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The rice market in Italy and the dynamics of global  
competition in the light of the Common Agricultural  
Policy (PAC) reform

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*Alla mia famiglia che mi è sempre accanto  
ed alla mia testa dura che mi ha portata fin qui.*

## *Summary*

The objective of this thesis is to analyze the rice market, in particular the Italian one, from a qualitative and quantitative point of view, assuming the market perspective of primary producers.

In the first chapter, a historical overview of the origin of rice and various cultivation techniques are given, followed by a classification of the different varieties. Finally, the nutritional properties and the benefits of its consumption are described.

The second chapter reports the supply analysis from a quantitative point of view: Italian, European and worldwide production have been considered, identifying the major market players. As for our country, the dynamics of producers' aggregation and the main instrument of rice allocation on the market by the Ente Nazionale Risi have been described.

As for the third chapter, trade flows between Italy, Europe and the entire World have been examined. Particular attention has been given to the issue of import duties from Third countries to Italy.

The fourth chapter reports the demand analysis from a quantitative point of view: rice consumption, geographically distributed, and different quotations have been investigated. Finally, a qualitative survey conducted by the Ente Nazionale Risi on trends in the purchase and consumption of rice-based products has been reported.

The focus of the fifth chapter is the Common Agricultural Policy (CAP) described in its two fundamentals pillars. Significant attention was given to the 2023 - 2027 reform of the CAP in order to understand the dynamics that will involve direct growers from 2023.

Finally, the sixth chapter reports an economic balance sheet belonging to a company located in the Vercelli area, obtained through direct contact with the owner of the farm. The objective was to evaluate, from a quantitative point of view, the impact of the reform hypotheses, described in the previous chapter, in order to estimate the loss that the farmer would have on his net income, in the event that they come into force.

## *Abstract*

The focus of this thesis is to analyze the rice market from a qualitative and quantitative point of view having assumed as a market perspective that of primary producers. The main players have been analyzed in the market of reference, as well as the dynamics that move the competition worldwide and the external environment in which different mentioned rice growers operate, with a particular focus on the Italian market.

In addition, the role of the Common Agricultural Policy and current reforms to it have been considered to assess how the returns of Italian direct growers are changing. For this last analysis, the starting point has been the only available economic balance sheet belonging to a company located in the Vercelli area, obtained through direct contact with the owner of the farm.

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# *1 The Rice*

## *1.1 Definition*

Rice is a gramineous plant of the genus *Oryza* L. belonging to the tribe *Oryzeae*. This includes twelve genera, of which only two, *Oryza* and *Zizania*, are plants of alimentary interest.

The classification of rice has been for long time object of discussion because of the wide morphological variability and the frequent presence of plants with intermediate characteristics among various species belonging to this genus and because of the remarkable amplitude of distribution (1).

The name rice originates from the apheresis of the Latin word *oryza* (or *oriza*), used by Linnaeus for the denomination of this genus of plants, in turn derived without any modification from Greek, following the tradition of Latinizing the names of everything that was native to other regions (2).

The genus *Oryza* currently consists of about twenty species, but only two are cultivated: *Oryza Sativa* and *Oryza Glaberrima*, while all others are to be considered as wild.

*O. Sativa* is the most widely cultivated species in the world and is the staple food for about half of the globe's population. It has probably evolved within a wide area between the regions at the foot of the Himalaya and the adjacent mountain ranges.

*O. Glaberrima* is a domesticated species on the African continent, currently cultivated in some areas of West Africa.

Wild species are distributed mainly in tropical areas (1).

While *O. Glaberrima* has not evolved further, *O. Sativa* has developed considerably as the original types were taken to places more and more distant and different from those of origin.

Today, more than 10,000 varieties of *Oryza Sativa* are known to be registered with IRRI, the International Rice Research Institute of the Philippines.

The best known and most cultivated subspecies are *Japonica* and *Indica*.

*Indica* varieties are mainly cultivated in tropical areas (South and Southeast Asia, southern states of USA, Madagascar, Caribbean) and are particularly resistant. The grains of this variety have a slender and elongated shape, which is why they are also known as

long grain rice.

Japonica varieties are typical in Eastern Asia, in the Arab states, in the Mediterranean area, in South America, California and Australia. They present short, oval to rounded kernels (3) .

In Italy, the varieties traditionally cultivated belong to the subspecies japonica, and this has been the case since the establishment of rice cultivation in our country. In the last decades, however, the cultivation of some varieties belonging to the indica subspecies has been introduced in order to meet the demand of European consumers who are more and more inclined to use rice as a side dish, as well as a first course (4).

## *1.2 Historical reference to the origin of rice*

### *1.2.1 Diffusion in the eastern world*

Asia is the continent where the species *Oryza sativa* originated. This gramineous plant appeared in this region more than seven thousand years ago. Thanks to several archaeological studies it was proved that in Hemudu, Zhejiang Province, near the Yangtze basin of the Yangtze River, rice farming was already practiced 5000 to 6000 years ago, during the Yangshao Cultural Period.

In 1996, near the Yangtze delta, was discovered an archaic rice field dating back to about 4000 years B.C. and with the excavations were found many grains of rice and discovered the remains of an irrigation system.

More in detail, the Himalayas, China and the countries of Southeast Asia, are considered the homeland of this plant.

Every religious, social, political and familiar aspect of those cultures sees its core in rice. There are many popular proverbial legends handed down orally that find rice as the main subject, some examples are: “One works and nine eat rice” or “All we need for our brief passage on earth is a hat and a fistful of rice” or “Talking does not cook rice” (2).

Moreover, there are many anecdotes about the beginning of rice cultivation in China, in particular in 2,800 B.C. the Chinese emperor Shennong, imposed to all the imperial family to preside over the ceremonies for the sowing, reserving to himself the one of rice, during which he symbolically spread with his hand, the seed on the ground (5).

The emperor, Kang Hi, who lived between 1662 and 1723 B.C., a lover of rice and its

cultivation, walking among the rice fields saw some plants whose panicles were already ripe among the others still green, and had them harvested. This is how a genotype of rice was selected to the north of the Great Wall, where autumn is early and low temperatures anticipate, a genotype of rice earlier by three months than the one in cultivation; the variety was named Yu Mi, imperial rice.

The emperors of the Song dynasty, dominant in southern China, in the tenth and thirteenth centuries A.D. introduced in the most populated areas of the Yangtze early *indica* subspecies rice genotypes, originating in Annam, Indochina and those of the subspecies *japonica*, confined to the colder areas in the North of the country. The first genotype is suitable for temperate areas, characterized by a short grain while the second one is characterized by long, thin, crystalline grain.

At the time of Marco Polo the Chinese knew 54 varieties of rice whose grain could be pink, white, yellow, with other characteristics, each with its own fragrance; varieties sometimes selected for exclusive use by the family.

Chinese literature makes ample reference to ancient dynasties for the production of alcoholic beverages obtained by fermentation from rice, traditions that later spread everywhere in Asia, expanding northward to Korea and Japan, as well as southward throughout the continent and the Pacific islands.

During the Edo period (1600-1868), the age of the samurai, rice was also taken as a unit of measurement called Goku, a tool of commercial transactions, and became an identifying emblem of the oriental world (2).

Lastly, according to some historians, from the period of the Ming Dynasty (1368 - 1644 A.D.), the creation of an advanced agricultural system, mainly related to the cultivation of rice, would have prevented the country's industrial development in China, inducing a sort of technological stagnation (6).

### 1.2.2 *Diffusion in the western world*

In Europe the cultivation of rice began in a not well defined period, between 600 and 700 B.C., although the cereal had been repeatedly mentioned by Latin and Greek authors some centuries before the Christian era (2).

The migration of rice cultivation from Asia to Europe took place in the south of Mesopotamia, in the areas subject to the flooding of Tigris and Euphrates rivers. In this

region the cultivation would have arrived towards the VI century B.C. as a consequence of a journey of exploration ordered by the Persian king Dario.

Later, and over the centuries, cultivation extends from Armenia to the Mediterranean basin, on the coast of the Red Sea, between Yemen and Ethiopia.

Between 1326 and 1376 A. C., the fourth sultan of Yemen, Al Abbas El Rasul, cultured and enlightened, wrote a treatise on agriculture, dedicating some detailed chapters to the ways of cultivating rice (6).

### *1.2.3 Diffusion in Italy*

Different hypotheses have been formulated about the introduction of rice in Italy. According to some scholars the cultivation of rice would have originated after the occupation of Sicily and Calabria by Arabs; according to others it would have developed in the Neapolitan area during the Aragonese occupation. In northern Italy the cultivation could have been introduced by Charlemagne's soldiers, after the battles against Arabs, or by merchants of the Maritime Republics. All these hypotheses are plausible, considering that the culture could have had in our country more centers of diffusion.

During the Roman Empire rice was known more for its medicinal properties than for its alimentary ones. They were essentially decoctions, farinades, liquid extracts, potions and drugs which were adopted all over Europe until the end of the Renaissance, in the sixteenth century and in the eighteenth century.

The peninsula, after the fall of the Roman Empire, was a territory of invasions and conquests of Arab and European powers; it is possible, therefore, that the cultivation was introduced in the different regions where it is now present in different times and from different areas of origin. With good probability, the first cultivations began in Sicily, in the same period in which Arabs spread the cultivation in Spain, in the VIII century, if not in previous times.

A document from 1253, now in the archiepiscopal archives of Vercelli, attests that the sick of the hospital of St. Andrew of the same city were given "risum et amigdolas" (rice and almonds).

Arabs brought in Sicily the rice but not the rice cultivation. For centuries, merchants imported it without anyone being able to cultivate it in a significant way.

The most ancient attestation proving the cultivation of rice in Italy is in Florence and is

dated back to 1468. Under the rule of the Medici family, a gentleman by the name of Leonardo Colto dei Colti, asked for the cultivation of rice and the tone used suggests the cultivation of the cereal was already known. However, historians believe for a Milanese origin. The most known document about the introduction in Italy of the cultivation is surely the letter sent by Galeazzo Maria Sforza in September 1475 to the orator of the Duke of Este in Milan, Nicolò de Roberti, with the promise of sending twelve sacks of rice .

In Lombardy and Piedmont rice found favorable conditions for its spreading, mainly because of the presence of flat and sumptuous lands and also because of the availability of many irrigation canals.

The local production soon became the object of exportation, so much so that between 1494 and 1499 there were merchants specialized in exporting rice to Switzerland, through the Gotthard. The trade became so important that Ludovico il Moro, in order to avoid the lack of availability of the product and the consequent increase in prices, prohibited the exportation of rice from the whole Duchy.

At the beginning of 1500's, in Italy, there were about five thousand hectares of rice fields, which in the following century became fifty thousand. The rice produced is protected in order to avoid that the seed is exported to adversary states (2).

The importance of rice is such that, in 1567, in the market of Antwerp, this cereal is considered a commodity of exchange, in the same way as fine fabrics and weapons (6).

This new crop was, however, opposed by the inhabitants of the cities who attributed to it the cause of malaria and urged the authorities to prohibit it, while it was claimed by the owners of the land and by the clergy, also owners of many lands, who saw in it a source of considerable gain (2).

In all the following centuries, and until 1850, only one variety of rice was cultivated, called Nostrale.

The modern cultivation of rice in Italy is due to the Jesuit father Calleri, a missionary in the Philippines, who in 1839 returned to his homeland carrying abusively 43 different qualities of rice. The "theft" of Calleri and the genius of Camillo Benso Count of Cavour, who stimulated the farmers of the Vercelli area to set up an efficient and extensive irrigation system, marked the beginning of rice growing and its study (6).

## *1.3 Plant Structure*

### *1.3.1 Seed*

It is commonly called rough rice and it is formed by a caryopsis, and a coating, known as a husk. In most of the cultivated varieties, the weight ratio between the decorticated caryopsis and the husk is approximately 80:20. The rice seed is an embryo and contains all the minerals the plant needs in the first phase of growth. The time required for the formation and maturation of the caryopsis varies according to the different genotypes, but in all cases, the formation of the embryo is complete after 15 days from flowering. The formation and subsequent ripening of the caryopsis take place in a period of time which varies greatly among genotypes. In the varieties cultivated in Italy only about 30 days are needed for the earliest genotypes and up to 70 days for the later ones. Then begins the filling of the caryopsis with the enlargement of the basal part and its subsequent elongation, followed by the accumulation of reserve substances, to end with the drying process (1).

### *1.3.2 Root*

It is the underground part of the plant which carries out a mechanical function of support and a physiological function of absorption of nutrients and water from the soil. It is constituted by a fascicled system that presents a complex of roots, which assume an increasing development and importance during the growth of the plant. At the early vegetative stages, the roots develop on the surface, later, in the tillering stage, development also occurs at depth.

The maximum development of the root system is reached at the end of tillering, which is a typical phase of the development of herbaceous plants and consists in the formation of secondary shoots and stems from basal buds. When flowering takes place, the formation and growth of roots is finished.

It has been measured that at maturity the entire root system constitutes 10-12% of the total amount of dry matter produced (1).

### 1.3.3 *Culm*

In rice, as in all other gramineous plants, the stem is called culm and is characterized by a succession of internodes and nodes. At the beginning of the germination process, a few days after planting, the primary stem develops. During the tillering phase, from the buds of basal nodes, secondary culms originate in variable number according to climatic conditions, genetic characteristics of the variety, nutritional status of the plant and conditions of oxygenation of soil. In the ordinary conditions of rice cultivation, in temperate climates, the head of a rice plant presents on average from 1 to 3 culms capable of forming a productive inflorescence (1).

### 1.3.4 *Leaves*

They are arranged alternately and in number equal to that of well-developed internodes. They consist of two parts: the sheath and the lamina or flap. The sheath is an elongated, cylindrical formation that fits over a node and embraces the upper internode, up to the point where the flap detaches.

Leaves vary in color from green to purplish red and have more intense pigmentation along the midrib and margins of the lamina. The complete leaves that form first soon exhaust their function and dry out. During the period of maximum vegetative activity five or six leaves are active at the same time, but at maturity, there are rarely more than two or three still viable. The last leaf is called the flag and is the one that usually maintains its photosynthetic efficiency the longest (1).

### 1.3.5 *Inflorescence*

The inflorescence is botanically a racemose panicle inserted on the last node, at the apex of each culm, a grouping of branches bearing flowers. The types of panicles differ in the following characteristics: length, verticillate or non-verticillate distribution of the primary branches, angle traced by the rachillae with the axis of the rachis indicating its shape, which can be closed, open or lax, density of the panicle expressed by the ratio between the total number of flowers and the length of the panicle itself.

The peduncle or pedicel is the last branch of the panicle, it may be articulated to one or

more spikelets or flowers, depending on the genetic basis (7).

#### *1.4 Environmental requirements for the cultivation*

Rice cultivation requires heat and water, but its most peculiar ecological characteristic is the tolerance of water saturation of the soil.

Temperature must be high and constant because rice is seriously damaged by thermal changes. In equatorial regions, where temperature is constantly high, it is possible to have 2-3 harvests per year. In temperate climates the only possible cultivation season is spring-summer and with the help of irrigation made with systems capable of carrying out important thermoregulating functions. The minimum vital temperatures are 12 °C for germination, while raising and flowering take place in an optimal way at 23-25 °C.

As for water, rice can be cultivated without irrigation ("upland rice") only where it regularly falls more than 200 mm of rain per month for at least 3-4 months.

In Italy, where the climate is temperate and rainfall is insufficient, rice is cultivated in submerged soil. In this way water, besides satisfying the very high water needs of the plant, is also an irreplaceable thermal help for the direct contribution of heat and for the thermoregulating action, giving during the night and in the cold days the heat accumulated in the periods of intense sunlight. With submersion a daily temperature range of 10-15°C is reduced to just 3-4°C.

The growth of the rice plant is also influenced by light according to different characteristics: duration of exposure, intensity, quality, daily light-darkness alternation. The latter determines the photoperiod, which in turn determines the length of the vegetative cycle of the plant, different for every variety. The optimal photoperiod is the one that determines the minimum germination-flowering interval.

As for the soil, rice adapts to every type and constitution: sandy, clayey, acid, etc. as long as it is humid. In addition, the uniform distribution of water and a rapid drainage must be guaranteed in order to be able to make the dry operations, necessary for the cultivation (8).



## *1.5 Cultivation systems based on water availability*

In the production areas rice is cultivated with very different techniques and system according to the specific environmental, social and economic situation of the country. The main differences are related to: water availability, methods of planting the crop and the degree of mechanization available.

With particular reference to water availability and to the relationships that can be established between soil and water during the crop cycle, the world rice growing can be schematically classified in four main ecosystems (9).

### *1.5.1 Upland rice system*

In this system rice is cultivated in fields placed from sea level up to the limits of steep mountain slopes. Soils can be flat or with slopes that can reach up to 40%; they are normally dry and draining and rarely the flooding lasts more than two days, during the whole cultivation cycle. Rice is cultivated on dry soil, in this system rainfall is the main source of water for the crop. It is estimated that this ecosystem covers about 10% of the world's surface, but it is able to contribute for no more than 3% of the total production. The main limits to production are due to the low fertility of soils and the aggressiveness of diseases and weeds. This ecosystem is present in India and Bangladesh, in the humid hilly areas of West Africa and in the slightly undulating regions of Brazil (10).

### *1.5.2 Rainfed lowland rice system*

Rice cultivation lands are more or less flat and surrounded by embankments, in order to retain rainwater or, in some cases, the water coming from small streams or rivers flooding. In these conditions, no control of the water level is possible and rice, during its cultivation, is exposed to the risk of water shortage or flooding with a lot of water (50 cm and more). This system is mainly located in river delta regions, swampy areas and flood plains of Asia and sub-Saharan Africa. It is widespread in environments characterized by unfavorable climate and poor substrates, where there are no conditions for the application of modern and expensive technologies. The major limitations of this system are related to a high degree of uncertainty of water availability and limited soil fertility (10).

### *1.5.3 Deep water rice or flood prone rice system*

This is typical of environments where rice fields are subject to uncontrolled flooding for much of the crop cycle. The water depth is commonly variable from 50 cm to 1 meter and sometimes can reach 5 or 6 meters. Under the latter conditions, known as floating rice, the plant is able to elongate its culm to the point where it emerges from the water surface. The deep water system is often practiced in deltas of rivers such as the Ganges and the Brahmaputra, in India and Bangladesh, the Mekong in Vietnam and Cambodia, the Chao Phraya in Thailand and the Niger in western Africa and in the corresponding flat lands of these same countries (10).

### *1.5.4 Irrigated lowland rice system*

It is adopted on flat land, adequately leveled and surrounded by banks, which can have a uniform layer of water adjustable in height according to the needs of the crop (from 2.5 to 15 cm). In relation to the availability of rainfall, the irrigated system can be classified as irrigated wet season or irrigated dry season; in the first case irrigation is used to integrate the water provided by rains. Dry season cultivation is typical of environments where rainfall is usually scarce and water is almost totally ensured by irrigation. These regions are characterized by high solar radiation, strong evapotranspiration, limited incidence of biotic adversities and high productive potential. The irrigated system is spread over about half of the world's rice-growing area and provides about 75% of total production. It involves a large part of the rice surface in North Africa (Egypt), North America, Australia and Europe, where cultivation is carried out only once a year. The irrigated system has also found wide diffusion in Asia and South America. In the tropical climate regions of these continents the use of irrigation, together with the cultivation of short cycle varieties and not sensitive to photoperiod, allows to realize from two to three crops per year on the same land. (10).

## *1.6 Ancient techniques of cultivation in Italy*

The first operation to be carried out on the future paddy field was the fertilization: the peasants or the horsemen unloaded heaps of manure on the field, which the women then had to scatter with the forks (11).

The next operation was ploughing, the traditional cultivation still shows the centuries-old images of buffaloes pulling the plough in the muddy soil, incited by the farmers. In this way, vegetable residues and cattle manure are worked into the ground. This is exhausting work for both people and animals. The turned clods of earth are carefully broken up with harrows: the more homogeneous the granular structure of the earth is, the more regularly the seeds can be distributed. In the last step of this operation the field is levelled (3).

The task of plowing was entrusted to the permanent employees who took care of the draft animals: the peasants with oxen, replaced later by the riders with horses. After plowing, solid embankments had to be built using the shovel. Water was then poured into highlight the parts of the ground that were outcropping, lowered and plowed with hoes by the women, while a rider further leveled the ground by passing with a wooden board pulled by the animal. This operation was particularly laborious because it was done barefoot in the still cold water of March-April.

Once the previous operations had been completed, the sowing took place, once carried out by particularly skilled workers, and therefore better paid, the sowers. They had to cadence the step to the cast, to sow uniformly and in the desired amount.

From the end of May to June there was the husking, in which each team of women proceeded lined up in front, the weeds were passed from hand to hand and deposited in the furrows by the two workers who were at the sides. The operation was considered less tiring than that of transplanting where a fast pace was required, while in the husking there could be moments of relative "rest" when there was a stretch of rice field with few weeds. During the manual transplanting technique, a man or boy would throw bunches of rice into the water, and the women would do the planting, again proceeding in lined up teams but walking backwards.

In July and August, the women were sent to weed the crodo rice, a wild rice that matured early.

The operation of harvesting was always done by hand by both women and men using the sickle.

Finally, the drying process used to take place in the farmyards, filling all the spaces of the farmyard exposed to the warm sun of early autumn with the tide of rice grains still covered by the husk (11).

### *1.7 Modern techniques of cultivation*

The many agronomic practices implemented in rice cultivation such as soil preparation, crop establishment, weed control, harvesting and threshing require time and motive power. Most of these operations can be conducted through the use of machines, equipment and tools that greatly reduce human intervention and fatigue, but involve an appropriate economic investment.

