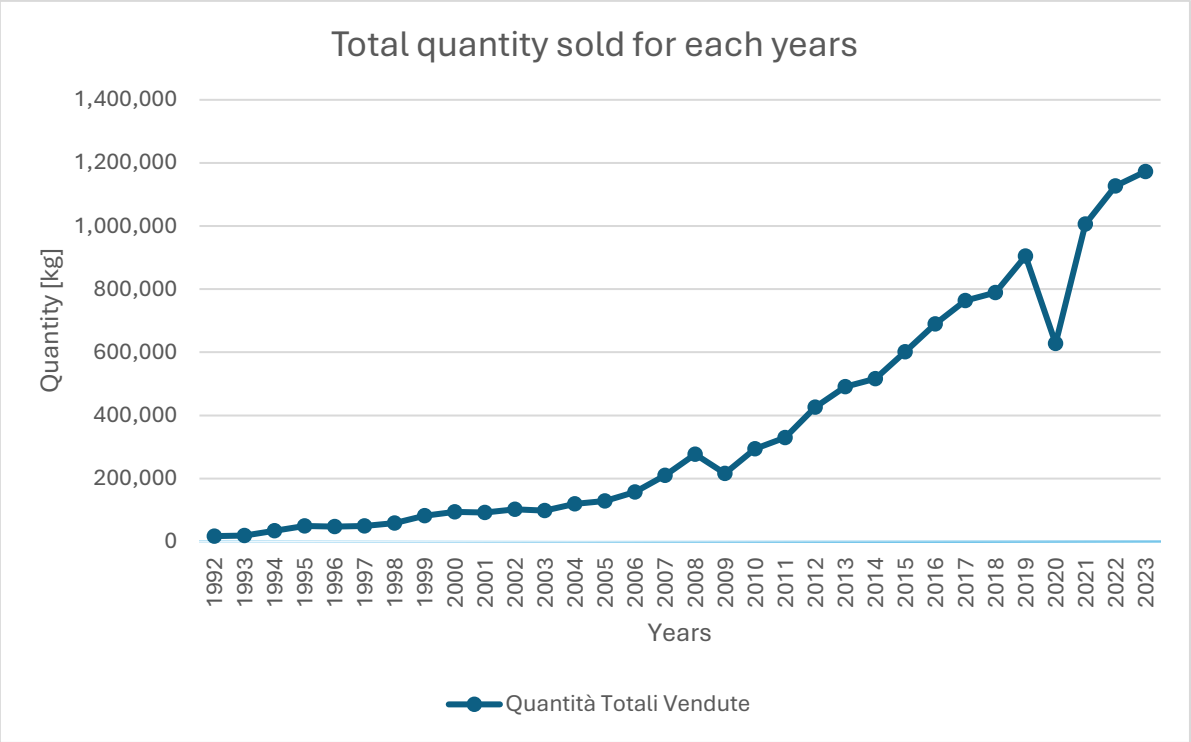


Figure 4.6 – Source: Revised data from Interview

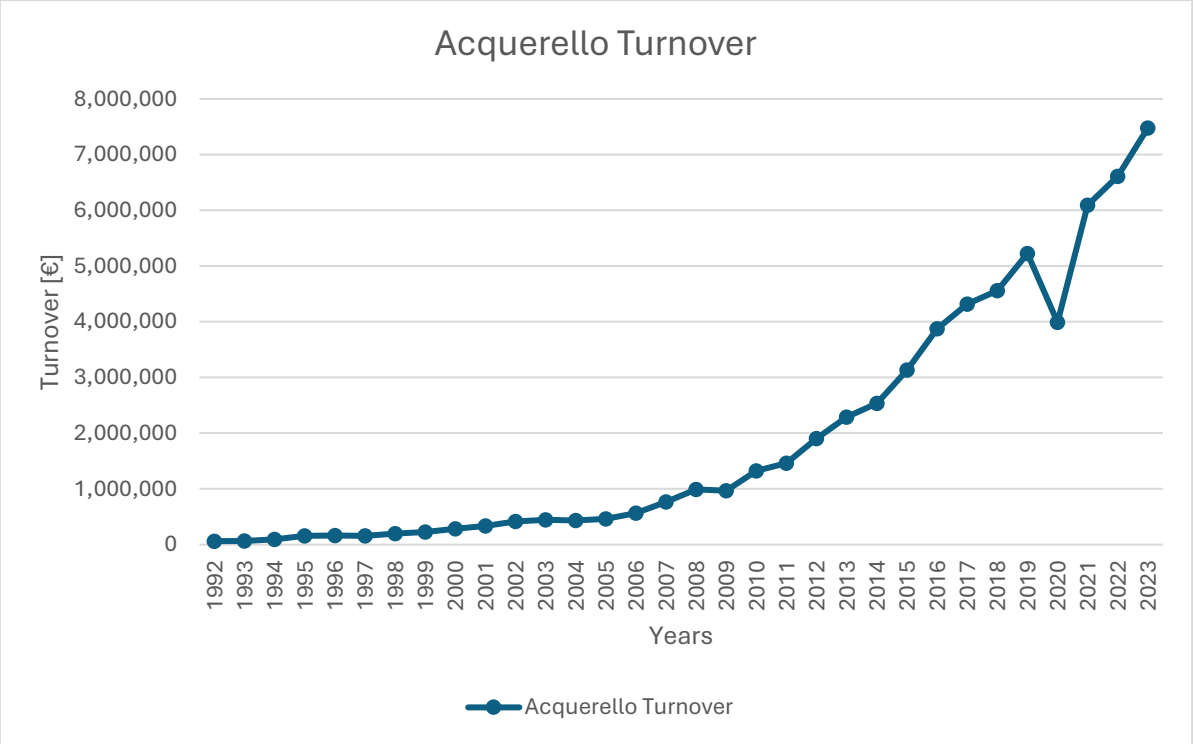


Figure 4.7 – Source: Revised data from Interview

4.4 Budgetary analysis

Let us analyse the value of the paddy rice contributed by the members as a balance sheet figure. The value of paddy rice, purchased by Acquerello from Piero Rondolino's farm, amounts to €3,720,664 and represents 94% of the total quantity purchased (1,172,916.8 kg).

From this data, it can be deduced that Acquerello owns paddy rice worth about €337 per quintal, a price significantly higher than the 2023 market average of around €70-75 per quintal.

To highlight Acquerello's real competitive advantage, the result of its owner's intuition and brand power, we can make a further comparison with a local farm. The latter produces the rice in-house, but relies on third parties for processing, selling the finished product directly in the farmhouse.

This farm, in addition to the cost of producing the paddy rice, incurs an incidental cost for its processing of about €0.50/kg, plus €0.30/kg for vacuum packing and packaging (for a total of about €0.80/kg). This rice is then sold as a finished product to the public, at about €3.80/kg.

These data highlight Acquerello's competitive advantage, which stems not only from its production efficiency, but also and especially from the strength of its brand. This is demonstrated by the fact that the value of its paddy rice is about 4.5 times higher than the market price and even comparable to the value of white rice sold by another company (€3.37/kg paddy, €3.80/kg white rice)

4.5 Black, the health gem

In 2019, the Rondolino family introduced a new initiative with the marketing of pure rice bud, packaged in pressurized 150g cans *(Figure 4.8)* that covers a consumption duration of about 15 days.

The product "Black" stands out for its impeccable health qualities. To fully understand the beneficial characteristics of the product, a collaboration with the Faculty of Medicine of the University of Pavia has been established. The goal was to assess the potential impact of this food variety on athletes and overweight individuals.

After a long eight-year research effort, the family finally filed for a patent application, which was approved in April 2021.