For this reason, the level of mechanization of rice cultivation varies, depending on the degree of economic development, from rudimentary forms still used in some areas of Asia and Africa, to high-tech levels found in more advanced economies.

In Europe, all cultural operations are mainly carried out by means of machines. Use is made of powerful tractors for soil preparation and mechanical transplanters for planting the crop, mechanical pumps for irrigation, boom equipment for herbicide distribution and combine harvesters for harvesting (10).

#### *1.7.1 In Italy*

This cultivation is mainly developed in Piedmont, Lombardy, Veneto and Emilia, generally following the course of the river Po. Italian rice paddies are the most northerly in the world (12).

The system of rice cultivation mostly carried out is the one which contemplates the submergence of paddy field.

The introduction of the machine in Italian rice farming has always aimed at replacing human and animal labor in the most demanding operations; first threshing, then plowing and drying, then the “monda”, ending with harvesting and weeding (13).

The need to operate on adequate size of surface to be able to conveniently use the machines needed to perform the various cultural operations and the possibility of making significant movements of land, using specific mechanical means operating with relative ease and in a short time, have led to systems undoubtedly more rational (14).

The preparation of the soil consists in ploughing and the subsequent breaking up of clods

by harrowing. Although it is desirable to minimize the interval between tillage and seeding, in order to limit weed competition, it has become common practice to plough in autumn, after harvesting, and refine in spring (13).

During ploughing, tractors pull equipment in the field equipped with large steel blades that cut the soil, work it and turn it over. The turning of the soil by means of the plow performs the main functions of aeration of the soil, incorporation of fertilizer, sinking of organic elements, replanting of the soil against some adventitious or weeds.

Fertilization takes place in March, the main objectives of which are to modify the state of deficiency of the soil with regard to individual nutrients, to establish or re-establish in the soil, between the various elements of fertility, a relationship corresponding to that of their use by the rice plant, to increase the fertility potential of the soil, to compensate for the removal of the elements resulting from the production and harvesting of rice, taking into account the inevitable losses, to modify and increase the product value, in addition to the biological one, of the harvested product.

After ploughing, the soil is harrowed and then flooded and levelled. Harrowing, carried out before flooding, allows the breaking up and the amelioration of the big clods formed after the turning of the soil, the perfect incorporation of the fertilizers distributed before and after the ploughing and the levelling of the soil.

The function of submergence, which occurs immediately after harrowing and leveling, in March, is to protect the seed from temperature changes; it is done by filling the paddy field with water up to 3-5 centimeters above the ground. The rice seed in water in 8 days swells and emits the radicles.

Weeding takes place around April, before sowing and immediately after. Control methods can be ecological, mechanical and chemical, or involve the use of herbicides and weed killers.

During sowing, 140 to 190 kilos of rice seed are distributed per hectare. Currently, direct seeding is practically the only method of rice cultivation in Italy. Once upon a time this cereal was cultivated in small plots and then transplanted, but this costly system has been gradually abandoned. Sowing can be done on submerged paddy field (scattering system) or not submerged (row system on muddy soil, scattering on dry soil, row system with seed on the surface, row system with buried seed).

Maximum caryopsis length is reached 25-30 days after flowering, September through October.

In Italy, rice harvesting operations take place, for the most part, in September-October.

This operation is done by using combine harvesters, until 1950 it was done manually. The first successes in mechanization were obtained with the advent of self-propelled combines, tested at the beginning of the 50's by Ente Nazionale Risi. In the last years, technological progress has reached very high peaks of perfection.

The moisture content of the harvested product always exceeds 14-14.5%, i.e., the maximum limit allowed not only for good preservation, but also for the appropriate processing of the product intended for food. If the threshing machine was the first machine to enter rice farming, the dryer should certainly be considered second in this ranking (14). Modern dryers are totally mechanized and the most recent models are equipped with automatic detectors of paddy rice humidity that shut down the system when the set humidity is reached. In order to obtain edible rice, paddy rice (raw rice) must undergo a series of operations in industrial plants (rice mills). Cleaning is carried out before and after drying. Modern cleaners do not require assistance, as the waste is removed by special conveyors, and special devices (brushes, bouncing balls) keep the sieves free from fragments of ears of corn that could clog them. In the latest models, a total enclosure avoids the dispersion of dust into the environment (13).

### *1.7.2 In China*

Rice stretches from south to north, across five climatic zones: the tropics, subtropics, warm-temperate, medium-temperate, and cool-temperate. Irrigated, upland, and rainfed lowland systems are the major rice cultivation patterns, respectively, representing 95%, 2%, and 3% of the total rice area.

Rice was traditionally sown in seedling nurseries and transplanted into paddy fields at the young seedling stage. This requires labor-intensive operations. Over the last 30 years, the migration flow of rural labor to urban areas has resulted in fewer farmers engaged in agriculture. Labor and time saving techniques are imperative to make up for labor shortages. Since the mid-1980s, new techniques such as dry seedling nurseries, direct seeding in dry and wet rice land, and seedling broadcasting by hand or by machine have been initiated and widely expanded.

In these areas the working processes of rice cultivation have been mechanized only in very recent times (15).

## 1.8 Classifications and varieties

According to Italian legislation (Law n.325 of 18 March 1958) rice is classified in: common or original group, semi-fine, fine and superfine groups (16).

Whereas, the European Union classification shows:

Round Grains - length equal to or less than 5.2 mm, length/width ratio less than 2 mm;

Medium Grains - length greater than 5.2 mm and equal to or less than 6.0 mm, length/width ratio less than 3 mm;

Grains Long A - length greater than 6.0 mm and length/width ratio greater than 2 mm but less than 3 mm;

Grains Long B - length greater than 6.0 mm and length/width ratio equal to or greater than 3 mm (17).

### 1.8.1 Common or original

It has small, round grains and has a great power of absorption and growth during cooking. It is used for soups, but also in the preparation of desserts, timbales, croquettes and arancini (18).

The main varieties in this category include Balilla (*figure 1.1*) and Selenio (*figure 1.2*) and under the European classification they are round grains (19).



Figure 1.1: Balilla (19)



Figure 1.2: Selenio (19)

### 1.8.2 *Semi-fine*

Long, tapered shape. The best known are Padano, which is characterized by a particularly soft dough and a high starch content, Vialone nano (*figure 1.3*), widespread in north-eastern Italy, and Venere, of Chinese origin, but now also cultivated in the Po Valley (18). Under the European classification these are all medium grains (19).



*Figure 1.3: Vialone nano (19)*

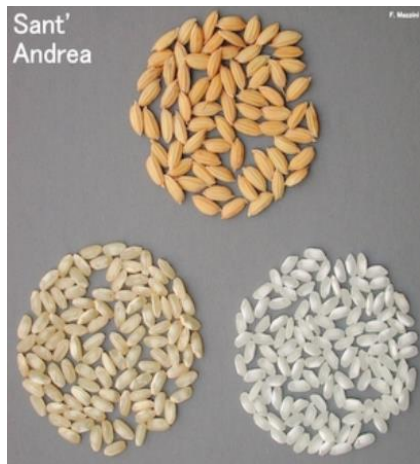
### 1.8.3 *Fine*

The most representative varieties that belong to this category are the S. Andrea, grains long A (*figure 1.4*) and Ribe, grains long A or medium grains (*figure 1.5*) (19).

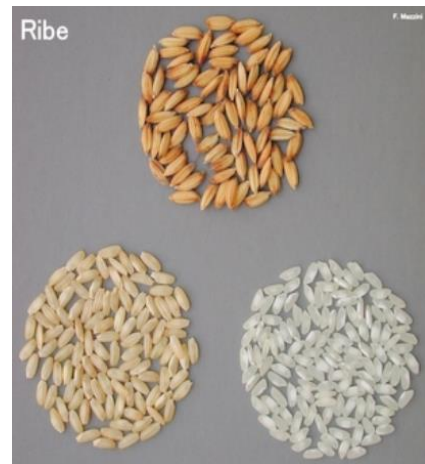
Due to their high starch content, they are particularly suitable for the preparation of soups, but also for flans and desserts. They absorb condiments well.

The Ribe variety is the most widely used in the parboiled pre-cooking process. Its grains retain their nutritional characteristics and it can be cooked for very long periods and it is never overcook (18).





*Figure 1.4: Sant'Andrea (19)*



*Figure 1.5: Ribe (19)*

#### 1.8.4 Superfine

This is the category of rice most commonly found on Italian tables, because suitable for risotto and baking (18).

The most representative are: Arborio, Carnaroli (*figure 1.6*), Baldo, Roma, Ermes and Thaibonnet (*figure 1.7*).

Under the European classification all these varieties are grains long A except Thaibonnet rice which belongs to the long B grains. (19).



*Figure 1.6: Carnaroli (19)*



*Figure 1.7: Thaibonnet (19)*

### 1.8.5 Out of Europe

In addition to the type of rice grown in Italy, there are many others from all over the world that arrive on the tables of Italian and European people.

Basmati is certainly one of the most popular, originating from India and Pakistan, is a tapered rice with a very delicate aroma (*figure 1.8*). In Hindi, its name means 'rich in fragrance'.

Another of these is red rice, brown rice which is part of Thai cuisine. Ideal as a side dish for meat and fish. The Indonesians offer it to the gods (20).

Thai rice, or Jasmine rice, comes from the same area and is available in many varieties, which have different colors and aromas but share the common feature of a tender, grainy and elastic grain that is suitable for boiling and cooking.

Patna rice is Indian and has similar characteristics to the varieties mentioned above (18).



*Figure 1.8: Basmati (21)*

## 1.9 Nutritional properties

Rice is a cereal which together with wheat and maize represents an important source of energy for the sustenance of the world's population; as a food it is used by about 50% of the population and represents one fifth of the total calories consumed by man for nourishment.

Rice is also used to produce other food products: rice flour, obtained by grinding the grain to different granulometry, cream, flour and semolina, which are used for the nutrition of children, elderly and for the confectionery industry; puffed rice by rapid evaporation of

the water contained in the grain after cooking, ideal for consumption with milk in the morning breakfast or for a snack; incorporated in a chocolate bar. Moreover, there are also sake, a weakly alcoholic beverage, produced from fermented rice must, and rice oil, characterized by a neutral taste and a high content of essential fatty acids (22).

As for the nutritional composition of raw shiny rice grain, carbohydrates represent about 80%, proteins about 7%, lipids about 0.5% and water 12% and it does not contain gluten. More specifically, as for the content of vitamins, the most represented ones are water soluble vitamins: thiamine (vitamin B1), riboflavin (vitamin B2), niacin (vitamin PP) and folic acid (vitamin B9). The macro elements present in the grain are: phosphorus, potassium, magnesium, sodium and calcium. As for trace elements, there are: copper, selenium, zinc and iron. Studies conducted on the structure of the grain have shown that the concentration of lipids, thiamine, riboflavin and niacin progressively decreases from the external part of the grain towards the center.

For its composition, rice is then fully assimilated in 60-100 minutes, but the varieties with a high amylose content (equal, for example, to 22%, as in Carnaroli varieties) have a slower digestion and absorption. As a consequence, they have the characteristic of determining a greater feeling of satiety.

From a nutritional point of view, there are significant differences between polished rice and brown rice. From the examination of the grain, it results in fact that, in case of brown grain, it is possible to find a significant presence of vitamins, fiber, minerals, essential fatty acids (mainly present in the germ). In case of polished rice, instead, these elements are almost totally absent or not very significant, as they have been eliminated during the processes of refining and polishing. Brown rice or paddy rice has a characteristic dark coloration which differentiates it from the whiteness typical of polished rice. Brown rice still retains all the coating layers of the grain, with the exception of the glumes, which are very important from a nutritional point of view. The pericarp is very rich in proteins, vitamins, fibers and minerals.

Therefore, from a nutritional point of view, brown rice is much more complete than rice subjected to the refining process. In particular the content of iron in brown rice is about 2 times higher than in polished rice and the content of calcium and phosphorus is double in brown rice than in polished rice. As for vitamin content, thiamine, riboflavin and niacin are present in higher quantities in brown rice as opposed to polished rice, whereas vitamin E is present only in brown rice. Even the content of fiber, mainly insoluble as opposed to soluble, an extremely important nutrient for the wellness of the body, in brown rice is

double than in polished rice. As in brown rice is present the germ, also the content in unsaturated fatty acids is higher than in rice having undergone the whole refining process; this presence of unsaturated fats causes problems for the preservation of brown rice and in fact they are responsible for the fast rancidity process the product undergoes. Moreover, in brown rice there is a good content of silicon, useful for the prevention of cardiovascular diseases (23).

In the context of gluten-free diets, in the group of cereals, only rice and corn are allowed for celiac patients. Numerous foods derived from rice have been developed for this purpose. Most of these foods, which have been produced and consumed for centuries in oriental countries, have recently been successfully introduced into the Western diet. Initially addressed to people suffering from celiac disease, today these products have a good market share as they have been well accepted by all consumers thanks to their excellent organoleptic and nutritional characteristics. These products are: rice drink or milk, rice semolina, rice pasta, rice based bakery products (cookies, bread sticks, cookies, bread etc.), rice oil, rice desserts, alcoholic beverages and vinegar (24).

## 2 Supply analysis

Supply Analysis is a research and analysis done to understand the supply trends and responses to changing market and production variables.

### 2.1 Rice production in Italy

Italy is the European Union's main rice producer and an important supplier.

In the 2020/2021 marketing year, the area dedicated to rice cultivation stood at 227.319 hectares, an increase of 7.292 hectares (+3,3%) compared to 2019.

The increased area resulted in a production of 1.526.864 tons, an increase of 1,49% compared to 2019 production, although the overall agronomic yield in 2020 - at 6,72 t/ha was lower than the agronomic yield in 2019 (6,84 t/ha).

Producers transferred to the processing industry and traders a quantity of 1.491.105 tons of paddy rice, i.e. 97% of the saleable supply. Compared with the previous marketing year, transfers were 18.812 tons lower (-1,25%).

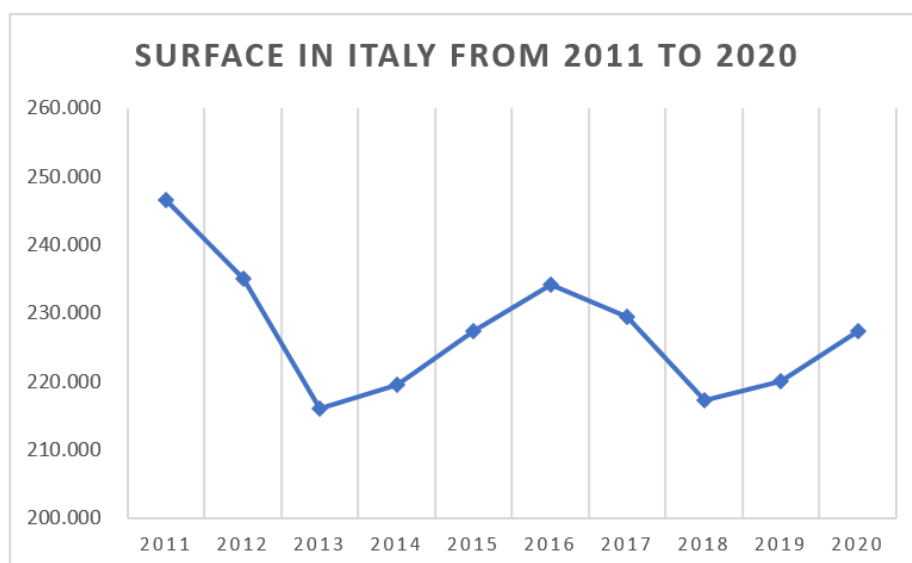
As a general trend, compared to 2011, the area invested has slightly decreased, with an increase in yields per hectare (*table 2.1 and graph 2.1*) (25).

**Table 2.1:** *Rough production, surface areas and yields in Italy (2011-2020)*

Year	Rice production (tons)	Surface area (ha)	Yield (tons/ha)
2011	1.560.128	246.541	6,33
2012	1.601.478	235.052	6,81
2013	1.433.111	216.019	6,63
2014	1.415.906	219.532	6,45
2015	1.505.804	227.329	6,62
2016	1.598.027	234.134	6,83
2017	1.516.033	229.547	6,60
2018	1.480.887	217.195	6,82
2019	1.505.099	220.027	6,84
2020	1.526.864	227.319	6,72

Source: revised data from Ente Risi

**Graph 2.1:** Surface in Italy from 2011 to 2020



Source: revised data from Ente Risi

### 2.1.1 Geographical concentration

Italian rice farming is concentrated in the country's most suitable areas, located in the Po Valley, home to the large irrigated farms. The most important provinces for Italian rice growing are Vercelli, Novara, Pavia and Milan, although the cultivation of rice is also widespread in the neighboring provinces of Alessandria, Biella, Mantua and Lodi. It is therefore clear that rice cultivation is economically important in the agricultural system of Piedmont and Lombardy. Other regions, in particular Veneto, Emilia-Romagna and Sardinia, also have important rice-growing areas, although their production size is smaller. In other areas such as Tuscany and Calabria, rice cultivation is limited to a few hundred hectares (*table 2.2*).

In Italy, the number of producing farms has progressively decreased from almost 10,000 in the 1980s to the current 3785 counted in 2020. At the same time, a progressive amalgamation of land has been initiated, increasing the number of farms with fifty or more hectares of land each. This trend allows farmers to take advantage of the positive effect of economies of scale and optimization of water regulation.

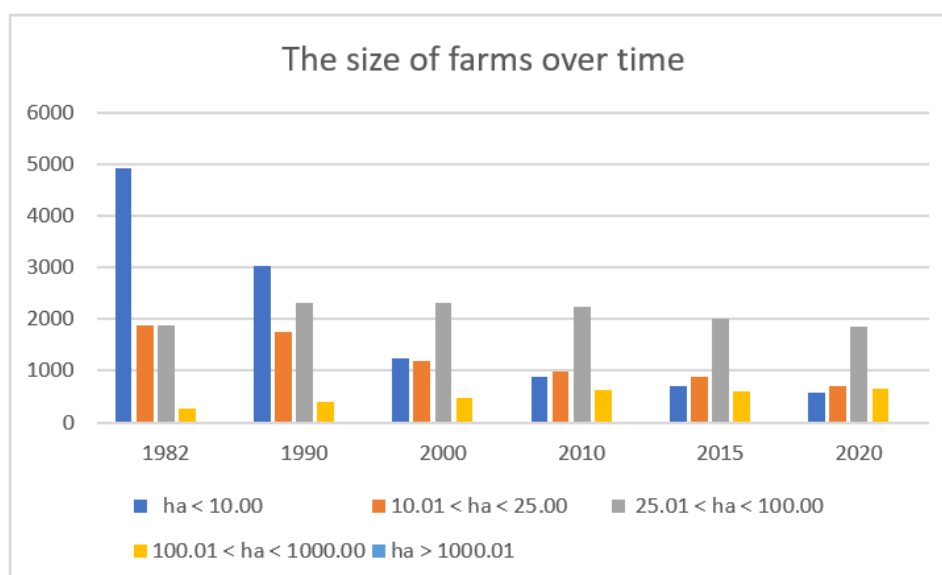
The graph below (*graph 2.2*) shows the development of farm sizes from 1982 to the present day.

**Table 2.2:** Rice cultivation by area in 2020

	Surface area		Production harvested	
	ha	% on total	tons	% on total
Piedmont	115.724	51%	779.484	51%
<i>Vercelli</i>	69.971	31%	472.986	31%
<i>Novara</i>	33.136	15%	224.518	15%
Lombardy	97.861	43%	650.448	43%
<i>Pavia</i>	81.298	36%	551.140	36%
<i>Milan</i>	13.232	6%	80.247	5%
Veneto	3.171	1%	17.823	1%
Emilia-Romagna	5.964	3%	34.498	2%
Sardinia	3.542	2%	26.776	2%
Other regions	1.056	0%	17.835	1%
<b>Italy</b>	<b>227.319</b>	<b>100%</b>	<b>1.526.864</b>	<b>100%</b>

Source: revised data from Ente Risi (26)

**Graph 2.2:** The size of farms over time



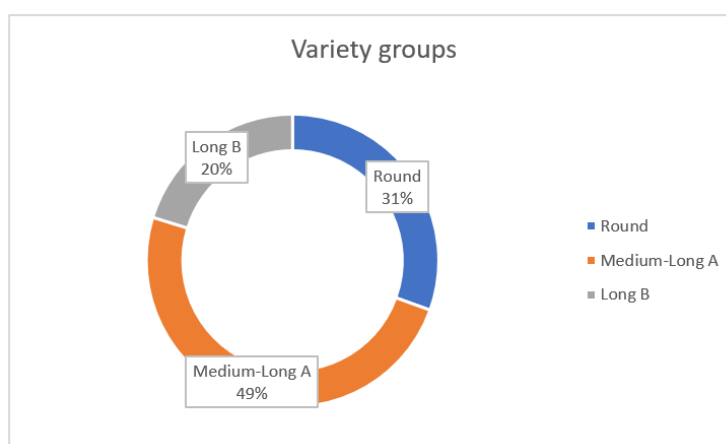
Source: revised data from Ente Risi (26)

### 2.1.2 Main rice varieties

The varieties of rice cultivated in Italy fall into three main groups: Round, Medium - Long A and Long B.

The varietal distribution of the 2020-2021 campaign is shown in the graph below (*graph 2.3*).

**Graph 2.3:** *Main rice varieties in 2020-2021 campaign*



Source: revised data from Ente Risi

The 49% of the national rice-growing area is cultivated with varieties from the Long A group (which includes parboiled rice and risotto varieties for domestic consumption, including Carnaroli, Arborio, Baldo, Sant'Andrea and Roma) and the Medium group; 31% of the area is cultivated with "Common" or "Round" rice; followed by the Long B group, which includes Indica export varieties.