At the moment, the company does not yet have a budget and an exclusive market study for this product. The only information we have at the moment is that about two out of three customers usually return to buy this product, and if they do not do so the following month, they return after two months at the latest.

Black

Figure 4.8 - Source: Rondolino's documents

4.5.1 What is Black

The term "bud" denotes the embryo inside the rice seed from which the bud develops, giving rise to the future plant. This part makes up approximately 2% of the grain and has a high content of protein, vegetable fats, carbohydrates, fiber and minerals, including iron and magnesium.

This product offers several advantages in various contexts. We can analysed in *Figure 4.9* in the nutrition table that, thanks to the presence of magnesium, consuming only three teaspoons a day, either alone or used as a condiment for dishes, can help relieve constipation disorders and improve intestinal transit. Moreover, thanks to its content of magnesium and vitamin B1, it provides extra support to face the day with more energy and vitality. Its pleasant taste makes it suitable to enrich many culinary preparations, such as yogurt, salads, ice cream, or even on pasta dishes and meat and fish, as breading, enhancing the flavor, without covering the flavor of the dishes, encouraging a more natural lifestyle. Thanks to vitamin B1, it also helps to increase energy and endurance during physical activity. Black is a rich source of zinc, vitamin E and anthocyanins,

essential elements to protect cells from oxidative stress. In addition, it contains linoleic acid, which is valuable to maintain tissue health, promote brain development and help maintain cholesterol to normal levels. Considering the numerous reports of intolerances, it is important to underline that this product is gluten and lactose free, it is only not recommended for diabetics because it contains small traces of sugar.

Nutrition table per 100 g

Tabella Nutrizionale per 100 g		VNR%
Energia	1719 kj - 415 kcal	20,75 %
Grassi	25 g	35,7 %
di cui grassi saturi	5,68 g	28,4 %
Carboidrati	13 g	4,86 %
di cui zuccheri	2,63 g	2,92 %
Fibre	28 g	
Proteine	21 g	42,2 %
Sale	0 g	0 %
Ferro	4,75 mg	33,9 %
Potassio	1790 mg	89,5 %
Magnesio	5000 mg	133,3 %
Vitamina B1	4,92 mg	445,5 %
Vitamina B6	2,15 mg	153,6 %
Vitamina E	2,28 mg	19 %
Acido Linoleico	0,35 g	

Figure 4.9 - Source: Rondolino's documents

Aesthetically, it takes on a black hue, as it comes from rice grains of dark variety cultivated in part of the lands belonging to the Rondolino family. This product is extracted directly from rice without undergoing further processing, making it a valuable ally for health, the first natural multivitamin.

The nutritional properties of the gem make it suitable for all age groups, in relation to the level of physical activity of each: from adolescents in the growth phase who need a high intake of vitamins and minerals, dynamic adults who require plant proteins to support the daily rhythm, up to the elderly who seek to counteract oxidative stress. To get the same benefits provided by the recommended daily dosage of Black, you would need to consume about 40 kg of black rice per month.

4.5.2 Analysis and effectiveness of Black in athletes

In the field of sports, maintaining a balanced diet with adequate intake of nutrients and calories, together with regular meals, is essential to ensure effective training and maximize performance during sports activities. Sometimes, athletes may need dietary supplements to fill any nutritional deficiencies, especially during periods of intense training or frequent competitions.

The rice bud, thanks to its richness of nutrients, is a natural supplement of value. By consuming 100 grams of rice bud, you can abundantly meet the recommended average requirements (RDA) for the general population in terms of vitamins, such as vitamin B1 (483% of RDAs) and vitamin E (212% of RDAs). In addition, vitamin B6 is also present discreetly. The most significant minerals include iron (covering 77% of RDAs) and magnesium (108% of RDAs), both essential to support sports activities. The rice bud is also distinguished by its nutritional content in macronutrients: it offers a high protein intake (18g/100g of edible product), with a significant presence of essential amino acids such as lysine, histidine and valine. In addition, it provides adequate amounts of lipids and fiber (7g/100g). Supplementing the rice bud in the daily diet allows you to compensate for any vitamin and mineral deficiencies, to provide essential proteins and amino acids, thus contributing naturally to improve the performance of athletes.

Black underwent a randomized pilot clinical trial, comparing it with a placebo, in order to evaluate the effectiveness of the integration of the rice bud on performance (speed in the 200 meters free style) and on the body composition of a group of moderately trained master swimmers. The study examined the effect of taking 5 weeks of RG supplementation (25 grams, twice a day) on speed in the 200 meters freestyle, body composition, muscle function and lactic acid levels in swimmers. In RG swimmers, a significant average reduction of 2.98 seconds over 200 metres was observed, while in the placebo group no appreciable change was observed. There were no significant differences in pre and post-performance lactic acid levels. In the comparison between swimmers who took RG and those who took placebo in the follow-up, there was a significant increase in the average muscle circumference of the middle arm, as well as ginoid fat. In addition, a reduction of 0.13 kg of fat mass was noted.

5. Italian Preferences and Purchasing Habits of Various Rice Varieties

5.1 Product types, shelf placement preferences and sorting

5.1.1 Methodology and Nielsien sample

Nielsen Homescan Panel represents 22.727 million de facto households out of a total population of about 59.255 million individuals censused in Italy. A de facto household is defined as a group of residents living together on a stable basis, allowing purchasing behaviour to be attributed to the household (mono-components included). Non-household consumption such as: hospitals, barracks, tourists, and extra household consumption (second home) are not represented. The amounts of data collected contain information about: the purchaser (who), source of purchase (where), quantity purchased (what and how much), the receipt (type of expenditure), price and promotions (how) and date of purchase (when).

This information leads to an answer to the 5W's:

- What? Who is the leader? What are my market shares? What are the value and volume trends in the category?
- Where? Which retailers represent the greatest sales opportunities? Which alternative shopping channels do our consumers use?
- When? How often is the product purchased? What are the seasonal sales peaks? How can I improve my product rotation on the shelf?
- Who? What is the socio-demographic profile of my buyers? What is the value profile of heavy consumers?
- Why? Which promotions are most successful? Is the purchase generally planned or impulse?

5.1.2 Buyers of rice in Italy and penetration of rice products

It was found that those aged <44 years have low education, they are the “habits”, for those aged >55 years, high education is found, they are categorised as “experienced chefs”, the age group >=65 years represent medium education, income aligned to medium, while those with medium/high education are categorised as “functional”.

Studying the market penetration of rice products such as: ready-to-cook risottos, pre-cooked risottos in pouches, savoury rice snacks, exotic rice, rice cakes, frozen risottos, rice pasta and rice oil shows interest mainly in the 34-44 age group.

The only planned purchase, as shown in *Figure 5.1,* is traditional rice, while most other rice-based foods such as savoury rice cakes/snacks, pre-cooked rice, salads, oil, pasta and exotic rice are bought via impulse purchases or promotions.