The results of the last ten years (2011-2020) show that the most cultivated variety has always been Medium - Long A with an average of 51,64% and a maximum peak of 59,53% in 2013.

The Round group, instead, presents an average of 25,74%, reaching its highest value in 2020 with 29,74%.

Finally, the Long B group is the variety that shows the greatest disparity in the percentage of land cultivated over the years, with a maximum of 33,07% in 2013 and a minimum of 14,34% in 2016.

### *2.1.3 Placement reports*

The Ente Nazionale Risi (National Rice Board) is a public economic body under the supervision of the Ministry of Agricultural, Food and Forestry Policies, which carries out an intense activity aimed at protecting the entire rice sector. Each year it draws up budgets and final accounts for the marketing campaigns, creating synergies between the supply chain in order to implement useful actions to facilitate the placement of production (27).



The figure below (*figure 2.1*) shows the budget 2020/2021 placement report, with a final column referring to the previous 2019-2020 campaign.

<b>BILANCIO DI COLLOCAMENTO 2020/2021</b> <i>Consuntivo provvisorio</i>					<b>Bilancio consuntivo definitivo</b>
	TONDO	MEDIO-LUNGO A	LUNGO B	TOTALE	Campagna 2019/2020
Superficie (ha)	67.454	117.690	42.175	227.319	220.027
Resa (t/ha)	6,90	6,39	7,32	6,72	6,84
	- Tonnellate di riso greggio -				
Produzione lorda	465.729	752.244	308.891	1.526.864	1.505.099
Risone per semina 2021	11.681	23.874	9.851	45.406	45.464
Produzione netta	454.048	728.370	299.040	1.481.458	1.459.635
Rendimento trasformazione	0,630	0,614	0,640	0,624	0,629
	- Tonnellate di riso lavorato -				
Produzione netta	286.050	447.422	191.386	924.858	917.529
Stock iniziali					
produttori	5.512	25.595	4.005	35.112	65.538
industria	34.882	63.351	42.187	140.420	159.865
Totale stock	40.394	88.946	46.192	175.532	225.403
Disponibilità Nazionale iniziale	326.444	536.368	237.578	1.100.390	1.142.932
Import da UE	5.399	4.851	11.664	21.914	23.004
Import da Paesi Terzi	1.884	3.391	127.867	133.142	126.886
Import totale	7.283	8.242	139.531	155.056	149.890
<b>DISPONIBILITÀ TOTALE</b>	<b>333.727</b>	<b>544.610</b>	<b>377.109</b>	<b>1.255.446</b>	<b>1.292.822</b>
<b>COLLOCATO di cui:</b>	<b>291.161</b>	<b>430.849</b>	<b>343.272</b>	<b>1.065.282</b>	<b>1.117.290</b>
Mercato Italiano	83.461	207.970	114.262	405.693	447.036
Mercato Unione europea compreso Regno Unito fino al 31 dicembre 2020	172.737	118.166	213.064	503.967	553.322
Esportazione verso Paesi terzi compreso Regno Unito dal 1° gennaio 2021	34.963	104.713	15.946	155.622	116.932
<b>Totale stock finali</b>	<b>42.566</b>	<b>113.761</b>	<b>33.837</b>	<b>190.164</b>	<b>175.532</b>
presso produttori	4.402	21.516	3.072	28.990	35.112
presso industria	38.164	92.245	30.765	161.174	140.420

*Figure 2.1: Placement Report 2020/2021 (25)*

The document is detailed in the three main varieties of rice produced in Italy with a final summary column representing the total and a final column referring to the previous campaign.

The item-by-item analysis shows:

- surface (ha), the number of hectares planted with rice;
- yield (t/ha), how many tons of rough rice can be obtained from each hectare of land;

#### *Tons of rough rice*

- gross production, the total tons of rough rice produced, calculated as the product between the surface and the yield previously mentioned;
- rough rice for sowing 2021, reuse of seed for sowing;
- net production, given by subtracting rough rice for sowing 2021 from gross production;
- processing yield, how many tons of milled rice can be obtained from one ton of rough rice;

#### *Tons of milled rice*

- net production, the total number of tons of milled rice calculated as the product between the net production and processing yield mentioned before;
- initial stock, leftovers from the previous campaign differentiated between producers and industrial inventories;
- total initial stock, sum of consumer and industrial leftovers previously mentioned;
- initial availability, sum between the net production and the total initial stock;
- total final stock, difference between initial availability and the national saleable availability, also differentiated between producers and industrial inventories. The national saleable availability is derived from an estimation analysis of production allocation based on market information;
- national availability, difference between initial availability and total final stock;
- import from EU, tons of imported milled rice from Europe to Italy;
- imports from third countries, tons of imported milled rice from third countries to Italy;

- total placeable availability, sum between the national availability and the total imports;
- Italian market, tons of milled rice allocated to the Italian market;
- EU market, tons of milled rice allocated to the European market;
- third countries, tons of exported milled rice from Italy to countries out of Europe.

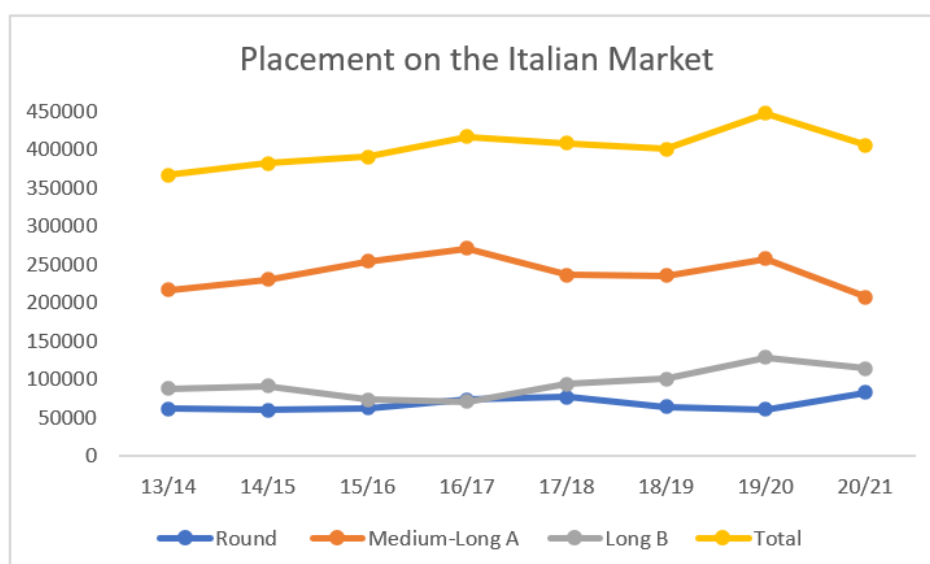
### 2.1.3.1 Market placement of milled rice

In the 2020/2021 campaign the placement on the Italian market decreased by 41.343 tons (-9,2%) from 447.036 tons in the 2019/2020 marketing year to 405.693 tons in the 2020/2021 marketing year.

The comparison with the previous marketing year shows an increase of 22.704 tons (+37,4%) in the placement of Round rice and a decrease of 49,584 tons (-19,3%) for Medium-Long A rice and 14.463 tons for Long B rice (-11,2%).

The graph below (*graph 2.4*) shows the development of the internal market over the last eight years, broken down by type of rice (25).

**Graph 2.4:** Placement on the Italian market from 2013 to 2020



Source: revised data from Ente Risi (25)

In the 2016/2017 marketing year, the 400.000-tons mark was broken for the first time. The progressive increase in rice consumption in Italy can be attributed to a number of factors, such as the economic crisis, which has oriented consumer preferences towards first courses, such as risotto, to the detriment of more expensive main courses, and greater awareness among Italian consumers of the health aspects of rice consumption (28).

## 2.2 Rice production in the European Union

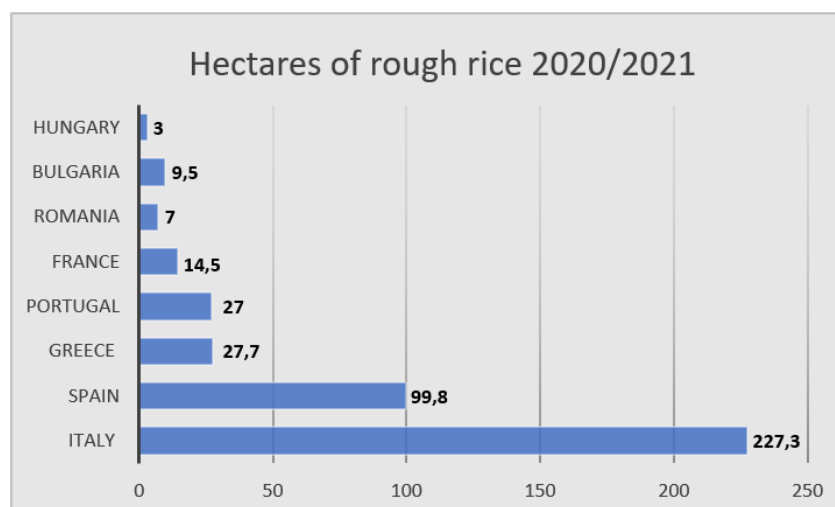
In 2020, the European Union produced 1,68 million tons in milled rice equivalent, in an area of 415.000 hectares. This result was down by 9.000 tons (-0,5%) compared to production in the 2019/2020 marketing year, while regarding the cultivated area, was up 2.000 hectares on 2019 thanks to a 14.000 hectare increase in Japonica-type rice, which more than offset a 12.000-hectare decline in Long B (or Indica) rice (25).

Italy accounts for more than 50% of European Union EU production (around 55% in the 2020/2021 marketing year) and is among the largest European producers.

Spain, with a production of about half that of Italy, is also an important rice producer in Europe. It is followed by Greece, Portugal and France and some Eastern European countries: Romania, Bulgaria and Hungary.

The graph below (*graph 2.5*) shows the distribution of the area under rice cultivation in the European Union for the 2020/2021 marketing year.

**Graph 2.5:** Distribution of rice-growing areas in Europe in 2020/2021 marketing year



Source: revised data from Ente Risi

The European Commission has drawn up a placement report (*figure 2.2*) which, due to Brexit, does not allow for an equal comparison with the previous marketing year, with the exception of the rice area and production, as the United Kingdom is not one of the producer countries.

Below are the placement figures for the last two marketing years (25).

		Campagna					
		2020/2021 (UE senza Regno Unito)			2019/2020 (UE con Regno Unito)		
		Japonica	Indica	TOTALE	Japonica	Indica	TOTALE
A	Stock iniziali (t)	277.000	182.000	<b>459.000</b>	262.000	271.000	<b>533.000</b>
B	Produzione a riso lavorato (t)	1.300.000	379.000	<b>1.679.000</b>	1.238.000	450.000	<b>1.688.000</b>
	Superficie (ha)	330.000	85.000	<b>415.000</b>	316.000	97.000	<b>413.000</b>
C	Importazioni (t)	204.000	977.000	<b>1.181.000</b>	336.000	1.342.000	<b>1.678.000</b>
D=A+B+C	Disponibilità totale (t)	<b>1.781.000</b>	<b>1.538.000</b>	<b>3.319.000</b>	<b>1.836.000</b>	<b>2.063.000</b>	<b>3.899.000</b>
E	Consumo (t)	1.242.000	1.283.000	<b>2.525.000</b>	1.295.000	1.749.000	<b>3.044.000</b>
F	Reimpiego seme (t)	39.000	8.000	<b>47.000</b>	37.000	10.000	<b>47.000</b>
G	Export (t)	229.000	77.000	<b>306.000</b>	220.000	33.000	<b>253.000</b>
H=D-E-F-G	Stock finali (t)	271.000	170.000	<b>441.000</b>	284.000	271.000	<b>555.000</b>

*Figure 2.2: European Placement Report 2020/2021 (25)*

### 2.3 Rice production worldwide

The world area planted with rice in the 2020/2021 marketing year stood at 164,864 million hectares, producing 757,173 million tons of rough rice and 507,204 million tons of milled rice.

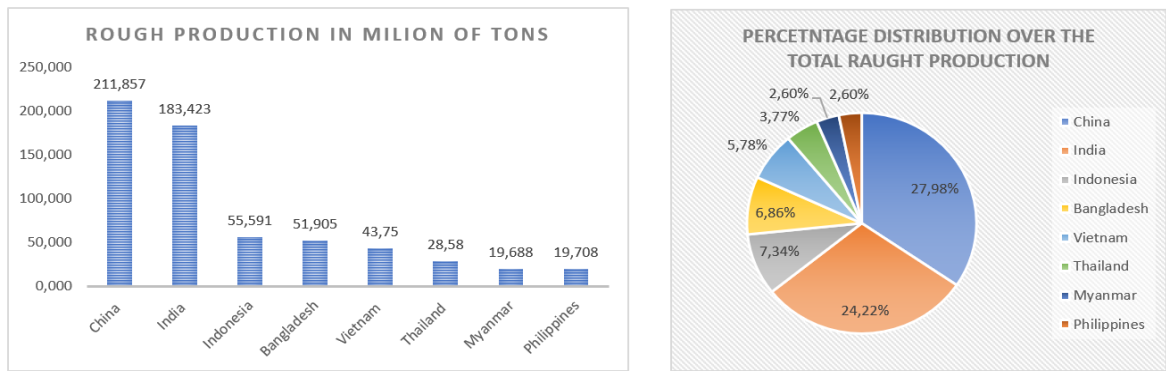
In the last six years, there has been an increase (+5,9%) in production from 711,019 million tons of rough rice to 753,173 million tons in the last marketing year and also an increase in harvested area (+2,2%).

Similarly, production yields of the rice crop reached 4,59 tons per hectare, an increase over the 2015/2016 marketing year of around 4%.

The leading countries in world rice production are China and India, followed by Indonesia, Bangladesh, Vietnam, Thailand, Myanmar and the Philippines, all of which

are Asian countries (*graph 2.6*).

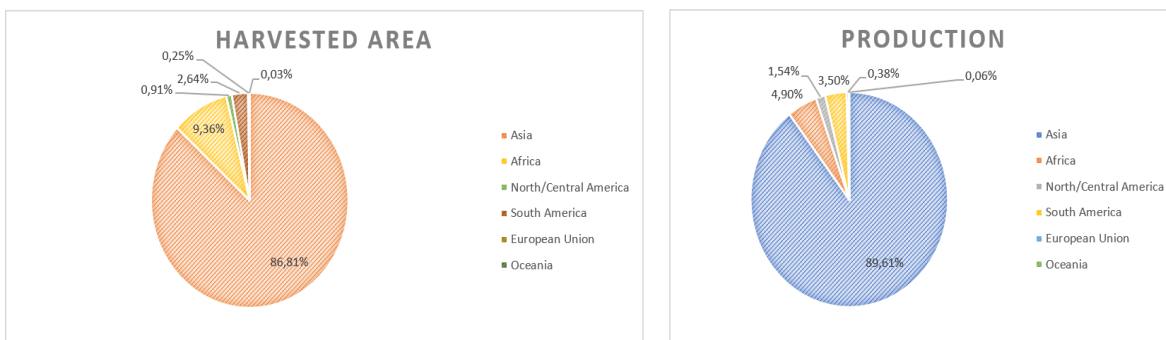
**Graph 2.6:** *Rough production of the world's main rice producing nations 2020/2021*



Source: revised data from USDA (29)

Asia produces 90% of the world's rice, with Africa, Latin America and North America accounting for the remainder. In the world production context, Europe plays an almost negligible role with 0.38% of total world production (*graph 2.7*).

**Graph 2.7:** *Distribution harvested area and production by continent*



Source: revised data from USDA (29)

## 2.4 The industry supply chain

The national rice supply chain (production and marketing of paddy rice) is characterized by a strong interconnection between the agricultural and industrial phases, both geographically and in terms of product flow.

From a production point of view, the supply chain is made up of the following operators: *Agricultural production enterprises* - are made up of paddy rice producers, who direct a large part of their production directly to the processing industry. The various forms of organization of agricultural operators play a marginal role and, in some cases, also take care of the grain processing stages. There are, however, cases of aggregations of producers whose activity covers the whole chain, from the acquisition of the raw material from the members to the carrying out of all the processing phases.

*Industrial sector* - made up of companies that process paddy rice for human consumption, including husking, bleaching, brushing and sorting. At this level too, there is an import channel through which mainly husked rice transits, which is handled directly by the larger production units. Large companies are also directly involved in supplying foreign markets, especially EU markets, with milled rice.

*Distribution and marketing* - for milled rice, marketing is largely done through modern distribution, and is directly managed by the most important industrial groups. It is not uncommon for this sector to practice direct sales on the farm, even in the more modest ones. In some cases, in fact, companies are able to provide all the stages of the chain; for smaller companies, on the other hand, the raw material is entrusted to external structures for processing and then sold processed in their own company shops. In this regard, a significant increase in direct sales on the farm should be noted in recent years. The companies that operate in rice processing have a high degree of integration with agricultural operators (30).

#### 2.4.1 Swot analysis

**Table 2.3:** Swot analysis for rice market

Strenghts	Weaknesses
Agricultural stage	
Concentration of production	High production costs
Possibility of achieving economies of scale	Low generational turnover
High level of professionalism of farmers	High investment costs: difficulties in increasing company size
Territorial specialisation and corporate structures	Technical/agronomic investment rigidity: companies report difficulties
Growth of the phenomenon of professional outsourcing of work for land tilling and harvesting operations	Large processors have high bargaining power over farms
Industrial know-how and use of advanced technologies	Grassroots associations still too latent

Industrial stage	
Strong integration of supply chain stages in terms of geographical distribution	Significant dependence on domestic raw material sometimes leads to rigidities in product diversification
High contractual integration between cultivation and industry through contracted production	
Dominant position in the export of milled rice to countries in the Mediterranean basin countries	
Product/Supply chain	
Absorption of all varieties produced by the market	Import requirements from third countries
Presence of specialised companies per product	Low vertical integration in the downstream stages downstream of the supply chain
Presence of traditional varieties of high gastronomic value	Stagnation of domestic consumption
High barriers to entry	Lack of an adequate quality monitoring system
Medium/low internal competition and bargaining power medium/high	

Opportunities	Threats
Upward price trend: investment opportunities	Reform of the Common Agricultural Policy
Good foreign demand for domestic milled rice	Liberalisation of international markets, with reduction or elimination of duties with negative repercussions on the domestic market
Promotion, protection and valorisation of "made in Italy" agri-food products (push for typicality with PDO and PGI products)	Price volatility
Results of research into new varieties from the point of view of increased competitiveness (less demanding varieties in terms of water supply, resistant to weed control against crodo rice; more productive and less susceptible to plant diseases).	Alternatives that tend to be more profitable than other other crops (e.g. maize)
Proposals for national regulations on rice consumption	Growing international competition

Source: revised data from Ministry of Agriculture, Food and Forestry (30)

## 2.5 Producers' aggregation

The average size of rice production companies is much larger than in others sectors; however, although they are a group of significant realities, they do not show the connotation of a production system capable of producing an integrated offer or a group of companies coordinated among themselves to achieve significant improvement in their



production processes. Significantly higher levels of horizontal integration could be achieved: this would allow for more effective policy implementation if managed in a mass and diffuse manner.

The need to aggregate supply stems from the realization that demand is much more concentrated: the processing and/or transformation industry requires significant quantities of product, with homogeneous characteristics and constant supply over time, of pre-determined quality, with constant batches, traced and traceable, and with certain hygiene and health characteristics. The need is exacerbated by the fact that nowadays when the buyer cannot find the product in Italy, he can get it easily and often at very competitive prices elsewhere. The objective is to build a shared pathway to bring a quality product to the market and maintain/improve the positions gained with a fair economic return for all, in a logic of fair profitability assessed in the medium and long term. Participation in these supply chain projects implies that the agricultural world has reached a sufficient degree of aggregation to participate with the necessary critical mass in terms of both product quantity and quality.

The aggregation processes go through the following regulations:

- Legislative Decree 27 May 2005, n. 102 (Regulations of the agri-food markets, in accordance with article 1, paragraph 2, letter e), of the law 7 March 2003, n. 38);
- Legislative Decree No 228 of 18 May 2001 (Orientation and modernization of the agricultural sector, pursuant to Article 7 of Law No 57 of 5 March 2001).

The Administration has already expressed its commitment to proceed with the reform of the aforementioned regulatory acts, which are part of the more general process of reform of market regulation interventions undertaken both at Community and national level. In this sense, a specific working group will be set up to monitor the evolution of the specific Community regulations (e.g., Regulation (EC) 1234/2007 and Regulation (EC) No 102 of 27 May 2005) in order to produce a timely and consequent proposal for adjustment and reform.

The qualification of the production process passes through a complex of instruments, among which are: production specifications, agreements and contracts, quality assessment systems, traceability systems, guarantee instruments, crisis management methods and ancillary services.

Today, the horizontal nature of grassroots associations can be pursued through a wider range of operational choices (cooperatives, producer organizations, joint stock companies, temporary groupings of companies, business networks, district agreements,

etc.) and remains the tool for achieving a variety of objectives: economies of scale aimed at reducing costs, centralization of technical assistance services, collective management of processes for introducing innovations, concentration of supply with the consequent possibility of stipulating significant contracts and access to services that require a critical mass of products. In order to support this process, the Administration, also in agreement with other national and regional institutions, will be able to: facilitate, also by assigning degrees of priority, those projects that envisage significant aggregations of producers, propose specific ad hoc paths within its own intervention tools for those associated structures that intend to use specific financial instruments (guarantees, access to credit) and outline paths dedicated to association structures when they show specific synergies with the Regional Development Programmes.

In the framework of this strategic action aimed at supporting the aggregation of producers, it is necessary to outline and other sub-actions, strictly functional to the achievement of the assumed objective: elaboration of specifications, integration of the supply chain through districts and business networks and infrastructural investments (30).

## 2.6 *Covid-19 impact*

Since early 2020, the labor market and commerce has undergone significant changes due to the outbreak of the Covid-19 pandemic, and the rice supply chain has not been excluded.

### 2.6.1 *Italy*

The Ente Nazionale Risi (National Rice Board) launched an investigation to assess what was happening during the first months of the pandemic in the Italian companies of entrepreneurs who process and sell rice.

While it is true that various surveys have shown a significant increase in the use of rice, some even speak of increases of between 40 and 50%, it is equally true that there are significant differences: between small and large rice mills, between those who only work with a shop open to private customers and those who work for large retailers. Here are some examples to illustrate the Italian situation better.

*Cascina Fornace rice farm in Vespolate (NO)* - Fabrizio Rizzotti, owner of the rice farm in Vespolate, says that while nothing has changed as far as cultivation is concerned, there

have been significant changes in processing and sales. The company had focused a lot on quality and catering, so the Covid-19 emergency has had a significant impact and has led to a slowdown in sales. Since catering has practically stopped, only private customers are left. These, however, had severe movement restrictions, so the owner was forced to introduce direct delivery of his rice, at least around Vespolate. But this was clearly not enough to compensate for the drop in sales.

*Riso Guerrini of Salussola (BI)* - being a small family business, four brothers plus grandchildren, with no additional employees, the production cycle has not suffered any particular delays. The only slowdown is due to the need to provide the company with all the safety equipment.

Sales are a different matter, and here they are spread over several channels: medium-sized distribution, the online market, restaurants and shops. With regard to medium distribution, there was a slight increase compared to previous year, while online sales boomed. As there was already an active and well-tested system in place for a few years, with couriers for distribution throughout Italy, there were no problems in matching orders. The most problematic channels remained the restaurant business, which stopped, and the shop, which suffered a major reduction because people could not move around freely. The hope was that online sales could wipe out, if not all then at least part of the losses in catering and the farm shop.

*Riseria Cusaro in Binasco (MI)* - A substantially stable situation in a medium-sized business. In terms of both production and management, nothing changed substantially, except for an increase in the precautions at personnel level.

There was, however, a greater demand for rice, sales went well and have grown by around 20%.

*Curti S.r.l. of Valle Lomelina (PV)* - the situation is different for the large rice mills. Since the pandemic broke out, explains Mario Francese, CEO of the Pavia based company, the first emergency we have faced is to safeguard the health of our workers by increasing the investments needed to sanitize departments and offices, as well as adopting strict procedures to increase the level of safety from the risk of contagion. The strategy implemented to date has given excellent results, so much so that the plant has been operating continuously, enabling the company to meet customer demand.

In terms of production, the incidence of the pandemic has been felt. Specifically, the emotional effect of the Covid-19 emergency led to a greater demand for rice from the retail channel from the second half of February and throughout March. The increase in

demand from the retail channel compensated for the default of the ho.re.ca channel.

The managing director of Curti S.r.l. assumed that once the emergency is over, there will be a drop in demand because purchases during this period have also increased domestic stocks. In perspective, a continued drop in demand from the ho.re.ca channel was expected, probably offset by the increase in consumption.

*Riso Gallo in Robbio (PV)* - showed a similar situation to the one described above. Managing director Riccardo Preve said that it is certainly more complicated to work in the conditions imposed by the pandemic. Many precautions have been taken to safeguard health, including sanitation and procedures, which make operations more complex. However, production continued without any problems thanks to the dedication of the workers.

Even at Riso Gallo, there was an initial increase in demand for the product during the first months of the pandemic, which has gradually settled down to stable levels as people are learning to live with the pandemic.

*The Gigante* - confirmation of this situation also came from the large-scale retail sector. The "Il Gigante" chain, which is present in many locations in northern Italy, ensured that rice was in great demand.

Cesare Colli, buyer for the rice category of "Il Gigante" confirmed that in the first months of the pandemic they bought and sold more rice than in the same period in 2019.

Between January and March 2020, the trend was +27%; in the single month of March, the trend was even +49%; an increase that was confirmed at the beginning of April.

Colli assumed that when the situation returns to normal, consumption will also fall, but that a small percentage of growth will remain, because this negative period has certainly led families to rediscover the pleasure of cooking and eating traditional dishes at home, and this certainly includes rice.

In accordance with analyses carried out by the Ente Nazionale Risi, the increase in sales showed that by March 2020, 90% of the rice had already been sold by producers compared to the previous year. This result is surely related to the pandemic, as rice from South-East Asia almost did not arrive. This has allowed our product to be sold more on the European market. Overall, rice was generally preferred to pasta on Italian tables during the pandemic.

It appears that during the lock-down period an average of almost 37.000 tons of paddy rice per week was transferred from producers to the industry, an increase of about 4.000 tons (+12%) compared to the weekly average recorded during the marketing year before

the lock-down. In more detail, the Round and Medium segments fell by 10% and 15% respectively. In contrast, there was an increase of 36% for Long B and 13% for Long A. The data are summarized in the table below (*table 2.4*)

There are many variables at play and they depend mainly on external factors such as the export restrictions of the large rice producing countries that have led to an increase in the price of Long B paddy rice (31).

**Table 2.4:** Comparison before and during lock-down (data expressed in tons)

Type	Average weekly transfers 1/9/2019 - 10/3/2020	Average weekly transfers 11/3/2020 - 21/4/2020	Difference	% Difference
Round	8.578	7.710	-868	-10%
Medium	976	830	-146	-15%
Long A	14.848	16.783	1.935	13%
Long B	8.480	11.526	3.046	36%
<b>Total</b>	<b>32.881</b>	<b>36.849</b>	<b>3.968</b>	<b>12%</b>

Source: revised data from Ente Risi (31)

The acceleration in transfers was accompanied by an increase in the average monthly price, which rose from € 342 per ton in March to € 384 per ton in April and then remained between a minimum of 371 and a maximum of 381 over the next four months (31).

## 2.6.2 Worldwide

The Ente Nazionale Risi, as it had done for Italy, extended the same analysis to the whole world in order to assess what the effects of the Covid-19 pandemic were globally.

From the point of view of product availability, in the first lock-down months there were higher local demand due to the necessity of populations to stock up on greater extent than the usual to face the period of isolation, motivating the governments of many countries to implement restrictive measures on exports, which will be dealt with in the next chapter (32).

China's agricultural industry collapsed during the first months of the pandemic without the free flow of labor and raw materials: the first problem was labor. Chinese farms rely

heavily on the movement of workers struggled to find enough after public transport was suspended in an attempt to stem the epidemic.

Instead of growing cabbage and maize, some areas of the country reverted to rice, which is less labor-intensive.

Farmers also faced a shortage of fertilizers and seeds. Hubei province, where the Covid-19 pandemic originated, is the country's largest fertilizer producer. According to Chinese analysts, the country's northeastern provinces, which produce most of the country's wheat, have faced a shortage of 1,3 million tons of phosphate fertilizer, around 40% of annual consumption. All of these risks exacerbating a much-felt problem in Beijing, that of food price inflation, which hit 21,9% in February 2020, the highest in twelve years.

In Cambodia, measures were needed to curb purchases and the spread of panic among the population. Pick up of rice and non-perishable food in general, such as those of fuel, have experienced a surge especially in the Kingdom's capital, Phnom Penh.

The Green Trade Company (GTC), an operational arm of the Ministry of Commerce, and the Cambodia Rice Federation (CRF), have called for calm, as panic hoarding usually results in higher food prices and speculation. Furthermore, they added that CRF members, together with GTC, had abundant stocks of rice to sell in markets in Phnom Penh and in provinces across the country. As further reassurance, the CRF has verified the stocks of milled and un-milled rice in the warehouses of 400 companies. In addition to meeting domestic demand, these volumes would have been sufficient to meet export needs, said the CRF, according to which the dry season rice harvest, estimated as of 16-th March 2020, was at 80%, with 2,3 million tons. On the foreign shipment front, the CRF said that in January and February, the Kingdom exported about 136.500 tons of milled rice, an increase of about 22% compared to the same period last year.

Agents from Cambodia's General Directorate for Import and Export Control and Fraud Prevention carried out spot checks in markets, shopping centers and shops and explaining to sellers why they should desist from raising prices. CRF Vice-President Chan Sokheang said that in order to prevent shortages of important commodities such as rice, the government and private sector have worked together to increase shipments to local shops from 100 to 500 tons (33).

### 3 Trade flows

#### 3.1 Export from Italy to the EU market

The situation of sales of Italian products to other EU countries has been drawn up on the basis of ISTAT data based on monthly Intrastat declarations by operators (excluding seed rice).

In the period from 1 September 2020 to 31 August 2021, 503.967 tons of rice, milled base, were placed on the EU market, a decrease of 49.296 tons (-8,3%) compared to the previous marketing year (549.518 tons). The decrease was mainly due to Brexit, which marked the exit of the United Kingdom from the EU.

The comparison between the two marketing years shows a slight increase in deliveries destined for rice-producing countries (+1.834 t, +1,1%), while deliveries to non-producing countries fell by 51.130 t (-13.4%).

Spain increased its purchases from Italy by 5.299 tons (+52.1%), mainly of Round rice, while Hungary and Greece recorded declines of 3.430 tons (-21.7%) and 1.017 tons (-26.1%) respectively.

France, first commercial partner of Italy, remained at the same level as last year (134.914 t), but increases were recorded for Round and Long A, respectively, of 6.963 tons (+23.9%) and of 4.010 tons (+24%) and a decrease of 11.755 tons (-13.5%) for the Long B segment.

Total deliveries to non-producing countries were affected by the exit of the United Kingdom from the EU; from 1 September to 31 December 2020, deliveries to the United Kingdom amounted to 26.109 tons and at the end of the campaign the decrease was equal to 33.970 tons (-56,5%).

With 129.677 tons imported, Germany ranks behind France, but with a decline of 4.004 tons (-3%). Deliveries to Slovakia were also down (-3.730; -41,9%), the Czech Republic (3.036 t; -11,7%), Poland (-1.840 t; -8,1%), Latvia (-1.651 t; -54,2%), Slovenia (-1.435 t; -54,2%) and Belgium (-1.377 t; -3,9%).

The breakdown by type shows a decrease in sales of Long B rice (-55.802 t; -20,8%), an increase for Round rice (+5.716 t; +3,4%) and a slight increase (+790 t) for Medium and

Long A rice (25).

The table below (*table 3.1*) gives details of deliveries to the EU (excluding seed rice).

**Table 3.1:** Deliveries 2020/2021 to the EU compared to 2019/2020  
(data expressed in tons of milled rice)

Change in deliveries (2020/2021 compared to 2019/2020)	Round	Medium	Long A	Long B	Difference
To producing countries (t)	11.888	798	6.396	-17.248	1.834
To producing countries (%)	31,9	40,3	25,3	-16,7	1,1
To not producing counties (t)	-6.172	-133	-6.271	-38.554	-51.130
To not producing counties (%)	-4,8	-2,4	-7,6	-23,4	-13,4
<b>Total variation (t)</b>	<b>5.716</b>	<b>665</b>	<b>125</b>	<b>-55.802</b>	<b>-49.296</b>
<b>Total variation (%)</b>	<b>3,4</b>	<b>8,7</b>	<b>0,1</b>	<b>-20,8</b>	<b>-9,0</b>

Source: revised data from Ente Risi based in ISTAT data (25)

### 3.2 Export from Italy to Third Countries

In the 2020/2021 marketing year, Italy's commercial exports to Third Countries stood at 155.622 tons, an increase of 38.690 tons compared to the 2019/2020 marketing year (25). The graph below (*graph 3.1*) represents the trend of Italy's exports to Third Countries from the 2011/2012 marketing year to the latest available.

**Graph 3.1:** Export from Italy to third countries from 2011/2012 marketing year  
(data expressed in tons of milled rice)



Source: revised data from Ente Risi (25)



There is a sharp increase in the last marketing year, that is mainly due to the Brexit which made the UK a Third Country. With 37.399 tons imported, the United Kingdom is an important trading partner among all non-EU countries. In general, the export volumes of Third Countries are substantially stable.

Exports to the Asian continent did not change significantly compared to the previous year, they increased by 1.795 tons (+3,4%) with a total volume of 55.238 tons.

Exports to Turkey also raised, reaching a total of 30.117 tons and showing an increase of 6.147 tons compared to the previous campaign.

Steady growth in exports to Jordan (+2.053 t; +13,7%). On the contrary, sales to Lebanon, at 1.909 tons, confirm the negative trend recorded in the last years and registered a decrease of 6.304 tons (-76,8%).

During the 2020/2021 marketing year, exports to Africa remained at the same levels as in the previous campaign, at 1.798 tons. Morocco and South Africa are confirmed as the main destinations.

Sales to America, equal to 18.985 tons, are up by 2.168 tons (+ 12.9%). At 8.781 tons, exports to the United States remained slightly above the figure recorded in the previous campaign (8.356 tons). Brazil follows with 6.617 tons (+1.374 tons; + 26,2%), and Canada, with 2.018 tons (-60 tons, -2.9%).

Exports to Oceania, equal to 5.756 tons, are just above the level recorded in the last campaign. Among these, those to Australia, equal to 5.253 tons, cover 91.3% of the exported volume and mark an increase of 3,9%.

There are increases in exports for all types of rice: the Round shows an increase of 24.808 tons (+ 244%), the Medium/Long A of 12.218 tons (+13%) and the Long B of 1.664 tons (+12%). The increase in exports of Round rice is due to the volumes exported to the United Kingdom (25.239 t) which represent 72,2% of the total exported Round rice. As regards the types of packaging, exports in small packages are down by 3% (*graph 3.2*) (25).

**Graph 3.2:** *Type of packaging, quantity expressed in tons of milled rice*



Source: revised data from Ente Risi (25)

### 3.3 Imports to Italy from EU countries and Third Countries

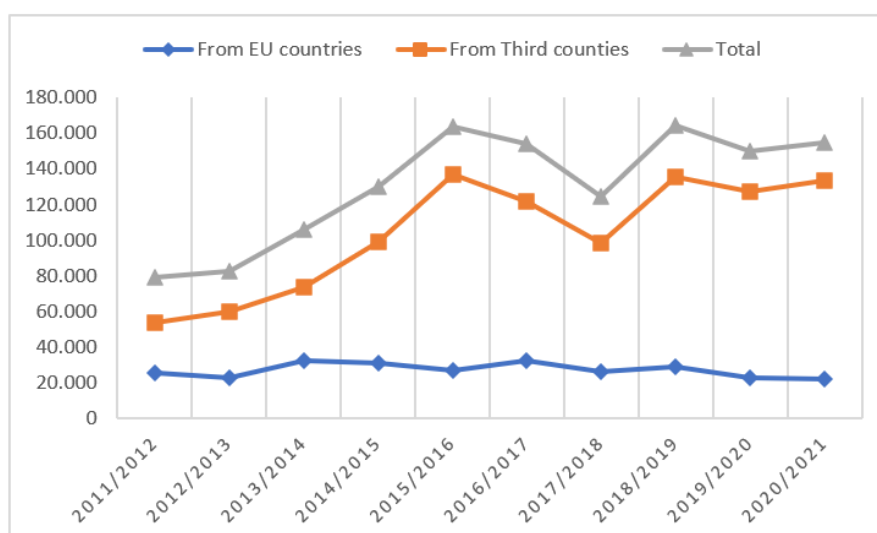
During the 2020/2021 marketing year, Italian imports, including paddy rice, amounted to 155.056 tons of milled rice, an increase of 5.166 tons (+3,4%) compared to the previous marketing year (149.890 tons).

Imports from EU countries stood at 21.914 tons, down 1.090 tons (-4,7%) on the previous marketing year (25).

The table (table 3.2) and graph (graph 3.3) below show the evolution of imports from 2011 to 2020, considering both EU and non-EU countries.

**Table 3.2 and Graph 3.3:** *Evolution of imports from 2011 to 2020*  
(data expressed in tons of milled rice)

	From EU countries	From Third counties	Total
2011/2012	25.790	53.452	<b>79.242</b>
2012/2013	22.914	59.563	<b>82.477</b>
2013/2014	32.545	73.697	<b>106.242</b>
2014/2015	31.214	98.699	<b>129.913</b>
2015/2016	27.092	136.725	<b>163.817</b>
2016/2017	32.286	121.779	<b>154.065</b>
2017/2018	26.097	98.046	<b>124.143</b>
2018/2019	28.881	135.451	<b>164.332</b>
2019/2020	23.044	126.886	<b>149.930</b>
2020/2021	21.914	133.142	<b>155.056</b>



Source: revised data from Ente Risi based on Istat, Eurostat, Ministry of Foreign Affairs and International Cooperation data (25)

Imports from non-EU countries (*table 3.3*) stood at 133.142 tons, wholly milled rice basis, an increase of 6.256 tons (+4,9%) over the previous marketing year.

From Pakistan, Italy's main supplier, 58.664 tons were imported, of which 35.601 tons of Basmati rice. This was followed by Thailand, with 20.201 tons, and India, with 19.438 tons of which 7,772 tons of Basmati rice, and Guyana, with 18.348 tons, of which 16.753 tons of paddy rice in milled equivalent. Imports from LDCs (Least Developed Countries) are all down, in particular those from Cambodia, which fell by 4.394 tons (-71.7%) (25).

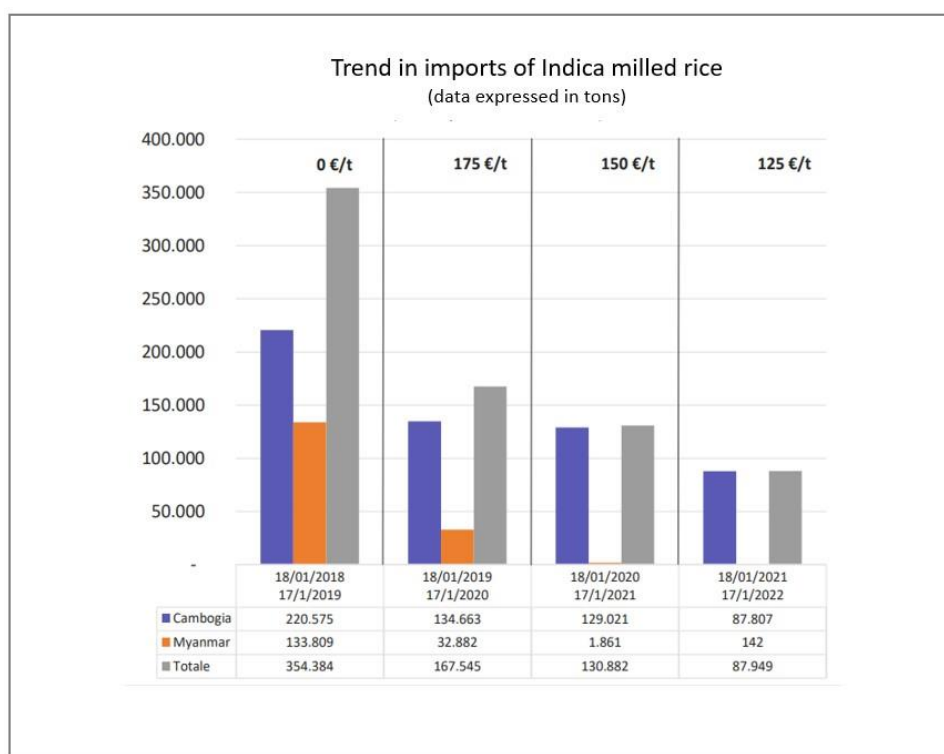
**Table 3.3:** Detail by origin of imports to Italy from Third Countries (data expressed in tons of milled rice)

Origin	2019/2020	2020/2021	Difference	Difference %
<b>Pakistan</b>	53.796	58.664	4.868	9%
<b>Thailand</b>	20.864	20.201	-663	-3%
<b>India</b>	17.593	19.438	1.845	10%
<b>Guyana</b>	12.666	18.348	5.682	45%
<b>Vietnam</b>	8.791	7.274	-1.517	-17%
<b>Myanmar (LDC)</b>	4.313	2.785	-1.528	-35%
<b>Cambodia (LDC)</b>	6.127	1.733	-4.394	-72%
<b>Bangladesh (LDC)</b>	1.011	846	-165	-16%
<b>Sri Lanka</b>	479	437	-42	-9%
<b>USA</b>	133	334	201	151%
<b>Paraguay</b>	0	283	283	NA
<b>Laos (LDC)</b>	423	264	-159	-38%
<b>Other counties</b>	690	2.535	1.845	267%
<b>Total</b>	<b>126.886</b>	<b>133.142</b>	<b>6.256</b>	<b>5%</b>

Source: revised data from Ente Risi based on Ministry of Foreign Affairs and International Cooperation – Eurostat data (25)

The reason for the import contractions from Cambodia and Myanmar is the safeguard clause that lasted from 18 January 2019 to 17 January 2022 and led to the reintroduction of a duty of 175 euros per ton for the first year, 150 euros per ton for the second year, and 125 euros per ton for the third year. As shown in the graph below (*graph 3.4*), imports from Cambodia and Myanmar have gone from a total volume of about 354.400 tons, recorded in the period between January 18, 2018 and January 17, 2019 in which imports were not yet subject to the duty imposed by the clause, to a volume of almost 88.000 tons recorded in the last year of the clause's application. Thus, over a three-year period, the safeguard clause has reduced total imports from the two Asian countries by 75%, with a 60% drop in imports from Cambodia and a nearly 100% drop in imports from Myanmar (34).