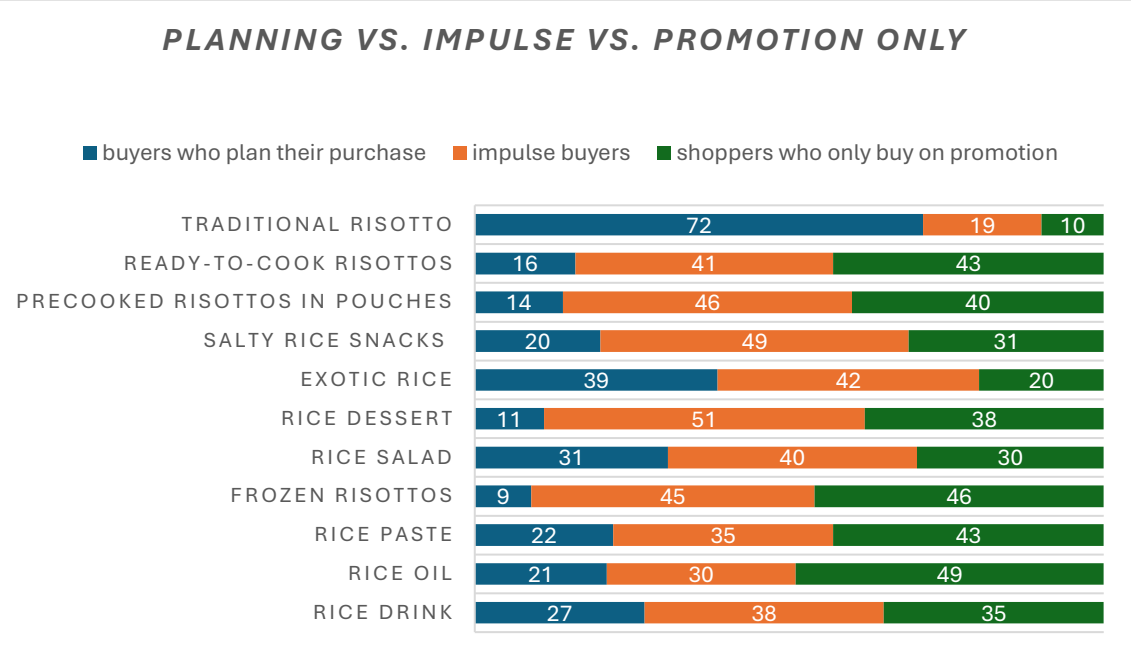


Figure 5.1 - Source: Revised data from Ente Risi

5.1.3 Quality Analysis

65% of the households buy industrial brand rice, where 22% are specialists, who only buy it for risottos/elaborate dishes, while 43% are considered generalists, who use such rice for all the dishes they prepare. In general, according to two out of three households, there is no difference between the quality of private label rice and industrial brand rice; as age increases, the comparison judgement improves in favour of private labels, while for the <=34 age group, there is an anchoring towards industrial brands.

The habitual person is willing to spend two euros more to buy: quick-cooking rice or ready-made risotto. The functional and the experienced chef would buy, high quality rice

from selected crops, rice from organic crops, Fairtrade certified rice, quick-cooking rice, and ready-made risotto.

5.1.4 Main purchase channels

49% of rice-buying households only go to: supermarkets/hypermarkets, this food does not change the shopping habits of its purchasers, 7% shop at discount stores, only 2% at rice mills, this phenomenon occurs especially in areas where rice cultivation is directly present and there are rice mills that offer retail, for those who want to be sure of the provenance of their rice and are directly linked to the territory.

Most people have considered the variety as the first criterion when assessing the purchase of rice, the price is considered as the second criterion, as are the brand and the intended use, which are only considered by the experienced chef. Characteristics that are not considered are: the presence of the vacuum pack, organic origin, fair trade certification and pack weight. In general, the organisation of the rice shelf in supermarkets/hypermarkets should be sorted according to variety and then destination of use, brand, and origin, although the habitual shopper will first focus on the brand than on the mode of use. According to the experienced chef, rice and ready-made risottos should absolutely be on two separate shelves, because they are considered by them to be totally different products, while 65% of people are indifferent to this decision.

To make a more in-depth analysis at the level of each customer type, according to the habits, the shelf should be organised according to variety and brand, followed by its intended use and origin. Another element taken into consideration is the actual positioning of the rice shelf. According to the informed, the experienced chef and the functional, who represent 67% of people who buy rice, it is a must that it is located next to pasta, while 7% of people would prefer it on a separate shelf, 1% would appreciate its proximity to frozen risotto, while 25% of people remain indifferent to this choice. In general, according to this study, the two points of sale that most meet customers' needs according to the criteria of shelf positioning and ordering are: Bennett and Esselunga, as can be seen from the graphs in *Figure 5.2* and *Figure 5.3*.

Manifest variable judgments for Esselunga

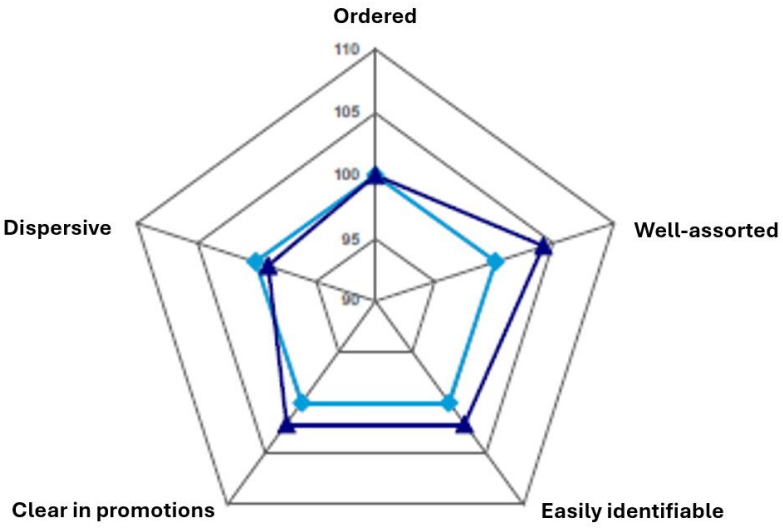


Figure 5.2 - Source: Revised data from Ente Risi

Manifest variable judgments for Bennett

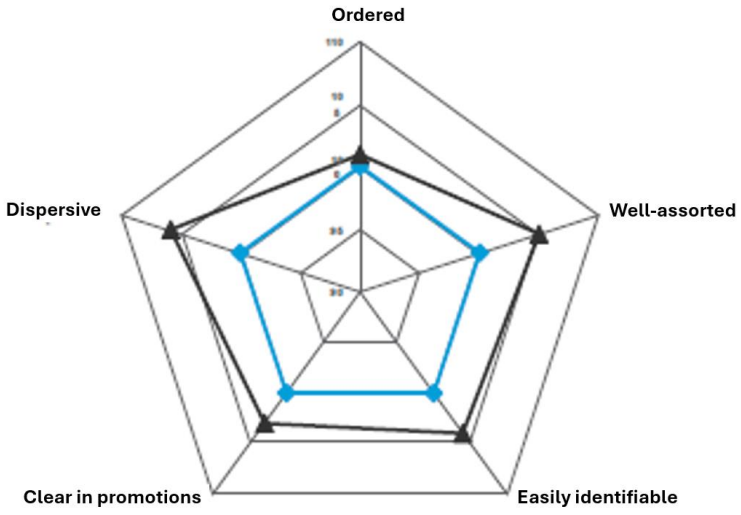


Figure 5.3 - Source: Revised data from Ente Risi

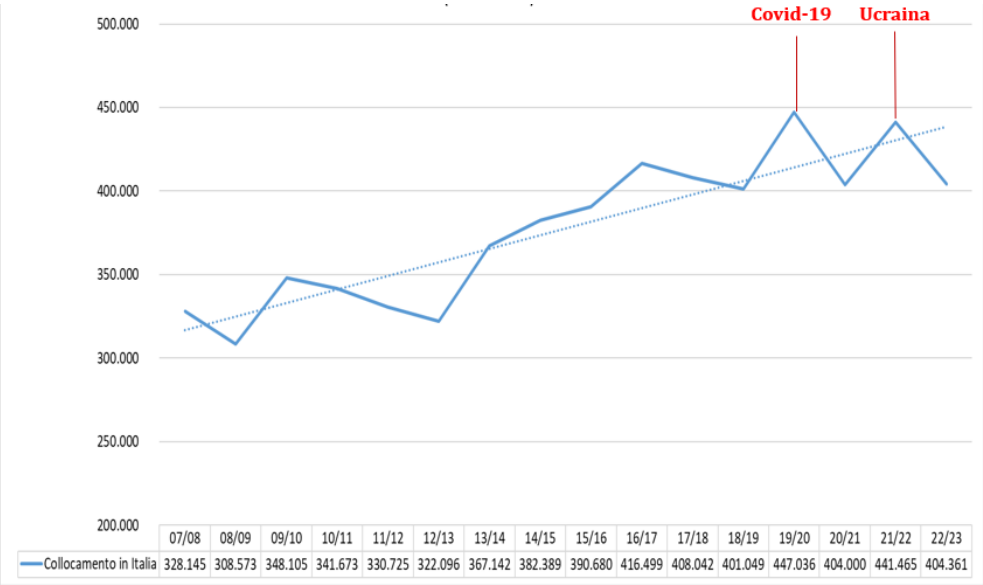
5.1.5 Factors that have recently changed consumer habits