**Graph 3.4:** *Trend in imports of Indica milled rice*  
(data expressed in tons of milled rice)



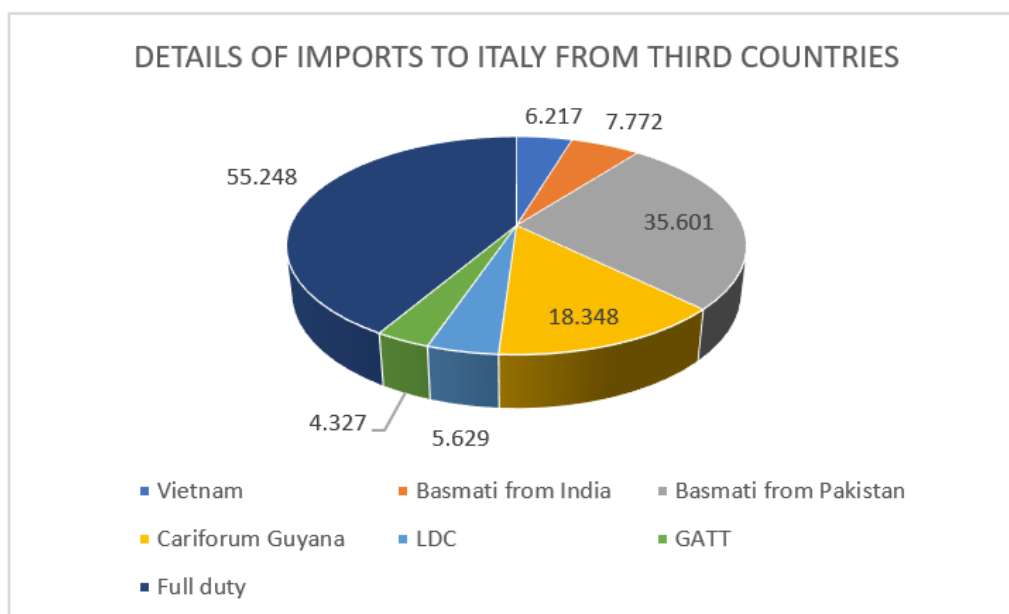
Source: revised data from Ente Risi (34)

Italian operators imported 4.327 tons under the GATT quotas with an increase of 8,8%. Imports from Vietnam are down by 1.517 tons (-17,3%), but with a differentiation according to the import regime. In fact, Vietnamese imports are up by 135,2% in the use of zero-duty quotas and down by 80,4% in imports with duty payments.

The graph below (*graph 3.5*) shows the quantities imported, taking into account the different import regimes provided for by the European Union regulations.

The 41.5% of Italian imports paid the relevant full import duty (25).

**Graph 3.5: Details of imports into Italy from Third Countries**  
(data expressed in tons of milled rice)



Source: revised data from Ente Risi based on Ministry of Foreign Affairs and International Cooperation - European Commission (DG Agri) data (25)

For Basmati rice imported from India and Pakistan, import duties follow the standard values for imports from Third Countries, i.e.: € 211/t in the case of rough rice, and € 175/t for semi-milled and milled rice, customs duty fixed in the Common Customs Tariff in accordance with EU Reg. No 1308/2013.

Import duties from LDCs applied are 'zero' under a Generalized Scheme of Preferences (GSP) provided for in EU Reg. No 978/2012, but duties are temporarily reintroduced on imports of Indica (semi-milled/ milled) rice originating in Cambodia and Myanmar under EU Reg. No 2019/67. Specifically, until 17 January 2021, have been set at € 150/t for imports of semi-milled and milled Indica rice and of 125 €/t from 18 January 2021.

For imports of rice originating in the Cariforums, the import duty applied is "zero" under an Economic Partnership Agreement provided for in Council Decision No 2008/805/EC of 15/07/2008.

Similarly, for imports of rice originating in Vietnam, the import duty applied is "zero" as

set out in Regulation (EU) 2020/761 and the EU/Vietnam Free Trade Agreement (35).

The EU-Vietnam trade agreement, entered into force on 1 August 2020, eliminates more than 99 % of all duties and partially eliminates the rest through limited zero-duty quotas (so-called 'tariff quotas').

Sixty-five percent of tariffs on EU exports to Vietnam is eliminated upon entry into force, with the remainder phased out over 10 years. EU tariffs on imports from Vietnam will be phased out over a period of 7 years. This asymmetric approach takes into account the fact that Vietnam is a developing country.

In the case of agricultural products such as rice, the EU will not open its market completely to Vietnamese imports: quotas will be set to limit the quantities that can enter the EU duty-free.

In addition to removing tariff barriers, Vietnam will also remove existing export duties in bilateral trade with the EU, and has agreed not to increase the few duties that exceptionally remain in place (36).

The quantity of milled rice imported by Italy from Vietnam for the 2019/2020 campaign stood at 8,791 tons (+115% compared to the previous campaign).

### 3.4 Imports to the European Union from Third Countries

Based on the quantities actually cleared through customs in the 2020/2021 marketing year, there was a contraction in imports into the EU compared to the record level of the previous campaign. Imports amounted to 1.238.477 tons of product, based on processed rice, down by 431.505 tons (-25.8%) due to the United Kingdom's exit from the EU starting from 1 January 2021 and the substantial increase in container freight costs.

Imports of Indica rice, equal to 1.030.304 tons, represent 83% of the total imported and decreased by 23% compared to the previous year, while imports of Japonica rice, equal to 208.173 tons, represent the 17% of the total and fell by 38% compared to the previous campaign.

UK imports fell by nearly 268,000 tons, but this was due to its exit from the EU.

The countries that reduced imports the most were France (-42.121 t, -18%), Bulgaria (-41.091 t, -64%), Germany (-40.058 t, -38%) and Portugal (-21.510 t, -20%), while Poland (+23.074 t, +45%) and Belgium / Luxembourg (+13.043 t, +13%) increased them.

Details of imports by country are provided below (*table 3.4*), based on milled rice (25).

**Table 3.4:** Imports into the European Union - detail by importing country  
(data expressed in tons of milled rice)

Importing country	2020/2021	2019/2020	Difference	% Difference
Netherland	218.267	227.534	-9.267	-4%
France	198.253	240.374	-42.121	-18%
Italy	126.334	120.730	5.604	5%
Belgium/Lux	115.784	102.741	13.043	13%
Spain	113.792	113.227	565	0%
Portugal	85.095	106.605	-21.510	-20%
United Kingdom	84.019	351.931	-267.912	-76%
Poland	74.711	51.637	23.074	45%
Germany	64.200	104.258	-40.058	-38%
Other Countries	158.022	250.945	-92.923	-37%

Source: Revised data from Ente Risi based on European Commission (DG Agri) data

\* United Kingdom included from 1/9/2020 to 12/31/2020 (25)

The data show that in the 2020/2021 marketing year, imports into the European Union of product as it is (paddy + husked + semi-finished + processed + broken rice) from the LDCs amounted to 462.589 tons, down by 310.288 tons (-40.1 %) compared to the record figure recorded in the 2019/2020 campaign.

As can be seen from the table below (*table 3.5*), in the 2020/2021 campaign, imports from Cambodia decreased by approximately 82.000 tons (-37%) compared to the previous campaign, reaching the lowest level after that of the 2011/2012 campaign. Imports from Myanmar fell by approximately 221.500 tons (-41%), reaching the lowest level of the last five campaigns (25).

**Table 3.5:** Imports to the EU from LDCs by origin (data expressed in tons)

Country	2011/2012	2012/2013	2013/2014	2014/2015	2015/2016	2016/2017	2017/2018	2018/2019	2019/2020	2020/2021
Cambodia	108784	195544	254667	279302	336426	288111	255598	210015	221218	139268
Myanmar	35938	16420	139969	227514	168517	369280	447972	483029	536211	314717
Others	2321	3972	5997	6446	6705	6134	14363	8653	15448	8604
Total	147044	215936	400633	513262	511648	663525	717933	701697	772877	462589

Source: Revised data from Ente Risi based on European Commission - Eurostat from 2019/2020 campaign (25)

As a result of the safeguard clause, imports of semi-milled and milled Indica rice originating in Cambodia and Myanmar were subject to a duty of € 150 per ton until 17 January 2021 and a duty of € 125 per ton from January 18, 2021, as previously mentioned.

### 3.5 *Covid-19 impact*

The Covid-19 pandemic caused major logistical problems, in particular the temporary interruption of many trade flows from the beginning of 2020. These disruptions impact on prices, but the situation is not the same as the one that caused extreme volatility and shelf shortages in half the world in 2008. The main difference between today and 10 years ago lies in abundant harvests and stocks at record levels, perfectly sufficient to meet demand (31). Some of the main trades disrupted will now be reported.

China had increased state purchases of rice, replenishing stocks that were already the most abundant in the world. The arrival of the Covid-19 outbreaks had prompted Beijing to abandon the policy of lightening silos that characterized all of 2019, with 12 million tons of rice returning from state warehouses to the market. In just over two months, from 20 January to 31 March 2020, the China Grain Reserves Group (CGRG), which manages centrally administered grain reserves, released 10,14 million tons of rice to stabilize market supply in the midst of the epidemic, an increase of 43% on the previous year. To compensate, the People's Republic resumed buying on the markets. By the end of March, the CGRG had bought 22,08 million tons of mid- and late-season rice at the lowest purchase prices since last year's autumn harvest, an increase of 350 thousand tons compared to the same period in 2019 (31).

By March 2020 Malaysia had closed its borders for two weeks and the trade minister of Singapore, an independent city-state that geographically is inside Malaysia, has assured that the city has more than three months of stocks of essential carbohydrates such as rice (33).

India started imposing restrictive measures due to the Covid-19 emergency later than other countries and, at least until April 2020, there do not seem to have been any supply problems. Despite the restrictions, data from the Ministry of Agriculture show that the early sowing of the summer rice crop covered 37% more land than at the same time of the previous year (31).

India's overall export of basmati rice to Middle Eastern countries declined by 9.2% in



volume terms and 19.3% in value terms in January, compared to the corresponding month in 2019. This is because buyers in Saudi Arabia, the United Arab Emirates and other countries in the region have been stocking up in anticipation of the impact on supplies of the logistical problems caused by Covid-19. Iraq, for example, has sealed its borders with Iran, forcing exporters to find alternative supply routes.

A further major problem for Indian exporters lies in the availability of containers. The China, which was first affected by the Covid-19 outbreak, accounts for almost one third of global container availability and its crackdown on the movement of goods has severely affected container availability (33).

Vietnam, the world's third-largest exporter halted exports in the last week of March and resumed them in April, but for a maximum monthly quantity of 400.000 tons. This have caused shipments to fall by 300.000 tons until March 2020 compared to 2019.

Cambodia shipped only flavored varieties, with a reduction of 500 thousand tons. Burma/Myanmar did not banned exports, but has suspended licenses, with the same effect, -500 thousand tons.

Thailand is struggling with a long drought, but foreign purchases of its prized Jasmine rice are expected to fall by only 100.000 tons.

India and China will each export 700.000 tons more. Prices are rising everywhere: Thailand, \$582 a ton, a record in the last seven years. Vietnam, \$435, India \$352, Pakistan \$418, and the USA at \$660, also a record for the last seven years.

With a disastrous season due to drought and rice trade complicated by the Covid-19 outbreak, Australians may be forced to go without rice in the coming months and possibly years as the country's rice needs have been 95% met by imports over the past two years. The government of the Philippines has allocated 8 billion national pesos (around 145 million euro) to purchase 300.000 tons of rice through intergovernmental transactions, and to ensure that the country had sufficient stocks in the Covid-19 pandemic. With this decision, the Ministry of Agriculture had assured that a rice shortage was unlikely in the short term. According to Agriculture Secretary William D. Dar, there were several suppliers of rice available on the world market, despite the suspension of exports reported by some countries (31).

## 4 Demand analysis

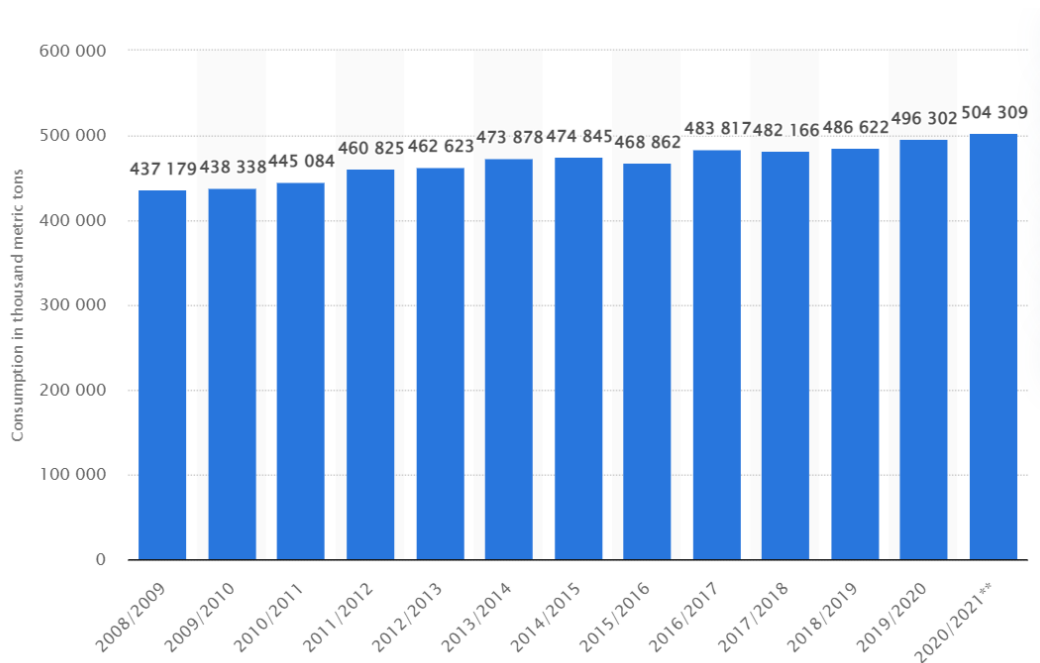
Demand is one of the main market forces, corresponding to the quantity of product demanded for a specific price.

### 4.1 Rice consumption

The request for rice is increasingly grown over years. Rice is chosen because it is rich in fibers, low in fat, induces an early sense of satiety, and having a moderate glycemic index, keeps insulin under control. There are studies showing that regular consumption of a good quantity of rice may be associated with a decreased risk of obesity (37).

The graph below (*graph 4.1*) shows how world rice consumption has evolved from 2008/2009 marketing year to 2020/2021.

**Graph 4.1:** Total rice consumption worldwide from 2008/2009 to 2020/2021 (in 1.000 metric tons)



Source: data from Statista (38)

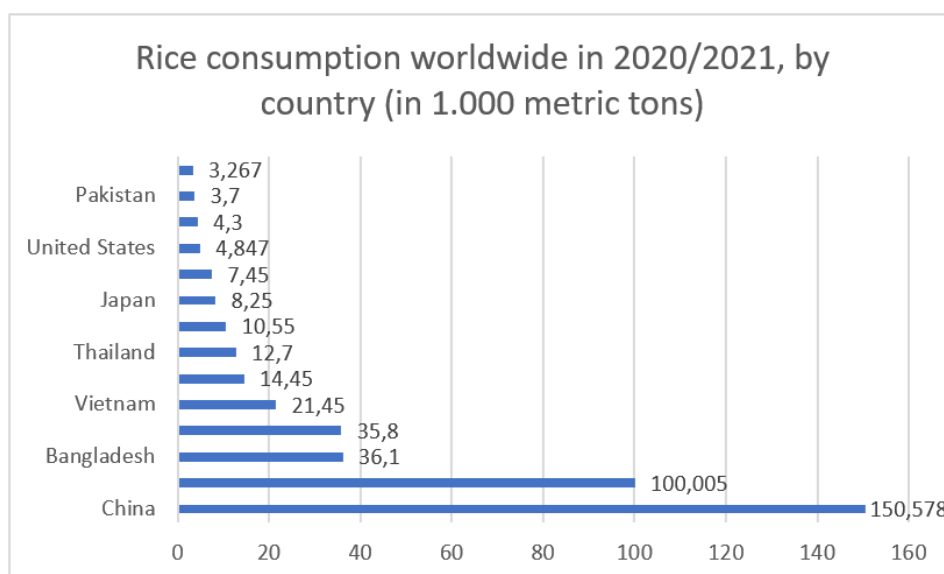
Global consumption of rice has seen a slight increase over the last several years. In the 2020/2021 crop year, about 504,3 million metric tons of rice was consumed worldwide, up from 437,18 million metric tons in the 2008/2009 crop year (38).

Rice is one of the most widely consumed grains in the world. As the most populous

country in the world, China also consumes more rice than any other country, with 150,5 million metric tons consumed in 2020/2021. Following China, India is ranked second with 100 million metric tons of rice consumption in the same period. In general, the rice market shows that the biggest producers are also the biggest consumers.

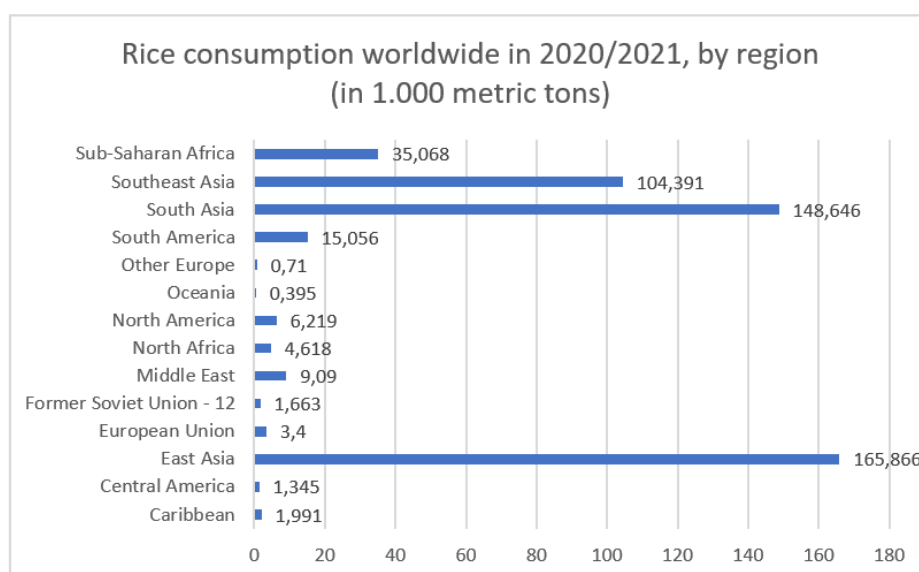
The graphs below (*graph 4.2 and 4.3*) shows world rice consumption for the 2020/2021 marketing year.

**Graph 4.2:** Rice consumption worldwide in 2020/2021, by country (in 1.000 metric tons)



Source: revised data from USDA (29)

**Graph 4.3:** Rice consumption worldwide in 2020/2021, by region (in 1.000 metric tons)



Source: revised data from USDA (29)

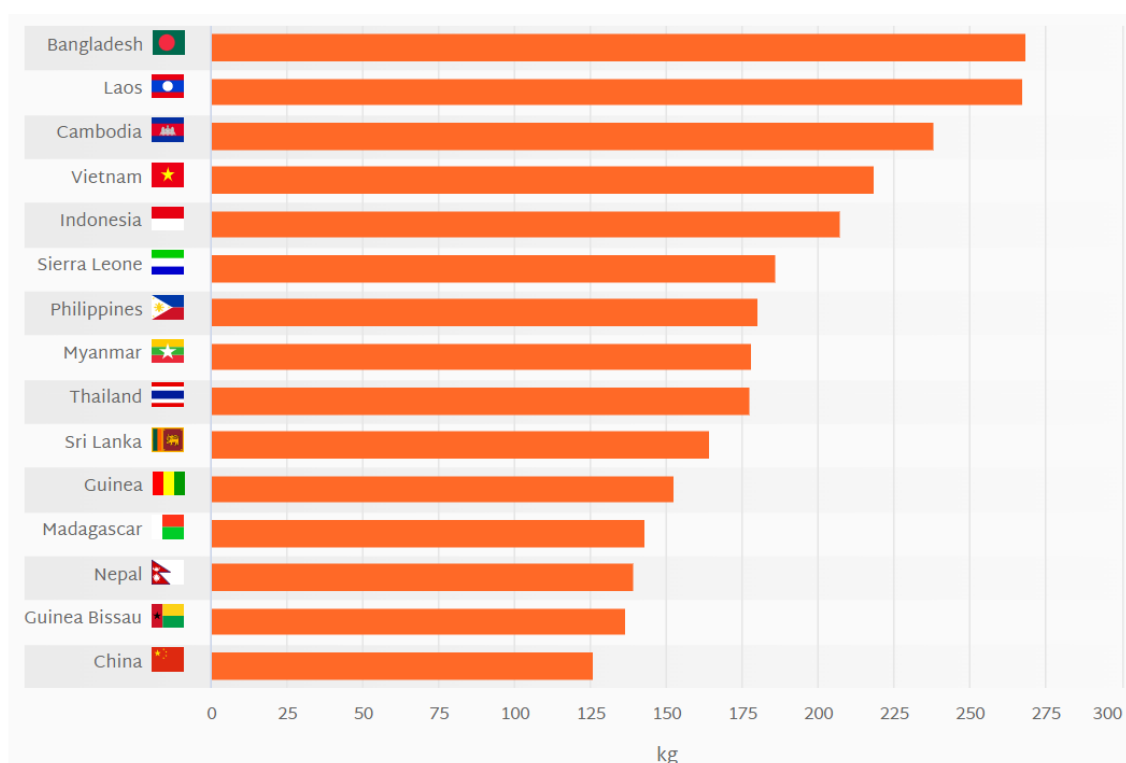
Analysis by geographical region also confirms Asia as the largest consumer of rice, accounting for more than 80% of world consumption. America, Africa and the Middle East follow. Europe plays a marginal role with a consumption of less than 1%.

Focusing on per capita consumption of rice, from a research carried out in 2017 based on a comparison of 154 countries in 2017, Bangladesh ranked the highest in rice consumption per capita with 268 kg followed by Laos and Cambodia. On the other end of the scale was Serbia with 0,997 kg, Tunisia with 1,22 kg and Poland with 1,61 kg.

Average rice consumption per capita reached 79,9 kg in 2017 in the World according to Faostat. This is 0,269% more than in the previous year and 33,4% more than 10 years ago. Historically, average rice consumption per capita reached an all time high of 79,9 kg in 2017 and an all time low of 38,8 kg in 1961. The average annual growth amounted to 1.30% since 1961.

The graph below (*graph 4.4*) shows the per capita consumption of the world's largest rice consumers.

**Graph 4.4:** Rice consumption per capita worldwide in 2017



Source: revised data from Faostat (39)

In Italy, the biggest consumers of rice are those who are faithful to the culinary tradition, which includes many regions such as those in the North where the classic risotto is a

symbol of international Italianness, without taking anything away from some areas in the South where rice is the absolute star of the table. Lombardy and Piedmont are big consumers of rice, as well as being big producers, but rice is also used in Sicily, where it is useful to think about arancini, or in Campania and Puglia. Rice consumption per capita reached 8,71 kg in 2017 in Italy, according to Faostat. This is 3,51% less than in the previous year. Historically, rice consumption per capita in Italy reached an all time high of 9,02 kg in 2016 and an all time low of 3,83 kg in 1971. Italy has been ranked 102nd within the group of 154 countries analyzed in terms of interest rate on rice consumption per capita (40).

#### 4.2 *Ente Nazionale Risi survey*

In 2007, the Ente Nazionale Risi carried out a survey to study the purchasing behavior of rice in Italy in relation to price and shelf organization. The instrument used was the Nielsen Homescan Panel, a continuous panel of 9000 nationally representative households (sample) allocated in proportion to the territory, in about 2000 municipalities. The object under observation was the family purchase: at each act of purchase, the family noted all the facts describing their behavior.

The five Ws analysis presents:

*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 the rotation of my products on the shelf?

*Who* - What is the socio-demographic profile of my buyers? What is the value profile of heavy-consumers?

*Why* - Which promotions were most successful? Is the purchase generally planned or impulse?

The analysis specifically was a continuous quantitative survey carried out on 6.000 purchasing managers of the Nielsen Consumer Panel through a closed-ended questionnaire, self-completed by the respondent.

The reference universe are Italian households, Nielsen represents 22.727 million

households out of a total population of about 59.225 million individuals surveyed in Italy. De facto households are defined as a group of residents living together on a stable basis, allowing for the attribution of purchase components (including single members) to the household. Non-family consumers e.g. hospitals, barracks etc. and non-domestic consumption (including second homes) are not represented.

Socio-demographic information was taken from official ISTAT sources and the main available sources.

Market trends have shown that, in 2007, 95% of potential buyers actually bought rice (corresponding to 20,196 thousand households), opposed to the remaining 1,096 thousand households that did not.

The functional analysis identified four types of buyers:

*Customary* - use one variety of rice for all recipes (low education, below average affluency, age  $\leq 44$ );

*Functional* - believes that rice has important characteristics for our diet (people with medium-high education, high affluency);

*Informed* - would like more information on the differences between different types of rice (average education, average income, age  $\geq 65$ );

*Potential chef* - keeps different varieties of rice at home and uses them according to the dishes he cooks (above average affluency, high education, age  $> 55$ ).

The table below (*table 4.1*) shows the percentage penetration of rice products differentiated by type of purchaser.

**Table 4.1:** Percentage penetration of rice products

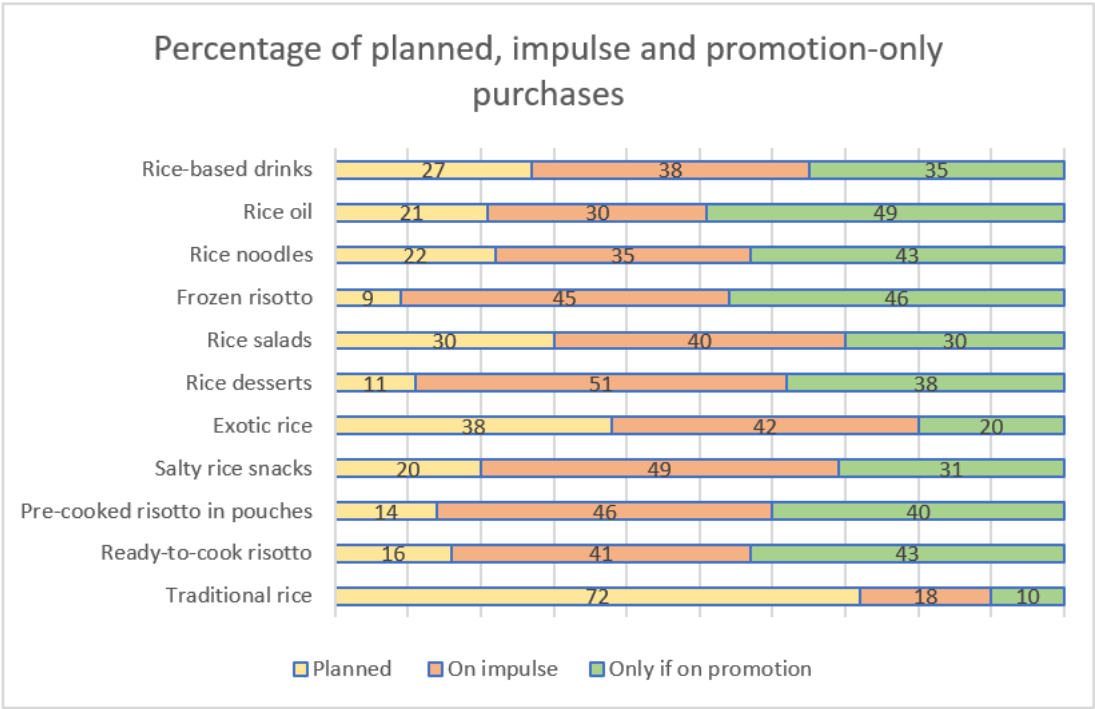
Rice buyers	Custom	Functional	Informed	Potential Chef
Traditional rice	99	99	99	100
Ready-to-cook risotto	35	38	38	37
Pre-cooked risotto in pouches	31	30	33	31
Salty rice snacks	28	32	33	35
Exotic rice	22	29	29	36
Rice desserts	22	26	25	26
Rice salads	15	16	15	17
Frozen risotto	13	13	14	14
Rice noodles	10	12	12	13
Rice oil	5	5	6	6
Rice-based drinks	5	5	5	6

Source: revised data from Ente Risi (41)

In general, the analysis showed that penetration of rice products is higher for people under 44 years of age.

If, on the other hand, the following three scenarios are considered: planned purchase, impulse purchase and purchase only if promoted, the purchasing behavior of potential buyers shows the results described in the graph below (*graph 4.5*).

**Graph 4.5:** *Percentage of planned, impulse and promotion-only purchases*

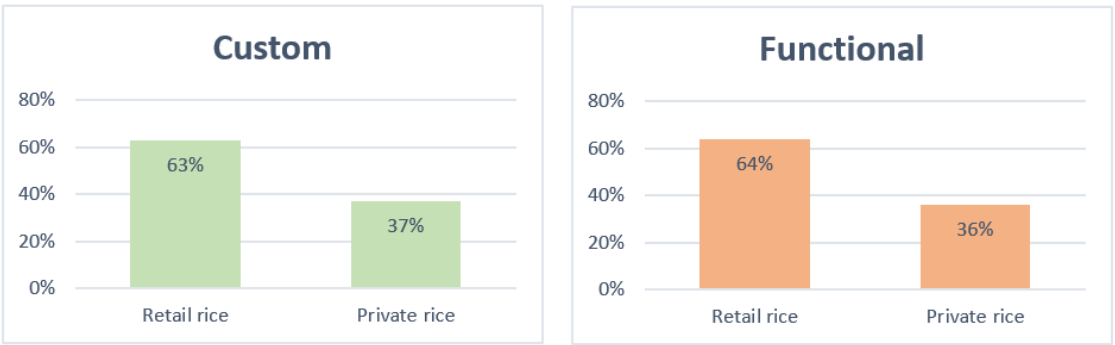


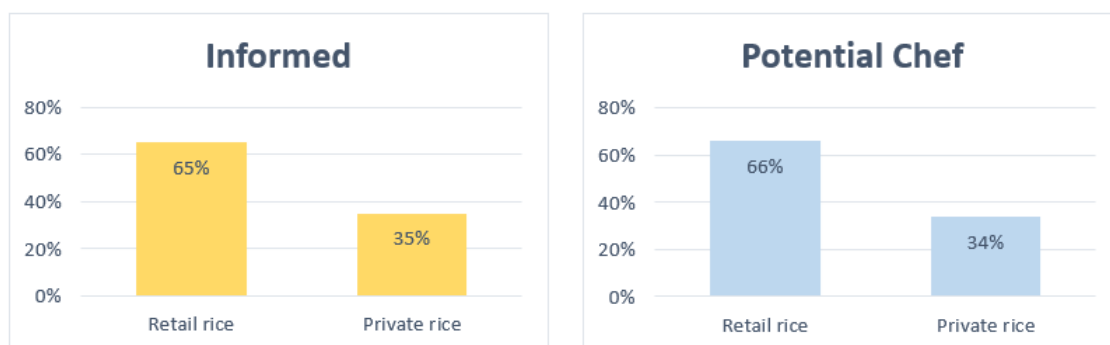
Source: revised data from Ente Risi (41)

In terms of quality, consumer preference between private label and retail brand rice was assessed. The overall result was that 65% of consumers almost always buy retail rice while 35% almost never buy it.

The graph below (*graph 4.6*) shows the distribution of this trend among the four types of consumers mentioned above.

**Graph 4.6:** *Percentage distribution between private label rice and retail brand rice*



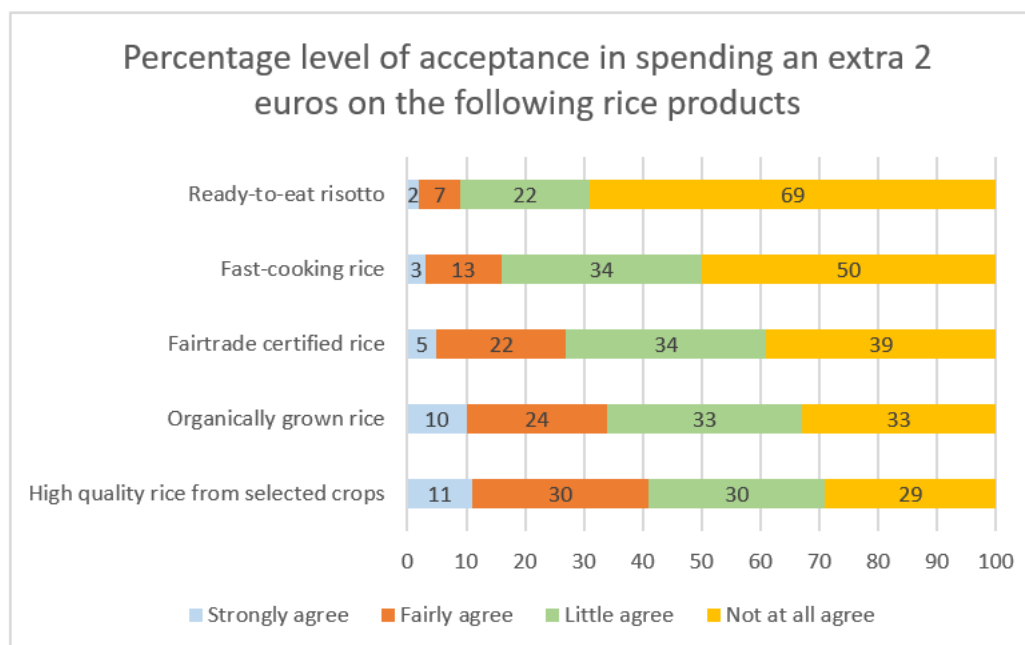


Source: revised data from Ente Risi (41)

In general, two out of three households say they do not perceive the difference between privately sourced and retail one. Furthermore, it was found that as the age of the buyers increases, the comparison improves in favour of private labels.

Focusing on prices, it was assessed whether customers agreed or disagreed with spending two euros more for different categories of rice products, the result of the survey is shown in the graph below (*graph 4.7*).

**Graph 4.7:** *Percentage level of acceptance in spending an extra 2 euros on the following rice products*



Source: revised data from Ente Risi (41)

Looking at where buyers bought rice in 2007, it was shown that 57% of people bought the consumer good from only one channel, 22% used two different purchasing channels

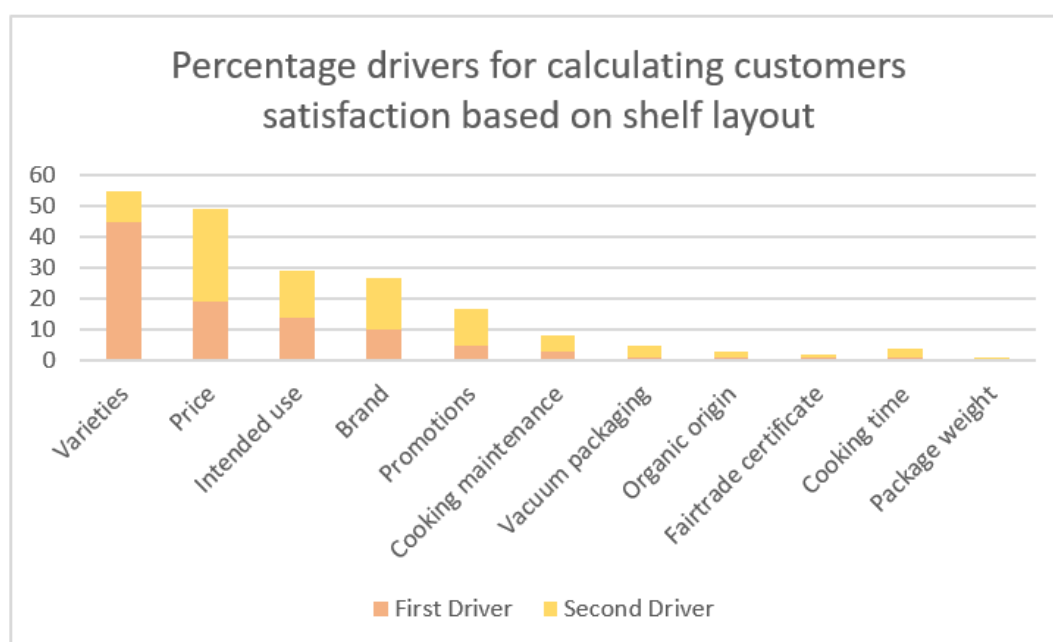


and 21% used more than two channels. The 83% of the first channel is made up of supermarkets and hypermarkets while the remainder are discount stores, traditional stores and rice mills. The second channel has 38% traditional stores followed by 29% discount stores, the others in order are: supermarkets, shops specializing in organic products, rice factories, fair trade shops and ethnic shops.

Overall, 14% of shoppers are satisfied with the rice shelf at the point of sale, 79% are fairly satisfied, 7% not very satisfied and the remaining 1% not satisfied at all. Thus 92% of individuals are very/fairly satisfied with the service.

The graph below (*graph 4.8*) identifies the drivers of choice that led to the above results.

**Graph 4.8:** *Percentage drivers for calculating customers satisfaction based on shelf layout*



Source: revised data from Ente Risi (41)

Taking into account the different categories of customers, it was seen that for the custom buyer the third criterion is the brand, while for the potential chef, the intended use. For this reason, according to the first customer, the shelf should be ordered taking into account variety and brand of rice. On the contrary, the latter would place rice and risotto on two different shelves.

Finally, for 67% of consumers, the rice shelf should be next to the pasta shelf, for 7% on a separate shelf, for 1% next to frozen food and for the remaining 25% it makes no difference (41).

### 4.3 Rice quotation

The most important quotations for the Italian markets for rough rice, milled rice and its by-products can be found on the Commodity Exchanges of Vercelli, Novara, Milan, Verona, Mantua, Mortara, Bologna and Pavia.

Also in this case, the Ente Nazionale Risi plays an important role by collecting these data and updating them on a weekly basis, deducting them from official Chamber of Commerce bulletins and specialized publications in the sector. In order to allow immediate comparability, all quotations are reported in €/ton, even if in the respective bulletins' quotations are expressed with other reference measures.

The 2020/2021 marketing year started with reference quotations for paddy contained in a range between €283 and €375 per ton, with the exception of the Arborio variety, which was quoted at €379,5 per ton.

The price of Selenio was lower than in the previous marketing year from November to April and higher from May onwards (*graph 4.9*).

The quotation for Long B rice rose until February, and then remained stable during the rest of the marketing year, remaining above the values recorded in the previous marketing year. The average value stood at €341 per ton, compared to an average value of €295 in the previous marketing year.

A comparison of the quotation for the Arborio group between the campaign just ended and the previous one shows decidedly higher values from October to March and lower values later in the campaign.

The Ribe group showed, almost always, lower values than those recorded in the previous marketing year (*graph 4.10*).

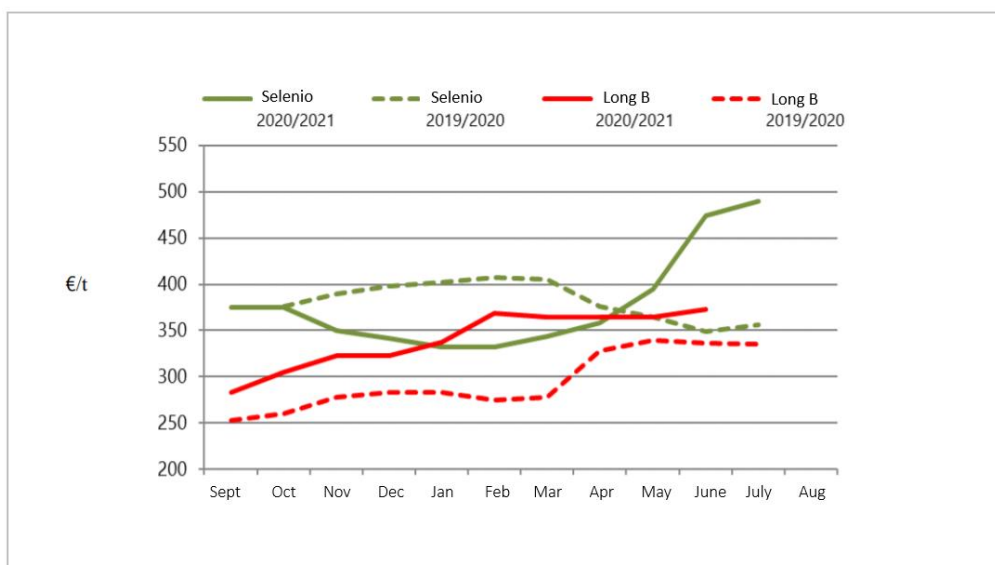
As far as milled rice prices are concerned, in the 2020/2021 marketing year the price of Round rice ranged between €817,5 and €972,5 per ton, with an average value of €869, lower than the value of €953 recorded in the 2019/20 marketing year. The price of Long B milled rice, which recorded an average value of €826, €112 higher than that of the 2019/2020 marketing year, remained in a range between €740 and €870 per ton.

Milled rice of type Long A from parboiled (Ribe and similar) showed quotations between a minimum value of €787,5 (in October) and a maximum value of €845 (in August). Compared to the previous year, the average level was €25 lower at €821.

As for Arborio, the average value of €1.097 per ton is higher than the average level of

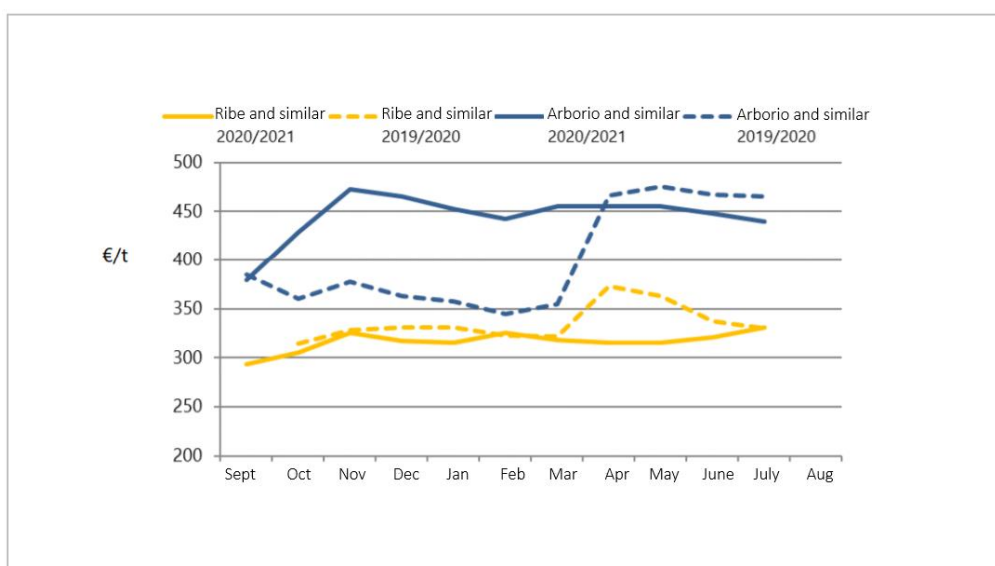
€963 recorded in the previous marketing year (25).