This study has not yet been updated in recent years, in which there has been a change in both quantity and consumption patterns. At the end of this paragraph, consumption trends in Italy over the last 16 marketing years are reported, where it is easy to see that demand for rice has grown significantly due to several factors:

- Increased demand for gluten-free products;
- Reduction in the consumption of red meat both due to its demonisation and for purely economic reasons, especially in the first years following the global economic crisis of 2007-2008;
- Increase of immigrants who have a greater propensity to consume rice.

Then there were two other events that positively affected demand that are expressed in *Figure 5.4*, Covid 19 and the conflict in Ukraine, referred to the 2019/2020 and 2021/2022 marketing years.

Evolution of placements in Italy (tons)



	07/08	08/09	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23
Collocamento in Italia	328.145	308.573	348.105	341.673	330.725	322.096	367.142	382.389	390.680	416.499	408.042	401.049	447.036	404.000	441.465	404.361

Figure 5.4 - Source: Revised data from Ente Risi

5.2 The future of rice

As evidence the text "La risicoltura italiana oltre la PAC" the possible future developments for Italian rice farming present a range of scenarios, ranging from optimistic visions, which imagine a strengthening and modernization of the supply chain, to the more pessimistic outlook suggests a potential decline and retreat in the sector. Among the most promising scenarios are the consolidation of relations between the supply chain players, an increase in vertical integration and an increase in exports. On the other hand, the less favourable outlook points to a growing fragmentation of the sector, accompanied by a loss of identity and a reduction in the area under cultivation.

The future prospects of the rice sector were outlined on 9 June in Isola della Scala (Verona), during “The Summit on Rice Consumption in Italy”. The National Observatory, promoted by Ente Fiera di Isola della Scala, Consorzio di Tutela della I.G.P. Riso Nano Vialone Veronese and Ente Nazionale Risi, presented a new market analysis, carried out to take stock of the situation in the sector, in the light of the drop in production in the last six months (-17%, also due to the loss of 26 thousand hectares of cultivation due to drought and 8 thousand hectares due to abandonment) and consumption (-27% in transfers). This also includes price increases, new consumer trends and the strategies of large-scale distribution. A focus that reiterated the importance of the new generations and packaging as a communication tool.

According to what has been observed, risotto and sushi, which currently dictate the world of both home and away-from-home cooking, have reached their apogee and are ready to give way to other culinary proposals such as flans, complete healthy dishes with low glycaemic index carbohydrates, paella and light desserts.

What are the impulses to favour? To influence consumers' choices, there would be suggestions for new preparations and detailed information, including certifications certifying the Italian origin of foods. The importance of labelling and sustainability is recognised, but often is difficult to spot on the shelves. Italians want a simplified, informative, and inspiring shopping process.

60% of Italians claim to consume rice at home at least once a week, leaving ample room for growth for this food. The frequency of consumption within the home is highest among women (66% every week, compared to 54% of men), in the 25-34 age group (69%), in households composed of 4 or more individuals (63%), and registers a slight increase with increasing socio-economic level. Interest in risotto increases with age, as

does interest in rice salads; sushi is particularly popular among 18–34-year-olds (third most popular in this age group) and poké ranks fourth for 18–24-year-olds and fifth for 25–34-year-olds. A positive element is the wide range of consumption modes considered by 25–34-year-olds. As for the future, filling preparations, flans, baked preparations (26.8%), rice cakes, rice cakes (23.9%), one-pot dishes such as paella, rice tiella with potatoes and mussels (23.2%), Cantonese rice (21.4%), savoury snacks (arancini, supplì 20%) are of particular interest to consumers, while the opportunities for further growth for risotto are very limited (3.2%). In the past six months, 10.3% of those interviewed have reduced their rice consumption (half for economic reasons). Almost three out of four Italians have noticed an increase in rice prices. However, the future looks promising: only 5% stated that they intend to decrease their rice consumption in the next five years, while as many as 42.6% intend to increase it (in particular, the positive trend among 25–34-year-olds is confirmed).

Stimuli to encourage the purchase of rice shown in *Figure 5.5* include suggestions for new/original recipes (52.5% - especially for 45–65-year-olds and women) and information, knowledge of lesser-known but interesting-tasting varieties/types. Seven out of ten Italians consider the presence of the mark certifying the Italian origin of the product to be important (58.9%) or even decisive (11.0%).

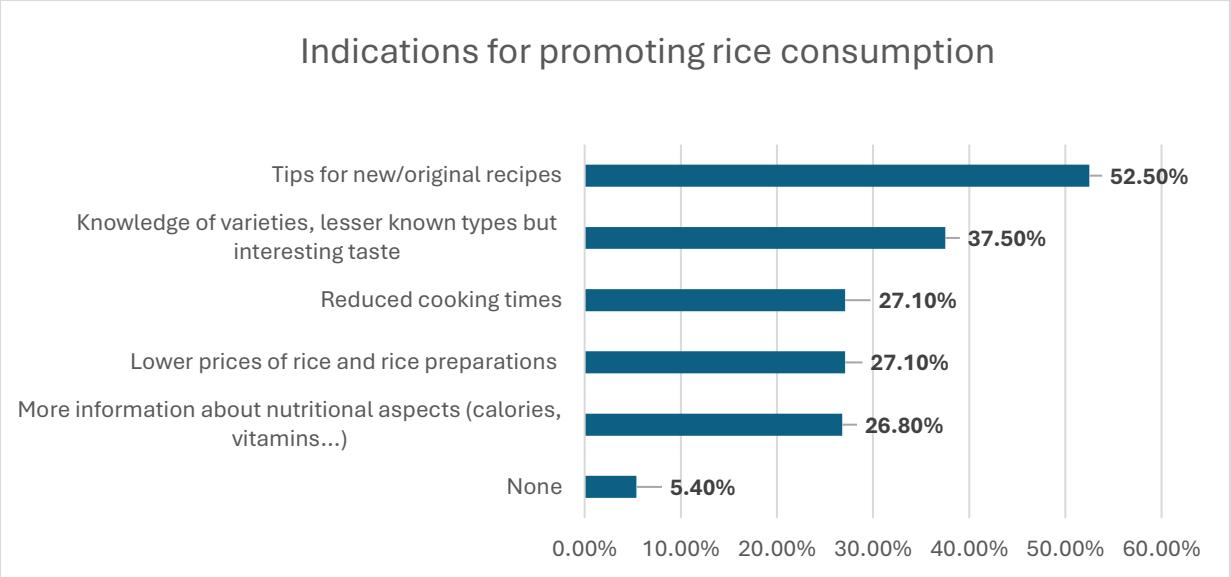


Figure 5.5 - Source: Revised data from Ente Risi

5.3 The types of Italian rice used for the preparation of sushi

5.3.1 The origin

Sushi is a typical Japanese dish made with rice, has an intriguing history dating back centuries and reflects a continuous culinary evolution. Its exact origins are not fully known, but the most reliable accounts trace back to Buddhist monks who returned to China in the 7th century. In Japan, during the same period as the early cultivation of rice, a variant very similar to sushi called "narezushi" developed, still popular in the Tokyo area. This version was inspired by a method used in Southeast Asia and China to preserve fish: fish arranged in layers with salt alternating with rice, pressed for weeks, and left to ferment for months. Over the years, innovations such as the addition of rice vinegar to shorten fermentation time and the marination or cooking of fish were introduced. Hanaya Yohei was the inventor of "nigirizushi," the idea of offering rice bites seasoned with vinegar and slices of raw fish at a street food stall. From there, the new sushi trend was born, becoming one of the most popular street foods. It's interesting to note how people could identify the best stall to purchase their provisions from: each stall had a white curtain reaching the height of men, intended for hand-wiping after eating, so the dirtiest curtain probably offered the best product. From then on, sushi became a commonly offered product in Japan, with initiatives and events like the "Discovery of Sushi" that is a European championship for sushi preparation.