**Graph 4.9:** Comparison of the Selenio's price between 2019/2020 and 2020/2021



Source: revised data from Ente Risi (25)

**Graph 4.10:** Comparison of the Ribe and Arborio's price between 2019/2020 and 2020/2021



Source: revised data from Ente Risi (25)

The table below (*table 4.2*) shows the prices for different rough rice varieties for the 2020/2021 marketing year on the Vercelli Exchange Commodity market. These prices are ascertained by a special Commission and are to be understood as wholesale prices, net of VAT and breakages. The average is obtained from the arithmetic mean of all prices for the specific agricultural year.

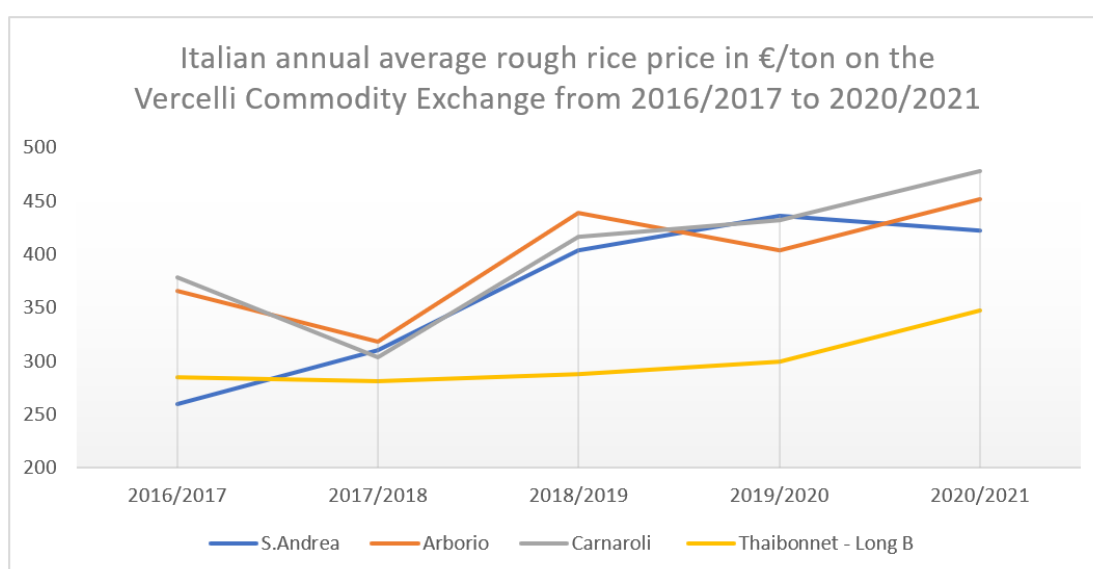
**Table 4.2:** Prices for different rough rice varieties for the 2020/2021 marketing year

	Rough Rice										
	Balilla (and similar)	Sole CL	Selenio	Ribe	Loto (and similar)	S.Andrea (and similar)	Roma (and similar)	Baldo (and similar)	Arborio (and similar)	Carnaroli (and similar)	Long B
	€/ton										
November 2020 (from 17th to 24th)	340,00	325,00	345,00	325,00	356,50	430,00	377,50	430,00	472,50	512,50	323,00
December 2020	340,00	317,50	341,25	317,50	356,50	430,00	380,00	430,00	465,00	503,13	323,00
January 2021	332,50	307,50	332,50	315,00	356,50	430,00	380,00	430,00	452,50	490,00	337,75
February 2021	325,00	305,00	332,50	325,00	351,50	430,00	380,00	430,00	442,50	460,63	369,00
March 2021	310,00	305,00	344,00	318,00	351,50	428,00	380,00	430,00	455,00	467,50	365,00
April 2021	310,00	307,50	358,75	315,00	346,50	415,00	380,00	410,00	455,00	468,75	365,00
May 2021	321,67	323,33	395,00	315,00	355,50	415,00	380,00	383,33	455,00	470,00	365,00
June 2021	329,00	334,00	474,00	321,20	355,50	415,00	374,00	349,00	448,00	467,00	373,00
July 2021	345,00	350,00	490,00	331,00	NA	NA	NA	337,50	440,00	465,00	NA
August 2021	NA	NA	NA	NA	NA	NA	NA	355,00	NA	NA	NA
September 2021	NA	NA	NA	NA	NA	NA	NA	NA	377,50	NA	326,50
October 2021	387,50	384,25	503,33	370,88	384,25	410,00	368,25	355,50	400,25	522,33	339,00
November 2021 (from 2nd to 9th)	423,50	441,00	542,50	394,50	447,00	420,00	372,50	379,50	466,25	550,50	370,50
<b>Avarage</b>	<b>342,15</b>	<b>336,37</b>	<b>405,35</b>	<b>331,64</b>	<b>366,13</b>	<b>422,3</b>	<b>377,23</b>	<b>393,32</b>	<b>444,10</b>	<b>488,85</b>	<b>350,61</b>

Source: revised data from Chamber of Commerce Monte Rosa Laghi Alto Piemonte (42)

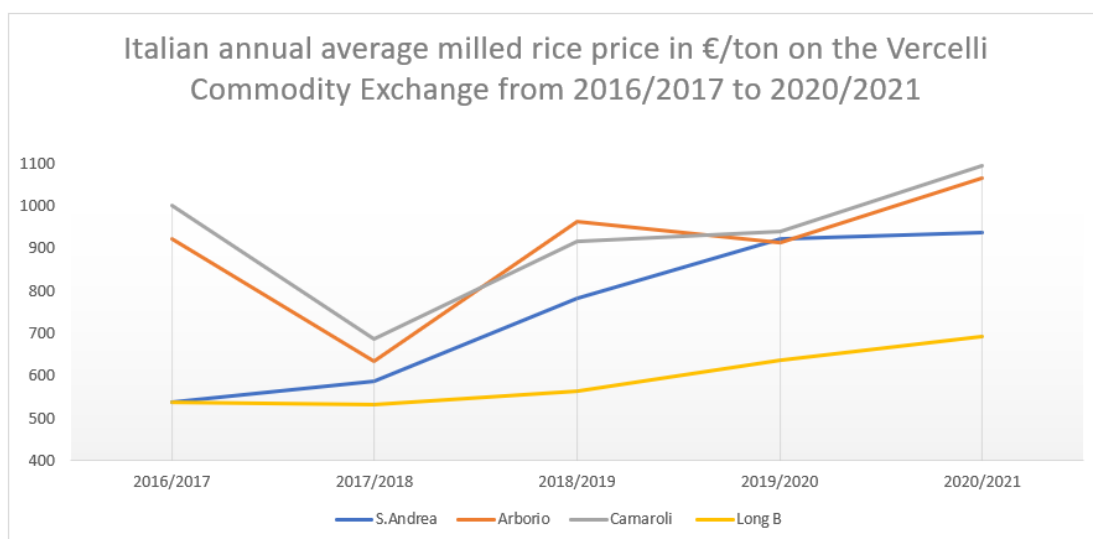
Collecting the annual data on the Vercelli Commodity Exchange market of the last five marketing years, stored weekly by the Ente Nazionale Risi, the following graphs have been obtained showing how the prices of rough (*graph 4.11*) and milled rice (*graph 4.12*) for four specific varieties: S. Andrea and similar, Arborio and similar, Carnaroli and similar, Thaibonnet - Long B developed.

**Graph 4.11:** Italian annual average rough rice price in €/ton from 2016/2017 to 2020/2021



Source: Revised data from European Union and Ente Risi (43)

**Graph 4.12:** Italian annual average milled rice price in €/ton from 2016/2017 to 2020/2021

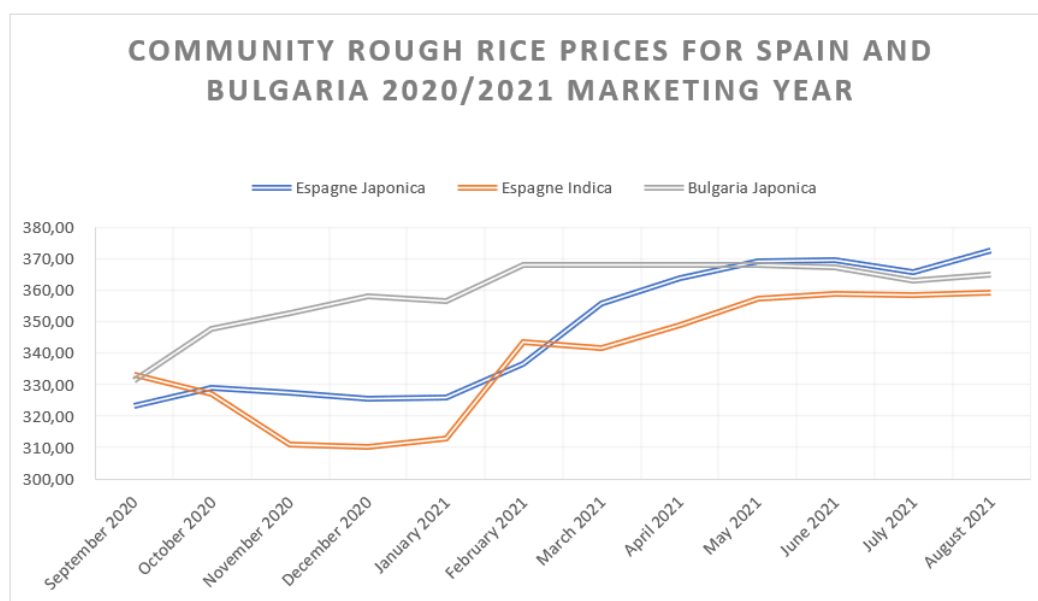


Source: Revised data from European Union and Ente Risi (43)

Under the European Community's Agricultural Policy, the community price is fixed annually, for each product, by the Council on a proposal from the Commission. Determined according to Community estimates, represents the value to which the market should aim for and which ensures sufficient remuneration to agricultural producers. On this basis the intervention price is then defined, that is the threshold below which the Community withdraws from the market the surplus production.

The graph below (*graph 4.13*) shows the development of paddy EU rice prices for the 2020/2021 marketing year for Spain and Bulgaria (September 2020 – August 2021).

**Graph 4.13:** Community rough rice prices for Spain and Bulgaria 2020/2021 marketing year



Source: Revised data from European Union and Ente Risi (43)

EU community prices specifically involve Italy, Spain, Portugal, Greece, Romania and Bulgaria for rough rice while Italy, Spain, Romania, Bulgaria and France for semi-milled and milled rice.

Finally, the main international market quotations for the 2021/2021 marketing year are presented (*table 4.3*).

**Table 4.3: International market quotations 2020/2021 marketing year**

Origin	Type	2020/2021 quotations (£/ton)	
		Min	Max
USA	Indica paddy rice grade 2 - 55/70 yield	310	340
	Indica semi-milled rice grade 2 - 4% breakages - 75 yield	545	550
	Indica milled rice grade 2 - 4% breakages	610	615
	California paddy rice medium grain grade 2 - 58/69 yield	580	625
	California milled rice medium grain grade 1 - 4% breakages	840	1100
Thailand	Indica milled rice 100% B	384	550
	Indica milled rice 5% breakages	374	540
	Indica milled rice 100% parboiled B	381	535
	Rice breakages	338	475
Cambodia	Fragrant Phka Malis 5% breakages STX	680	850
	Fragrant Sen Kra Ob 5% breakages STX	560	785
Myanmar	Indica milled rice 5% breakages	360	450
	Indica milled rice parboiled 5% breakages	510	540
India	Indica milled rice 5% breakages	350	415
	Indica milled rice parboiled 5% breakages	365	395
	Basmati traditional	1375	1425
	Basmati Pusa	1075	1175
Vietnam	Indica milled rice 5% breakages	380	525
	Medium grain Japonica 5% breakages	475	520
	Breakages	320	435
Pakistan	Indica milled rice 5% breakages	360	445
	Indica milled rice parboiled 5% breakages	375	465
	Basmati	715	975
	Breakages	300	375
Uruguay	Paddy rice	315	340
	Olimar milled rice 5% breakages	585	680
	Generic milled rice 5% breakages	580	630
	Milled rice parboiled 5% breakages	600	650
Argentina	Paddy rice	280	340
	Generic milled rice 5% breakages	475	610
Brasile	Paddy rice	280	350
	Milled rice 5% breakages	530	592
	Milled rice parboiled 5% breakages	520	586
Paraguay	Paddy rice	265	320
	Generic milled rice 5% breakages	465	560

Source: revised data from Ente Risi (43)

\* Grade - measure of whiteness of rice. This value can be used as an assessment of the grinding quality and purity and it is directly correlated with the amount of milling.

\* Breakages - represents all the grains broken during rice whitening and can be used by processors to produce rice products.

\* Basmati Pusa - semi-dwarf hybrid with almost the same characteristics as the traditional Basmati (more elongated grain, a little less fragrant). It was released for commercial cultivation in 2003.

## 5 *CAP – Common Agricultural Policy*

Launched in 1962, the EU's common agricultural policy is a partnership between agriculture and society, and between Europe and its farmers.

Intervention in agriculture was based on the principle, widespread at the time, of the specificity of a sector highly dependent on climatic risks and geographical constraints, subject to systemic imbalances between supply and demand and, consequently, characterized by strong volatility of prices and incomes.

Rice demand is inelastic, i.e., it reacts little to price changes. On the other hand, the length of production cycles and the fixity of production factors make the overall supply of agricultural products very rigid. Under these conditions, an abundant supply causes prices to fall, while a reduced supply causes prices to rise sharply. All these elements generate permanent instability in the markets. In this situation, public authorities have always shown a clear tendency to regulate agricultural markets and support producers' incomes, a tendency that the CAP has inherited.

The legal basis of the Common Agricultural Policy lies in Articles 38 to 44 of the Treaty on the Functioning of the European Union (TFEU).

Among them, Article 39 establishes the specific objectives of the CAP: increase agricultural productivity by developing technical progress and ensuring optimal use of the factors of production, in particular labor, ensure a fair standard of living for the agricultural community, stabilize markets, control the security of supply, ensuring reasonable prices for consumers. Alongside these economic and social objectives of Article 39, several Treaty provisions add other objectives applicable to all EU policies and actions. These include: the promotion of a high level of employment, the protection of the environment with a view to promoting sustainable development, consumer protection, animal welfare requirements, the protection of human health and economic, social and territorial cohesion (44).

The CAP takes action with the following measures:

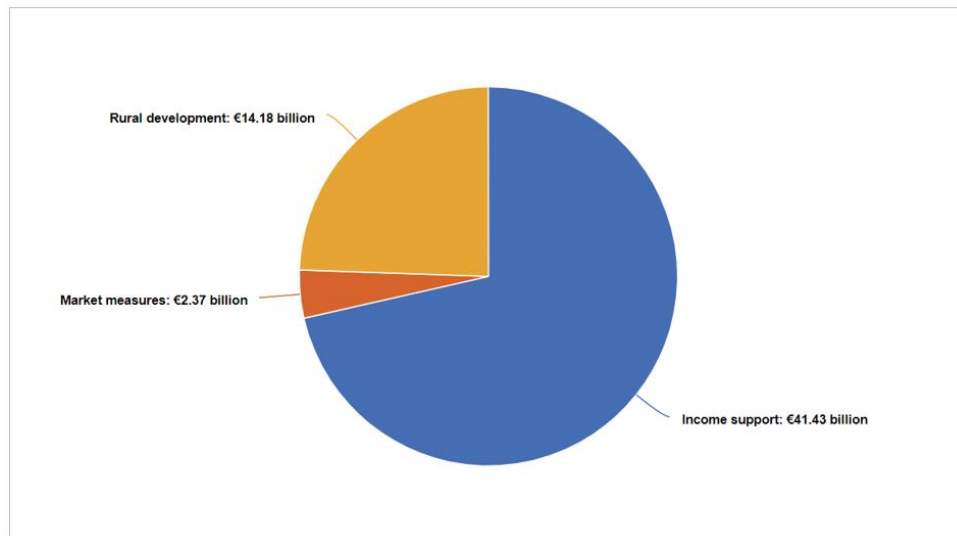
- income support, through direct payments ensures income stability, and remunerates farmers for environmentally friendly farming and delivering public services not normally paid for by the markets, such as taking care of the countryside;
- market measures to deal with difficult market situations such as a sudden drop in demand due to a health scare, or a fall in prices as a result of a temporary oversupply on

the market;

- rural development measures, with national and regional programs to address the specific needs and challenges facing rural areas.

In 2019 EU supported farmers with 57.98 billion euros broken down into the three different aids as below (*graph 5.1*):

**Graph 5.1:** EU supported farmers with €57.98 billion in 2019



Source: European Commission (45)

The CAP is a common policy for all EU countries. It is managed and funded at European level from the resources of the EU's budget. More precisely, it is financed through two funds: the European agricultural guarantee fund (EAGF), that provides direct support and funds market measures while the European agricultural fund for rural development (EAFRD), that finances rural development. Payments are managed at national level by each European Union country (45).

## 5.1 First pillar

### 5.1.1 Market Measures

The legal basis lies in Articles 38 to 44 of the Treaty on the Functioning of the European Union (TFEU), Regulation (EU) No 1308/2013 of the European Parliament and of the



Council, Council Regulation (EU) No 1370/2013 and Directive (EU) 2019/633 of the European Parliament and of the Council.

The market measures of the CMO, Common Market Organization, fall under the first pillar of the CAP. The creation of CMOs aims to achieve the objectives of the CAP (Article 40 TFEU), namely stabilizing markets, ensuring a fair standard of living for the agricultural community and increasing agricultural productivity. They apply to the products listed in Annex I of the TFEU, and include a number of mechanisms governing the production of and trade in these products within the EU.

Until the entry into force of the single CMO in 2007 (Council Regulation (EC) No. 1234/2007), there were 21 separate CMOs, covering specific products and governed by their own basic regulations. At the beginning the CMOs were mainly based on guaranteed prices, which then underwent progressive reductions, compensated at first fully and then partially by the granting of direct aid.

The intervention instruments have thus undergone a series of reforms and are now considered as "safety nets", i.e., they are only applied in the event of price-related crises or major market disturbances. As far as price support measures are concerned, only intervention prices have been maintained (guaranteed price below which an intervention agency designated by the member states buys up the quantities produced and stores them). The basic regulation of the CMO consists of 232 articles plus numerous rules resulting from delegated and implementing acts. The Common Market Organization comprises an internal component (market intervention, rules on marketing and producer organizations) and an external component which concerns trade with third countries (import and export certificates, import duties, management of tariff quotas, export refunds, etc.).

In addition, there is the reserve, a new instrument designed to support the sector in the event of a crisis in production or distribution. It is fed annually by applying a reduction to direct payments under the financial discipline mechanism (Regulation (EU) No 1306/2013). Each year the reserve, if not used, is returned to farmers.

Provisions for producer organizations, associations of producer organizations and interprofessional organizations have been extended to all sectors in order to strengthen the bargaining power of farmers. Their financing is part of rural development.

For the 2014-2020 period, the funds available for EU market policy, including the crisis reserve, are expected to represent around 4% (EUR 17.5 billion) of the total CAP budget (46).

### 5.1.2 *Income support*

The legal basis lies in Articles 38 to 44 of the Treaty on the Functioning of the European Union (TFEU); Regulation (EU) No 1306/2013 (OJ L 347, 20.12.2013, p. 549) and Regulation (EU) No 1307/2013 (OJ L 347, 20.12.2013, p. 608), as amended by Regulation (EU) 2017/2393 (OJ L 350, 29.12.2017, p. 15), referred to as the "omnibus" regulation, which accompanied the proposals submitted by the Commission in the mid-term review of the 2014-2020 multiannual financial framework.

Below is the Content of Regulation (EU) No 1307/2013: a multifunctional system of direct payments.

The income support mechanisms currently provides for seven multifunctional payments, each with specific objectives: (1) a "basic payment" per hectare, the amount of which is to be harmonized according to national or regional economic or administrative criteria and subject to a convergence process (referred to as "internal"); (2) a "green" component, in the form of additional support to compensate for costs related to the provision of environmental public goods not remunerated by the market; (3) an additional payment to young farmers, i.e. new farmers under 40 years of age who have been in business for less than five years; (4) a "redistributive payment" to increase support for the first hectares of a farm; (5) additional income support in areas with specific natural constraints; (6) coupled production support, granted to certain areas or types of farming for economic or social reasons (rice: 150 €/ha) ; (7) an optional simplified system for "small farmers" receiving payments not exceeding € 1250. The first three components are compulsory for Member States, while the last four are optional. Member States must allocate 30% of their national envelope of direct payments to finance the greening component. To do this, three criteria must be considered: firstly, crop diversification, the farmer must cultivate at least two different crops if the arable land exceeds 10 hectares, if it exceeds 30 hectares, the minimum number of crops is three and the main crop may occupy a maximum of 75% of the arable land (the two main crops a maximum of 95%). Secondly, the preservation of existing permanent grasslands. Finally, the maintenance of an area of ecological interest corresponding to at least 5% of the farm's arable land for farms whose arable land exceeds 15 hectares, i.e. uncultivated land at the edge of fields, hedges, trees, fallow land, landscape features, biotopes, buffer strips, areas subject to afforestation, nitrogen-fixing crops.

The remaining 70% is used to finance the basic payment component, after deduction of

the amounts committed for national reserves of entitlements (compulsory, up to 3% of the national envelope), redistributive top-up payments (up to 30%), payments for young farmers (up to 2%) or less-favored areas (up to 5%) or production-linked payments (up to 15%). The new aid per hectare is exclusively reserved for active farmers. Moreover, until 2019, these payments were subject to a partial convergence process (referred to as "external") between Member States (47).