Over time, many variations emerged regarding the ingredients used to season sushi, adapting to the needs and dietary habits of different populations, introducing ingredients like scallops, spicy tuna, beef or chicken, grilled vegetables, orca, and cheese, as shown in *Figure 5.6.* An example of these new trends was the introduction of the California Roll in the United States, to make the public accept the idea of consuming raw fish.

Sushi

Figure 5.6 - Source: Website

According to the most famous chefs, becoming a master of this craft requires a lot of experience, in-depth knowledge of raw materials, and fish cutting and processing techniques. In Japan, making sushi is considered an art taught by a sushi master.

5.3.2 Sushi variety characteristics

Rice stands as a fundamental component of sushi, with Japan enforcing strict controls on its varieties:

- Humidity: 15% for husked/milled rice
- Whiteness: >39.5 for milled rice; > 19 for husked rice
- Cracking: 0 - 4 %
- Proteins: < 6,2 %
- Taste Score: > 75
- Pearled grains: < 0.1%

The degree of whiteness is determined using a colorimeter, correlating with crude fat content and processing yield. The taste score, crucial for assessing protein, amylose, and whiteness, requires a result > 75, with pearly grains deemed unsuitable for sushi rice due to Italian preferences for risotto. Protein content impacts nutritional values, milling yield, and cooking characteristics, influencing stickiness and consistency. Amylose levels, alongside protein content, control stickiness and consistency, with higher protein content increasing resistance to abrasion during refining operations.

A significant portion of the sushi rice marketed in Europe is grown in Italy. The "classic" varieties such as Arborio, Roma, Baldo, Carnaroli, Ribe; Vialone Nano, and S. Andrea are exclusively commercialized with guaranteed varietal traceability and subject to the controls of the Rice Consortium. Traditional varieties exhibit chemical and morphological characteristics similar to the classic ones, while numerous generic varieties can be distinguished based on their biometric features. Italian varieties suitable for sushi, belonging to the "Round or Original" commercial group, exhibit low amylose content, such as Selenio, a crystalline grain variety with low amylose content, standing out as one of the oldest and optimal for sushi. Varieties incorporating Clearfield technology, such as CL18, CL12, CL15, VAR1, and VAR2, are also selected for their round and transparent grains.

Japan's meticulous rice controls, especially regarding appearance, as a result, it is required to respect a very narrow range for cracked grains, between 0% and 4%, a regulation that has never been fully adopted in Italy. This does not seem to have a significant impact on the quality of the product, since there is less attention than the Japanese for this requirement in sushi. Each examined variety exhibits unique characteristics, although formal tests assessing the impact of rice variety on sushi preparation are yet to be conducted.

The evolution of sushi not only showcases human creativity and ingenuity in the culinary field but also underscores the importance of innovation in the agricultural sector, particularly in rice production. The introduction of rice varieties specifically tailored for sushi preparation and the adoption of advanced agricultural technologies have contributed to ensuring better quality and consistency of the final product. This highlights the interconnection between agricultural production and the food industry and emphasizes the crucial role of management engineering in guiding and leveraging these innovations for the improvement of the food supply chain and consumer satisfaction. Furthermore, the ongoing evolution of sushi and its global acceptance demonstrate how culinary innovation can transcend cultural and geographical barriers, offering growth and development opportunities for producers and consumers worldwide.

5.4 Soju, one of the latest discoveries of Italy as rice products

5.4.1 The origin

The origin of soju in Korea is not fully defined, there are two theories that place its appearance in two different periods. One hypothesis attributes this to the era of the Silla dynasty (668-935 AD), during which there were flourishing trade with the Arab communities, which already possessed distillation skills used for the production of Arak. The second theory places the emergence of the soju during the period in which the Goryeo was a vassal of the Mongol Empire, between 1270 and 1356 AD, arguing that it was the Mongols who introduced the art of distillation in Korea, influenced by the techniques learned by the Persians. Andong's soju, from which the modern version of the beverage, shown in *Figure 5.7*, was later derived, initially constituted a home liquor produced around Mongolian logistical bases.

Original Soju

Figure 5.7 - Source: Website

Usually, in a traditional way, soju is produced through the distillation of alcohol derived from fermented cereals. Rice wine, used for the production of distilled soju, usually undergoes a fermentation process of approximately 15 days. During the distillation phase, fermented and filtered rice wine is boiled in a large cauldron called "sot", covered by a two-story distillation device, known as "soju gori". In the early 20th century, there were more than 3,200 soju breweries in Korea.

Until 1965, soju maintained a 35% alcohol concentration, but later a 30% diluted version was developed when the South Korean government, to address the shortage of rice, banned the traditional distillation of this cereal. Then began the distillation of ethanol from potatoes and tapioca, with the addition of aromas, sweeteners and water. Until the late 1980s, saccharin was the most common sweetener, then replaced with stevioside.

In the 1970s, the government began to consolidate the soju industries, bringing together small local businesses, which at the time were about 300. One producer was assigned to each province, each of which had to develop a brand of soju representing its own region. The government then implemented two policies to protect local businesses and discourage excessive competition: the first required that over 50% of the soju be purchased from their province by every provincial alcohol wholesaler; the second, instead, assigned to the government the management of ethanol, main ingredient of soju, distributing it to companies according to their market share of the previous year. This government corporate merger led some companies to dominate the market over others.

In the 1980s and 1990s, the South Korean government began deregulating the soju industry, lifting restrictions on new alcohol distribution licenses in January 1991, the

obligation to buy only from their own province in January 1992 and removing or weakening further regulations on soju production in March 1993.

During this period, HiteJinro increased its market share in regional markets outside of its territory, while local businesses experienced a steady decline. This led local producers to pressure for the abolished protection policies to be reinstated, but these measures were later abolished after being declared unconstitutional by the Supreme Court in December 1996.

The ban on producing soju from rice was lifted in 1999, but economic soju continued to be made from other raw materials. The diluted version of soju gradually reduced its alcohol concentration to 30% in 1973 and 23% in 1998, while a variant with an even lower concentration of 17% was introduced. Since 2015, fruit flavored soju has been produced. For many years, including 2013 and 2019, the soju produced by HiteJinro has been the world's best-selling spirits.

In Korea, soju is renowned for being a cheap option and the most popular and consumed spirits. Its tasting is regulated by specific rules of behavior: it is considered inappropriate to pour the soju alone; the glass is not topped up until it is completely empty; if the soju is poured by a respected person, the glass should be held with both hands; while pouring, the bottle is held with the right hand while the left hand supports the right arm.

Government policies regarding the production and distribution of soju have directly influenced the structure of the sector and the competitive dynamics among enterprises. For example, the implementation of corporate consolidation policies in the soju sector has led to the formation of dominant conglomerates, with significant market and competition implications. This scenario provides a unique opportunity to analyse resource management strategies, regulatory policies, and the impacts of government decisions on local industries. Moreover, the transition from government restrictions to more deregulation in the soju sector provides interesting insights into the adaptation of enterprises to changing market conditions and strategies for growth and diversification.

5.4.2 The Soju market

Analysing the data in the graph shown in *Figure 5.8*, we can see that the global soju market is expected to increase from $3.32 billion in 2023 to $4.37 billion by 2030.

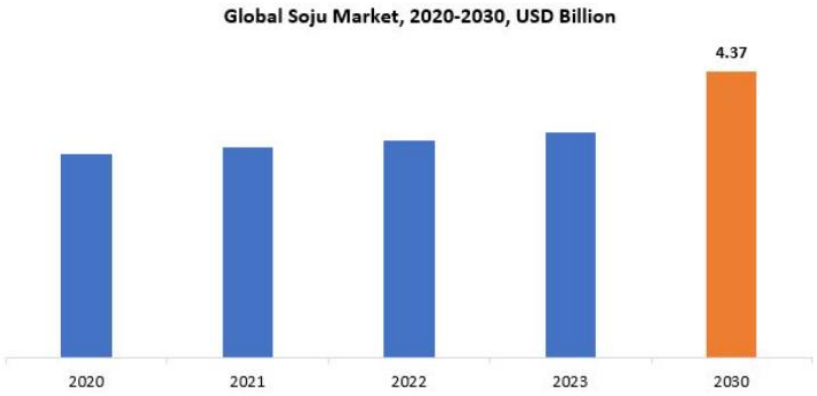


Figure 5.8 - Source: Website

Its versatility as a base for cocktails intensifies its appeal, attracting customers looking for fresh and fun consumer experiences. In addition, the affordable cost of Soju makes it an attractive choice compared to other alcoholic beverages, increasing its popularity among a wide audience. With consumers increasingly open to new cultural offerings, the trend to explore unusual and exotic alcoholic beverages fuels the growth of the Soju industry. Moreover, the increase in international tourism has exposed the Soju to a wide range of people, stimulating the demand for this traditional Korean distillate even outside the national borders.

Based on usage, the demographic group between 20 and 40 years stands out in the soju market. This age group represents the predominant share of soju consumers, a reflection of the attractiveness this beverage has on a young and middle-aged audience. Innovative aromas and branding strategies are designed to capture the attention of a trend-conscious clientele. Marketing initiatives are specifically targeted at this age group and use social media and other channels to consolidate the brand and encourage engagement. The under 20 age group shows preference for fresh tastes, while those who are about to reach the legal drinking age may be attracted by the creative and vibrant proposals of soju. Between the ages of 40 and 60, consumers are interested in a variety of authentic and superior soju, looking for a traditional and comprehensive consumer experience. More delicate and traditional selections of soju may be preferred by customers 60 years or older, indicating a preference for established and proven options.

In the graph below, *Figure 5.9,* we can see the quantities of people in a given age group who are involved in the use of Soju.

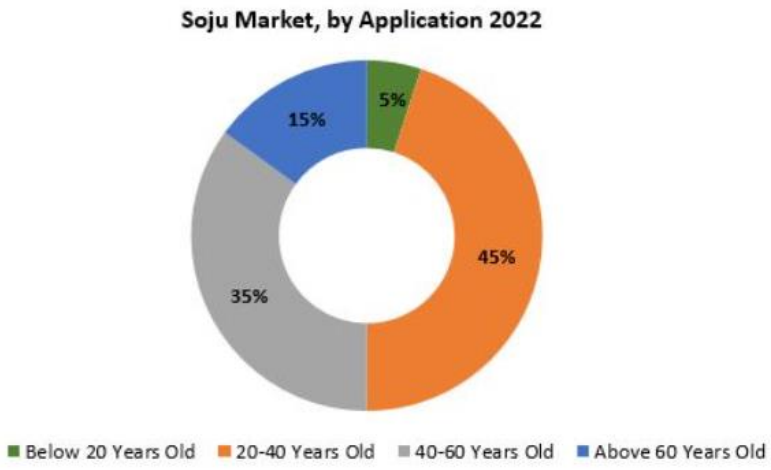


Figure 5.9 - Source: Website

The widespread consumption of Soju in South Korea is deeply ingrained in the country's culture, where it plays a central role in social gatherings, holidays, and daily life. While Soju holds a dominant position in the Asian alcohol market, its presence in North America is currently limited. However, there are promising growth opportunities for Soju in North America, driven by factors such as the increasing interest in Korean culture, particularly in the United States, and the introduction of a diverse range of flavor variants.

The growing acceptance of Korean culture, especially among young adults aged 20 to 40, is a key driver behind the expansion of the Soju market in the United States, which is expected to experience rapid growth. In Europe, Soju has gained popularity, especially in cities with diverse culinary scenes and multicultural environments. It is often featured on the beverage menus of pubs and restaurants offering Korean or Asian fusion cuisine, thus gaining visibility among a wider audience.

An interesting curiosity that emerges from the data is the growing role of soju as a base for cocktails, which increases its attractiveness for consumers looking for fresh and fun consumer experiences. This suggests a trend towards innovation in the alcoholic beverage industry, with soju standing out as a versatile and affordable choice to create creative and unique cocktails. In addition, the growing interest in new cultural offerings and exotic beverages further fuels the popularity of soju, especially among consumers open to exploring new taste experiences. This phenomenon suggests that soju not only remains

rooted in Korean culture but is also gaining popularity globally as a trendy and fashionable beverage.

The inclusion of the study of Soju in this chapter provides a broader view of the market dynamics and cultural influences that are shaping the global food industry. While Soju is certainly not destined to become a mainstream rice product, its success as a market trend provides valuable insights into how consumers interact with new products and how these products can contribute to the diversification and added value of the rice supply chain.

6. CAP 2024

The Common Agricultural Policy (CAP) has been one of the main instruments for the agricultural and economic development of the European Union (EU) since its introduction in 1957, with Article 39 of the Treaty of Rome. The initial objective was to ensure food security, increase productivity and stabilise European agricultural markets. However, over time the CAP has undergone several reforms to respond to new challenges, with significant impacts on various sectors, in particular on Italian rice farming.

In the 1970s, the Mansholt reform attempted to reduce public support and correct economic distortions, but with limited success. The real change came in 1992 with the MacSharry reform, which shifted the focus from price support to an income-based model. Compensatory payments were introduced to stabilise farmers' incomes and reduce overproduction, aligning European markets with global ones. However, the growing liberalisation of markets and international competition have posed new challenges to the agricultural sector, including rice, especially in the 2000s.

The CAP 2014-2020 introduced measures to promote more sustainable agriculture, reducing direct payments and encouraging environmental practices through "greening". This has led to resistance among farmers, concerned about the decrease in economic support. The changes brought about by the CAP reforms have had a profound impact on Italian rice farming, forcing a shift from a system based on direct subsidies to one more oriented towards environmental sustainability. Farmers have been faced with new rules and reduced public support, which has had a negative impact on the profitability of the sector. The reduction in aid value from €1,029.50 per hectare to around €688 per hectare in 2019 is significant, making it more difficult for rice farmers to maintain the profitability of their farms.

In addition, the combination of lower support and higher production costs has created liquidity problems for farms, compromising their operations and sustainability. This situation has made it difficult for farmers to maintain satisfactory profitability, contributing to a deterioration in their operating results. The opening of markets has exposed farmers to increasing international competition, particularly from low-cost countries, causing further price declines and increasing vulnerability in the sector. Italian farms, considered weak links in the supply chain, are struggling to defend margins while production costs continue to rise.

Besides economic difficulties, the rice sector has faced challenges related to climate change. Adverse events such as heavy rains, hail and drought have reduced yields and increased management costs, forcing farmers to resort to more intensive treatments to combat diseases and pests. In this context of uncertainty, farmers may feel compelled to redevelop land-use. Although there have been no dramatic changes in the areas under cultivation, the maintenance of a positive trend has raised concerns about long-term sustainability.

The CAP reform has been criticised by many farmers as being the main cause of the current crisis in the sector. However, the criticalities are the result of several complex factors which are not exclusively attributable to the CAP. The interaction between internal and external variables and changing agricultural policy priorities require farmers to rethink their strategies and operating practices.

Despite these difficulties, there are opportunities to revitalize the Italian rice farming, valuing the environmental and social role of the sector. Tools such as greening and agro-climate-environmental payments (AKAs) can encourage sustainable farming practices and move towards a more environmentally friendly model. Recent analyses and research on the sector, such as those in the book of Elena Baici, Cinzia Mainini, highlight the importance of adopting innovative strategies to overcome current challenges.

In summary, Italian rice farming is in a transition phase characterized by economic and environmental challenges, but with potential opportunities for a more sustainable and competitive future, in line with the new CAP guidelines and the suggestions made in studies on the sector. The future of rice farming will depend on farmers' ability to adapt to these new conditions, exploring strategies that exploit multifunctionality and innovation in agricultural production.

In the last twelve months, farmers have begun to adapt to the recent Reform of Agricultural Policy (RPA), which has been implemented since the first day of 2023. . Although the previous period may have been considered a trial period, the current year, 2024, has proved more complex, especially since many of the provisions of the new RPA are based precisely on 2023, making any violations more relevant this year.

6.1 Derogations

During this first year of implementation, it is important to note that the legislator has developed a number of exceptions that take into account various factors, including geopolitical dynamics such as the conflict in Ukraine and bureaucratic delays.

6.1.1 The burning of stubble

The Bcaa 3 component, included in the enhanced conditionality, establishes the prohibition of the practice of burning stubble in cultivated fields, a habit still frequent in some cereal areas of the national territory, such as in the territory of Foggia. However, the autonomous regions and provinces are entitled to derogate from this general provision by means of a measure which delimits temporally or territorially the areas subject to that obligation. The dispensation cannot be applied in Special Protection Areas (APS) and Special Areas of Conservation (ASC).

6.1.2 Crop Rotation Derogation

Provision Bcaa 7 requires crop rotation in cultivated fields to maintain soil fertility, some example of possible crop rotation are shown in *Figure 6.1*. Therefore, the farmer must plan a change of crop at least once a year for each individual cultivated area. It is not allowed to grow the same cereal on land already used for the same purpose the previous year, for example sowing wheat after wheat or maize after corn.

Bcaa 7: some examples of crop rotations on arable land

Years	Main Crop	Eligibility
	Example 1	
1° year	Grain	NO
2° year	Grain	
	Example 2	
1° year	Grain	YES
2° year	Corn	
	Example 3	
1° year	Corn	YES
2° year	Corn	
	Example 4	
1° year	Alfalfa	YES
2° year	Alfalfa	

Figure 6.1 - Source: Revised data from University of the Studies of Perugia

However, for the year 2023, farms were not required to implement crop rotation. This is because, at the time of the drafting of this rule, the situation in Ukraine had led the legislator not to impose restrictions on cereal production. The obligation to implement crop rotation has entered into force from 2024, which will serve as a reference for this practice. In other words, if a particular crop is cultivated in 2023, it will be possible to repeat it in 2024, but if the same crop is sown in 2024, it will have to be changed in 2025. In addition, there are exceptions to the BCAA 7 provision for farmers operating in regions classified as dry areas (as in the case of southern Italy) or in mountain areas. In both cases, it is allowed to grow the same crop on the same area for two or three consecutive years, under certain conditions.

6.1.3 The derogation to 4% of non-productive areas

Provision Bcaa 8, included in the enhanced conditionality, provides that at least 4% of arable land should be designated as a non-productive area. This quota includes fallow land, protection bands, wooded areas, terraces and other items not used for agricultural production. However, due to the circumstances related to the situation in Ukraine (known as the "Ukraine Derogation") and following pressure from European farmers in recent weeks, the European Commission has decided to grant farms the possibility of obtaining

a derogation from this obligation for the whole year 2024. It is important to note that in non-productive areas subject to this derogation, it is not allowed to grow maize and soya, nor to carry out the rapid rotation of coppices, but the use of plant protection products is allowed.

6.1.4 Derogation for young farmers

The First Pillar of the Common Agricultural Policy (CAP), also in its 2023-2027 version, includes income support for newly established young farmers. For this intervention, identified by code PD 03 - CIS YF and referred to as "Supplementary income support for young farmers", intended for individuals under the age of 41 who are setting up for the first time as head of a farm on a farm, a financing equivalent to 2% of direct payments is available, amounting to about 352 million euro to be distributed in the period 2023-2027.

As regards the Second Pillar of the CAP, which focuses mainly on Rural Development Complements (CSRs), successors to the Rural Development Plans (RDPs) of the programming up to 2014-2022, the regions have worked on two fronts. The first concerns the premium for the first setting-up of young farmers, a fixed contribution linked exclusively to the establishment of the young entrepreneur, or the company structure mainly composed of individuals under the age of forty, delivered through Measure 6 - Sub-measure 6.1. This award has been widely used, although some regions continue to award these premiums according to old programming. Another form of intervention under the Second Pillar of the CAP 2014-2022 was Measure 4.1.2, which finances part of the investments of young entrepreneurs and is linked to the specific investments made. This type of intervention was justified by the legislator to ensure generational change in rural areas, considered essential for development. Here again, we are faced with the last acts of the old programming. In the new programming, more than 713.5 million euros have been allocated to the prize for newly installed young people, equal to 5.5% of the public expenditure of Italian CSRs, distributed among the various CSRs of the Italian regions. However, there are some innovations: the grant can also be granted to new farmers, even if they are not young. In addition, the prize will also be available to young entrepreneurs who enter into a support contract with an elderly agricultural entrepreneur, also not professional but active (with more than 65 years or retired). With this contract, the senior entrepreneur undertakes to transfer his professional skills to one or more young associated

farmers, in exchange for direct participation in the management of the farm by young people.

Besides there was the introduction of a new requirement to access this benefit, which consists in having "adequate training requirements or skills". This implies the possession of a qualification in agronomy, agrotechnical or agricultural expert, or the completion of a professional course in addition to any diploma, or the achievement of the average license together with work experience in agriculture. The legislator, having introduced this requirement for the first time in 2023, has decided to grant an extension for the presentation of the documentation proving the formative suitability until 30 September 2023.

6.2 News

6.2.1 Crop Rotation

It was agreed to allow the use of catch crops to comply with the rotation requirement. Anyone who then grows corn, has the opportunity to sow corn again the following year, provided that during the winter the land is covered for at least ninety days by an interlayer crop (such as mustard, horseradish or field).

The obligations remain valid even if the land has been rented. Suppose, for example, that a farmer leases land for one year and decides to cultivate it directly the following year: he needs to know about the crops included in the single declaration of the tenant, since the crop plan of one year affects the next. If, for example, the tenant has sown maize, the owner will not be able to repeat this crop (unless he plants an interlayer crop in winter).

6.2.2 Grazing

There is a table, *Figure 6.2,* listing the different categories of grassland, with their characteristics and the percentage of eligibility for payments. For each category, the minimum and maximum number of livestock units (LU) that can graze per hectare per year are indicated.

Grazing and calculation of tare	Eligibility
a) Permanent shrubbery, trellised and/or bedrock meadows with up to 5% tare weight	100%
b) Permanent shrubbery, trellised and/or bedrock meadows with tare weight exceeding 5% and up to 20%	80%
c)Permanent shrubbery, trellised and/or bedrock meadows with tare weight exceeding 20% and up to 50%	50%
d) surface on which traditional local practices (PLT) are carried out with scattered elements such as rocks affixed and others greater than 50% and less than 70%	30%
e) in different cases with a tare weight greater than 50% referred to in letter c) or with a tare weight greater than 70% referred to in letter d)	0%

Figure 6.2 - Source: Revised data from University of the Studies of Perugia

For example, in polyphytic pastures the minimum number of LU is 0.2 per hectare per year, while the maximum allowed is 4 LU. In order to obtain payments, it is necessary to carry out both mowing and other ordinary cultivation operations (such as sowing), provided that they are documented, for example, through a geo-referenced photo.

These provisions are introduced to prevent farmers from actually using abandoned land to claim CAP contributions without real grazing or mowing grasses. If the farm has no livestock, it must prove that it has collected and sold the hay produced.

6.2.3 Monitoring System

New advanced technologies such as machine learning and remote sensing are also highlighted to implement a monitoring system within the European Common Agricultural Policy (CAP). This monitoring system aims to simplify the implementation and management of CAP support by replacing traditional field inspections with those based on remote sensing.

Remote sensing methodologies, in particular the use of satellite images, have become effective tools for agricultural monitoring and management. Periodic and systematic checks aim to verify the correspondence between declared agricultural activities and

those actually observed through satellite imagery, thus helping to ensure compliance with CAP obligations.

The integration of advanced technologies such as machine learning and data from the Copernicus programme, in particular those provided by the Sentinel-2 satellite, makes it possible to transform data into useful information for monitoring agricultural activities. This innovative approach improves the efficiency of CAP management, enabling more accurate and continuous monitoring of agricultural activities and subsidies, reducing the need for field inspections and optimising administrative resources.

It highlights how the adoption of new technologies and methodologies based on remote sensing and machine learning can revolutionise the monitoring and management of the Common Agricultural Policy, promoting sustainable, efficient farming practices that comply with CAP objectives.

In economic terms, the implementation of this surveillance system could have several positive consequences on the financial side. For instance, optimising the observation of agricultural activities could reduce administrative and control costs for the institutions in charge, allowing them to allocate resources more accurately and effectively. Furthermore, the ability to promptly and accurately detect violations of agricultural regulations could help reduce fraud and non-compliant activities, promoting greater transparency and integrity in agriculture.

6.3 Prizes and payments

As for payments, there are some good news. Ecoschema 2 recorded higher payments in 2023 than expected (133 euros instead of 120), as well as Ecoschema 3 (238 euros instead of 220) and Ecoschema 5 for arable crops (659 euros instead of 500 euros). However, as far as Ecoschema 5 is concerned, the paying agencies are stepping up their checks, as the first checks show that Ecoschema is most susceptible to fraud. It is therefore essential that farmers adhere strictly to the rules.

For example, it is considered illegal to participate by presenting pastures instead of arable land, or not respecting the protection bands around areas intended for honey trees, or still not planting the species indicated by the Executive Regulation.

There are also concerns about the Ecoschema 5 for tree plants, because while it imposes a ban on the mowing of honey trees, the National Action Plan requires mowing

before the phytosanitary treatments for the protection of bees. This conflict has led to few requests (at least in Emilia-Romagna).

Instead, Ecoschema 4 saw payments halved (49 euros instead of 110) due to the large number of companies that joined. However, this Ecoschema is generating a lot of controversy because not everyone has fully understood the commitment required, which effectively binds the company for two years

6.4 Penalties

Who does not respect a BCAA or a CGO receives a 15% reduction of all CAP aid received (both First and Second Pillar) in the first year of violation. In the second year, if the error persists, he is sanctioned with a reduction of 45%, while in the third year the penalty increases to 90%. In the case of two infringements, a reduction of 30% is applied from the first year, followed by 90% and finally 100%.

As for Eco scheme, the penalty for each breach is 30% to 50% and up to 100%, depending on the severity, extent, duration and frequency of the infringement.

However, for the year 2023, the application of sanctions shall be suspended provided that the infringement is of minor gravity and the defaulting beneficiary applies for the same scheme in 2024. If the beneficiaries for whom the sanction was suspended in 2023 commit further violations in 2024, the suspended sanction for 2023 will be applied together with the one imposed for 2024.

6.6 Acquerello CAP and different point of view

Rondolino is a farm that, like all others, benefits from the CAP, but at the same time, being also an industry, since 2001 it also benefits from the subsidy allocated to it. This subsidy is allocated on the condition that investments are made that favour the farmer who sells the product; it is from this moment on that in Acquerello is born the cooperative, which buys from Rondolino and processes. Two different legal figures combined in the same family, thanks to which contribution benefits are obtained on both sides.

The owner of Acquerello, Piero, although is a farmer and therefore benefits from the CAP that he receives every year, agrees with receiving a reduced part of it, because himself is aware that farmers, in the past, have received more than they are actually entitled to, but at present, having given them so much in the past, he finds no reason to

“complain”, all the more so because their market is linked to the product, the brand, the customers, the CAP results as something “marginal”, welcome but not necessary for survival and impacting on the budget. This concept reflects precisely the motivation why Piero decided to differentiate himself, for a choice of freedom because living on subsidies is neither ethical nor guaranteeing.

There are different views on the subject of the CAP. Some argue that the CAP should continue to provide significant support to traditional farmers, especially in less developed rural regions. Others believe that the CAP should be reformed to promote more sustainable and environmentally friendly farming practices. This could include incentives for conversion to organic farming, reduction in the use of pesticides and chemical fertilisers, and support for soil and biodiversity conservation projects. Some critics believe that the CAP is too bureaucratic and ineffective, with an unequal distribution of funds that favours large farms at the expense of small businesses and farmers. They call for a simplification of the system and greater transparency in the distribution of funds. There is a growing movement calling for a reform of the CAP to better integrate environmental and animal welfare objectives. These activists want to see a reduction in the environmental impact of agriculture and more support for farming practices that respect animal welfare.

Conclusion

This thesis investigated the Italian rice sector from multiple aspects, including market dynamics, regulatory challenges and innovations adopted by producers to differentiate themselves in a competitive environment. One of the key objectives was to understand how Italian companies can maintain competitiveness through strategies that integrate tradition and innovation, even in the face of globalised market pressures and openness to imports from countries with lower production costs.

The case of Tenuta Colombara and the Acquerello brand was an emblematic example of differentiation. The company has distinguished itself through unique practices such as the ageing of the rice and the reintegration of the bud, strategies that not only improve the quality of the product, but also consolidate the brand's positioning at the high end of the market. The introduction of vacuum-packed cans and the creation of the nutrient-rich “Black” rice have enabled Acquerello to build an identity of excellence, appreciated by international chefs and consumers.

An analysis of the recent reforms of the Common Agricultural Policy (CAP) has highlighted the weight of regulations on Italian rice farming. The new directives promote greater environmental sustainability and incentivise more responsible farming practices, but also impose economic and operational challenges. For Italian producers, adapting to these regulations means investing further in sustainable technologies and improving production efficiency in order to continue to compete both at a European and International level.

In summary, Italian rice-growing has great potential for growth, which can be realised through innovation and the valorisation of local characteristics and product quality. Despite competitive pressures, Italian producers can prosper by focusing on high quality products and focusing on strategies that combine sustainability, tradition and innovation, thus turning current challenges into opportunities for development and resilience.

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