## 5.2 *Second pillar*

The legal basis lies in Articles 38 to 44 of the Treaty on the Functioning of the European Union (TFEU), Regulation (EU) No. 1303/2013 (OJ L 347, 20.12.2013) (common provisions on the European Structural and Investment Funds), Regulation (EU) No. 1305/2013 (OJ L 347, 20.12.2013) (support for rural development), Regulation (EU) No. 1306/2013 (OJ L 347, 20.12.2013) (financing, management and monitoring of the CAP), Omnibus Regulation (Regulation (EU) 2017/2393; OJ L 350, 29.12.2017, p. 15, introducing amendments to Regulations Nos. 1305/2013 and 1306/2013).

This second pillar focuses on rural development policy, designed to support the Union's rural areas and address the wide range of economic, environmental and social challenges of the 21st century. A greater degree of flexibility (compared to Pillar I) allows regional, national and local authorities to design their multi-annual rural development programs based on a European "menu of measures", listed in the Rural Development Regulation (Regulation (EU) No 1305/2013) and co-financed by the EAFRD. In contrast to Pillar I, which is entirely EU-funded, programs under Pillar II are co-financed by Union and regional or national funds.

The three general priorities for rural development policy set by the commission are: promoting the competitiveness of agriculture, ensuring sustainable management of natural resources and climate action, achieving balanced territorial development of rural economies and communities, including job creation and retention.

In the 2014-2020 multiannual financial framework, around € 100 billion have been allocated to rural development from the EU budget, plus € 61 billion paid by Member States as national co-financing for these measures (48).

### 5.3 *CAP reform 2020-2027*

On December 28, 2020 was published in the Official Journal of the European Union the transitional regulation Reg. (EU) 2220 of the Parliament and of the Council of December 23, 2020 containing the rules for the extension and transition to the CAP 2023-2027, the so-called transitional period.

Entering into force on January 1, 2021 it will ensure the continuation of the current rules of the Common Agricultural Policy and the continuity of payments for 2021 and 2022, until the date of application of the new CAP which will begin on January 1 2023.

The transitional regulation became necessary as the debate on the new post-2020 CAP accumulated a series of delays to which was added the health emergency of the Coronavirus that significantly slowed down the approval of the Multiannual Financial Framework 2021-2027. Initially, the transition period was only supposed to affect 2021, but it was later extended for two years.

Specifically, the regulation, applying to support from the European Agricultural Fund for Rural Development (EAFRD) and the European Agricultural Guarantee Fund (EAGF) in the years 2021 and 2022, amends Regulations (EU) No. 1305/2013, (EU) No. 1306/2013, and (EU) No. 1307/2013, with respect to resources and application in the years 2021 and 2022, and Regulation (EU) No. 1308/2013, with respect to resources and distribution of such support in relation to the years 2021 and 2022.

One of the most interesting novelty contained in the Transitional Regulation is the integration of CAP resources with those of the Next Generation EU (NGEU) program, which have been allocated to rural development. It should be remembered, in fact, that the European Union has allocated 750 billion euros to the Next Generation EU program for recovery from the COVID-19 crisis. Of these, 8,07 billion euros are earmarked for rural development and aimed at support measures to repair the impact of the pandemic on agriculture and rural development and prepare the recovery of the economy (49).

The Pac 2021-27 resources at EU level amount to € 386,6 billion euros at current prices (of which 378,5 billion euros from the Multiannual Financing Framework and 8,07 billion euros from the Next Generation EU program). The budget is divided into 291 billion euros for the first pillar (direct payments and market measures) and 95.6 billion for the second pillar (rural development), at current prices (50).

Referring only to the two years of the transitional period (2021-2022) Italy will be able to count on a total allocation of around 11,9 billion euros, of which: 7,3 billion for direct

payments, 3,9 billion for Rural Development and NGEU to which will be added the share of co-financing, 727 million euros for market measures (49).

By December 31, 2021, member states had to prepare National Strategic Plans for the implementation of the reform, which will also have to include the Rural Development Plans, until now the exclusive responsibility of the Regions. The discretionary margins of the Mipaaf (Ministry of Agricultural Food and Forestry Policies) and the Regions will be limited by the action of the EU Commission, which by the end of June 2022 will have to evaluate the national strategic program of the various countries, verifying compatibility and positive contribution to the guidelines expressed in the European Green Deal.

Going into detail about the first pillar, the next CAP (2023-2027) will provide for the modification of the current architecture of direct payments. In particular, the most relevant novelties are three:

- The abolition of the "greening" payment, whose commitments are in part included in the cross-compliance that must be met in order to benefit from the new basic payment that will be called basic income support for sustainability;
- The obligatory introduction of the complementary redistributive payment;
- The mandatory introduction of voluntary climate and environmental schemes (eco-schemes). These innovations lead to a new classification of payments from which farmers will be able to benefit: basic income support for sustainability, complementary redistributive support, complementary support for young farmers, climate and environment schemes (eco-schemes) and income-coupled support.

This architecture brings to light the risk for rice farmers of facing a reduction in the level of support from the CAP, since, from 2023, they will be sure to benefit only from basic income support for sustainability; in fact, unlike the "greening" payment, which was accessible to all, with the new CAP the redistributive payment and the eco-schemes will be more selective and not all farmers will be able to access them (50).

As mentioned earlier, by the end of the year 2021, Italy had to present the new National Strategic Plan for the 2023-2027 programming, deciding the agricultural policy for the next 5 years, for about 35.5 billion euros (7.1 billion euros per year).

As of January 2022, the most plausible scenario for redistributing direct payments was as follows (*table 5.1*):

*Table 5.1: Direct payments – CAP reform*

Direct Payments		
Type of payment (% ceiling)	% Incidence	Million Euros
Basic income support for sustainability	44%	1.597
Support complementary income redistribution for sustainability	10%	363
Complementary income support for young farmers	3%	109
Climate and environmental schemes (eco-schemes)	25%	907
Income-coupled support	15%	544
Sector interventions	3%	109
Total	100%	3.629

Source: data from Ente Risi (51)

The new CAP, which will have a new environmental dimension in the first pillar, aims to make Europe achieve the ambitious objectives of the Green Deal. During the negotiations, the representatives of the institutions have decided that 25% of the resources of the first pillar must be devoted to agronomic practices that respect the climate and the environment.

Two methods have been examined for recalculating the base payment: the flat rate hypothesis and the distribution support hypothesis with pre-convergence securities.

As a reminder, CAP securities are vested rights that can be sold or leased with land.

The first hypothesis foresees the suppression of historical securities per hectare and from 2023 a uniform annual payment is distributed to all (equal to the average unitary national value). The Flat-rate option is adopted in Eastern countries and although its choice was not considered desirable by most of the agricultural world, it had some supporters in Italy, due to the strong redistributive effect and the strong administrative simplification with respect to the attribution of securities. The impact on rice in terms of contraction of basic income support for sustainability compared to the previous basic payment would be extremely negative and difficult to recover with the other supports.

The second option, always considered more probable, was that Italy would continue with the granting of direct payments through securities. This regulation foresees that their allocation to 2023 will be made in proportion to the value of the basic payment plus greening received by each beneficiary before the reform (year 2022), calculating the value on the basis of the new resources available, in clear contraction compared to the past. The new value of the rice security would be considerably reduced and would be reduced from

the current 722 to 364 €/ha on which the effect of convergence would subsequently be assessed.

In fact, the disbursement of basic support with securities would carry with it the application of the convergence process (at 85% or 100%) that would begin in 2023 and should be completed by 2026. In a first option, the goal of the convergence process is that all beneficiaries would be able to receive an amount for their securities equal to at least 85% of the national average unit value by 2026. The resources needed to raise the value of the lowest securities would come from the contraction of the highest ones, causing their value to fall by no less than 30%. In a hypothesis of 100% convergence, the securities in 2026 would have a value equivalent to the national average unit value and we would in fact fall back into the situation already described for the uniform annual flat-rate payment. In the more plausible case of convergence to 85%, given the high value of the rice certificate compared to the national average unitary value, a reduction of 30% has been hypothesized.

The tables below show the impact of the two strategies, described earlier, in comparison (*table 5.2*) and how the 85% convergence would impact the value of securities (*table 5.3*)(51).

**Table 5.2:** Comparison between the flat rate hypothesis and the distribution support hypothesis with pre-convergence securities

Flat-rate hypothesis		Hypothetical distribution support with pre-convergence securities	
Basic support resources (millions €)	1.597	Resources for basic support 2023 (millions €)	1.597
Impact on resources direct payments	44%	Resources Basic payment + Greening 2020 (milions €)	3.168
National average unit value (€/ha) 2023 and onwards	159	Contraction of securities resources 2023/2019 (value in milion € and %)	-1.571 -50%
Rice Italy (€/ha) Basic payment + Greening 2020	722	Rice Italy (€/ha) Basic payment + Greening 2020	722
Impact on Rice (€/ha)	-563	Basic support for sustainability 2023 (€/ha)	364
Impact on Rice (%)	-78%	Contraction 2023 on 2020 (€/ha)	-358

Source: data from Ente Risi (51)

*Table 5.3: Impact of 85% convergence on the value of securities*

<b>Convergence at 85% = -30% pre-convergence security</b>	
Security 2023 pre-convergence (€/ha)	364
30% Contraction	-109
<b>Post-convergence security 2026 (€/ha)</b>	<b>255</b>
Impact on base payment + Greening rice 2020 (%)	<b>-65%</b>

Source: data from Ente Risi (51)

The second major innovation discussed is the introduction, as mentioned above, of the complementary redistributive payment: the agreement would provide for a mandatory redistributive payment of at least 10% of the national direct payment envelope. In other words, states must ensure redistribution of direct payments from larger farms to smaller or medium-sized farms in the form of an annual decoupled payment per eligible hectare (50). The "first hectares" method is applied. The first 14 hectares (national average) of farms are eligible up to a maximum threshold of 50 hectares. In the case of rice, approximately 2,000 farms will benefit. The minimum size to benefit from this support is set at 0,5 hectares (52).

The third major notion discussed concerns eco-schemes: the new CAP obliges each member state to set up climate and environmental schemes, the so-called eco-schemes, which generate an annual payment per hectare, in addition to the basic payment, to farmers who undertake to observe agricultural practices beneficial for the climate and the environment. The new CAP envisages that 25% of the budget for direct payments will be allocated to eco-schemes for the entire programming period, with resources of 907 million euros each year. The agreement includes a "learning" period, for 2023 and 2024, with a minimum threshold of 20%. Eco-schemes will have to go beyond the requirements of: compulsory management and standards of good agronomic and environmental conditions, use of fertilizers and phytosanitary products, animal welfare and other mandatory requirements established by national legislation and the EU, maintenance of minimum agricultural activity and finally, provide different commitments for which agro-climatic-environmental payments of the second pillar. Eco-schemes will be different from greening in that they are more selective and have larger commitments; therefore, some farmers may not find it worthwhile to access the payment (51).

From the latest updates, which date back to February 2022, it appears that basic income support for sustainability will no longer be allocated a share of resources from the national ceiling of 44% but approximately 48%, equal to 1.7 billion euros. Therefore, the flat-rate



option has finally disappeared in favor of maintaining a payment system based on securities (payment entitlements), the value of which is reviewed on the basis of available resources. Maintaining the system based on securities, it will be necessary to continue the internal convergence process starting from 2023 with the objective that, by 2026, all payment entitlements will have a value equal to at least 85% of the national average value. Recall that Italy in 2015 opted for a system of partial internal convergence, i.e., without the achievement in 2019 of the national unit value (VUN) for all entitlements. This system was called the "Irish model" and had the objective of ensuring that by 2019 no security had a value lower than 60% of the VUN. In the new CAP there will be four progressively increasing steps (5%, 6%, 7%, 7%) to move securities from 60% of VUN to 85% in 2026. This increase in the value of low securities (below 85% of VUN) will be fed by the decrease in the value of securities with a value above 85% of VUN. For these securities with a value greater than the VUN, the application of a 30% "stop loss" is established, i.e., the security cannot lose more than 30% of its value over the five-year planning period. The Ministry of Agricultural, Food and Forestry Policies (Mipaaf) has also set a cap on the value of the security at 2.000 euros.

From the latest updates, it seems that Mipaaf has planned five categories of national eco-schemes, to which 25% of the resources will be allocated. The five eco-schemes will cover:

- ECO 1 - Payment for animal welfare and antibiotic reduction;
- ECO 2 - Weeding of tree crops;
- ECO 3 - Preservation of olive trees of special landscape value;
- ECO 4 - Extensive forage systems;
- ECO 5 - Specific measures for pollinators.

In addition, the creation of a new national public mutual fund for the management of catastrophic risks in agriculture is foreseen, which will be financed, for the part to be borne by the private sector, by a levy of 3% on direct payment recipients, while the public part will be co-financed by the EAFRD. This intervention will make it possible to integrate and strengthen risk management tools for the benefit of farms, including the National Solidarity Fund.

Considering the new regulatory framework and the impacts on rice cultivation described above, it has always been clear that the instrument of coupled aid was the most suitable to offer a real compensation for the losses of the sector by improving its competitiveness, sustainability or quality as required by the CAP regulation. This is precisely the means

found by Mipaaf to "sweeten" the CAP reform 2023-2027. In fact, the Ministry pointed out the high volatility of prices at the origin of paddy rice and prices of current means of production, with growth rates, on the cost side, higher than those of selling prices at different times throughout the decade, with consequences in terms of fluctuations in profitability, leading to a negative trend in the operating margin per hectare in the period 2015-2019. In addition, it highlighted how rice imports from some Asian countries, as happened in the 2016 -2018 period, may again pose a threat by coming off the safeguard clause. With these reasons the Mipaaf considers that income support through direct payments is one of the tools to ensure adequate remuneration to the rice sector in view of the fluctuation of farm revenues which in some years has a heavy impact on profitability. For this reason, a budget of around 77 million euros is allocated to rice, with the aim of helping companies to overcome difficulties and improve competitiveness. This amount would guarantee, on the basis of the current rice areas (227.000 ha), a contribution per hectare equal to about 340 €/ha compared to 145 €/ha received by rice growers from the 2019 campaign. The Mipaaf in the National Strategic Plan, citing the Ente Nazionale Risi as a source of studies, underlines the importance of rice cultivation from the environmental point of view as it is responsible for the creation of a real agro-ecosystem consisting of rice fields, canals, ditches and springs that preserves the maintenance of water in the summer season, providing a natural refuge for the avian-fauna, otherwise destined to migrate to other environments.

In addition, it is emphasized that the submergence of rice fields in the Piedmont and Lombardy regions would allow in areas far from them the raising of water tables, determining the possibility to irrigate even in periods of low rainfall. Rice cultivation favors, in fact, the management of water allowing to regulate excess water during violent rainfalls, as well as allowing the maintenance of hydraulic infrastructures also avoiding in the cultivated areas on the mouth of rivers the rise of the salt wedge allowing the increase of soil fertility. Precisely because of the important environmental value of rice cultivation, in the National Strategic Plan is allocated a five-year funding of 49 million euros for an additional income support specifically for paddy field based on the voluntary adherence to the Agro Climatic Environmental (ACA) measures within the rural development. The intervention includes two actions:

- water sowing of rice, to ensure a longer period of submergence throughout the year favorable to the biodiversity of avifauna and allow a more rational use of water among the main crops;

- creation of a ditch of specific dimensions within the paddy field chamber to ensure the maintenance, during the cultivation cycle of rice, of a water reserve that allows aquatic organisms to survive even during the dry season and to repopulate the paddy field chambers in the subsequent phases of flooding, combined with the grassing for naturalistic purposes of an embankment of the paddy field chamber.

Finally, from the NSP it is expected that rice growers will be able to take advantage, always in the context of rural development, of support measures related to the appropriate use of nitrogen, with the strengthening of the protection of the quality of surface and deep water resources, while mitigating climate-changing emissions potentially caused by fertilization activities (52).

At the end of the chapter, the main constraints of the CAP will be analyzed: capping, enhanced compliance, social compliance and agro-environmental measures of the second pillar.

Capping provides for a reduction in payments for large beneficiaries of the CAP: member states may choose to apply a reduction in direct payments, capping direct aid at € 100.000, while also being able to apply a reduction up to 85% for amounts over € 60.000.

Enhanced compliance includes revised greening commitments. The most relevant and innovative point is that of rotation, which becomes mandatory and requires for farms with more than 10 hectares a change of crop at parcel level (except in the case of multi-year crops, grasses and other forage grasses and fallow land), including secondary crops that are properly managed. Rice cultivation is excluded from this requirement. In fact, farms with more than 75% of their area under rice are excluded from this requirement. On the basis of the diversity of cultivation methods and agro-climatic conditions, Member States may nevertheless authorize in the regions concerned other practices of enhanced crop rotation with legumes or crop diversification. Farmers who produce organically certified will be considered to meet this standard.

Social compliance represents a new commitment compared to greening, it has entered the new CAP, under the push of workers' organizations, strongly supported by the European Parliament. For farmers who do not comply with basic standards relating to working and employment conditions of agricultural workers and occupational safety and health, Member States must ensure that proportionate, effective and dissuasive sanctions are applied. The agreement provides for voluntary implementation in 2023 and mandatory implementation in 2025.

In conclusion, the agro-environmental measures of the second pillar envisage allocating

at least 35% of rural development funds to measures with high environmental value, including organic farming, forestry, integrated pest management, but also measures aimed at improving animal welfare or supporting disadvantaged areas (50).

## 6 The lighting impact of PAC reform on Italian rice producers

In the following chapter, the balance sheet of a directly managed farm in the Vercelli area has been analyzed. The assumptions on which the calculations have been made are that the size is between 70 and 120 hectares and that land and machinery are owned. The table below (*table 6.1*) shows the previously mentioned balance sheet.

**Table 6.1:** Balance sheet of a directly managed farm in the Vercelli area

	Expenses	Income	Notes
Labor	882,00 €	- €	Considering 3 full time workers
Labor contribution	290,00 €	- €	Considering 3 full time workers
Irrigation contribution	234,00 €	- €	By contract with Ovest Sesia consortium
Long A seeds cost	119,00 €	- €	Considering 175 kg/ha
Long B seeds cost	156,00 €	- €	Considering 175 kg/ha
Long B Clearfield rights	15,00 €	- €	
Fertilizers	290,00 €	- €	
Pesticides	310,00 €	- €	
Wheat seeds cost	50,00 €	- €	
Fuel	160,00 €	- €	
Electricity	55,00 €	- €	
Insurance	120,00 €	- €	Civil, hail, vehicles and buildings
Depreciation	300,00 €	- €	Building and machinery depreciation
Rent	855,00 €	- €	Cost for all non-owner farmers, for owners it is an interest in land value
Fees	15,00 €	- €	Chamber of commerce registration, stamps etc.
Agrarian income tax	- €	- €	IRPEF exemption for direct rice farmers
Passive interest	1,05	- €	3% of capital assets
Revenues from the sale of Long A rice	- €	2.640,00 €	Long A rice - considering 80 quintals/ha and price = 33 €/quintal
Revenues from the sale of Long B rice	- €	2.320,00 €	Long B - considering 80 quintals/ha and price = 29 €/quintal
Green manure	- €	180,00 €	Practice 10.1.1
Basic Commitments	- €	170,00 €	Practice 10.1.1
CAP	- €	708,58 €	Pre 2020-2027 reform value
<b>Total</b>	<b>3.852,05</b>	<b>6.018,58 €</b>	
<b>Net income/ha</b>		<b>2.166,53 €</b>	

As can be seen, all values are expressed per hectare of the farm, calculated for the single production season 2020/2021 and the results is therefore a net profit per hectare. Analysis of individual items shows:

### *Outflows*

- labor, 882 €/ha, considering that three people work on the farm. The cultivation of rice in Italy is almost completely mechanized allowing the containment of labor costs;

- labor contribution, 290 €/ha, account for about 35% of the value of labor. It also takes into account costs such as training courses, protective equipment etc.;
- irrigation contribution, 234 €/ha, defined by contract with Ovest Sesia consortium. This value may vary depending on the permeability of soils, the efficiency of local irrigation administrations, etc.;
- long A seed cost, 119 €/ha, the average quantity of seed adopted for the calculation is 175 kg/ha and the cost of the seed is referred to the purchase price for the 2020/2021 season;
- long B seed cost, 156 €/ha, the average quantity of seed adopted for the calculation is 175 kg/ha and the cost of the seed is referred to the purchase price for the 2020/2021 season;
- long B Clearfield rights, 15 €/ha, technology whereby a specific variety of rice is resistant to a specific weed killer, used against the crodo rice. In order to use this rice seed, a payment of 15 euros per hectare seeded is required;
- fertilizers, 290 €/ha, this cost is dependent on soil characteristics, environmental and genetic factors. Moreover, they undergo heavy fluctuations as the cost of raw materials such as oil changes;
- pesticides, 310 €/ha, based on the control techniques adopted by the farm based on herbicides currently compliant with use;
- wheat seed cost, 50 €/ha, once the rice harvest is over, green manure is sown to enrich the soil with organic substances and nutrients, it is not brought to harvest but is buried as fertilizer;
- fuel, 160 €/ha, this value derives from the need for diesel fuel for cultural operations, but 50% is spent in the dryers for drying paddy rice;
- electricity, 55 €/ha, due to drying, to operate the movement of paddy rice and cooling devices, for lighting etc.;
- insurance, 120 €/ha, this value includes the civil insurance, the one of the agricultural machineries and plants and also the insurance on the product due to the risk of hail and atmospheric events;
- depreciation, 300 €/ha, takes account of depreciation of buildings and machinery;
- rent, 800 €/ha, this value represents an opportunity cost for farmers who own the land they cultivate and an actual cost for those who lease that land;
- fees, 15 €/ha, for chamber of commerce and contract registration, stamps, etc.;

- agrarian income tax, as of 2017, the exemption for IRPEF purposes (art. 1, paragraph 44, Law no. 232/2016) of the dominical and agrarian incomes related to land declared by direct cultivators has been provided for;
- passive interest, 1,05 €/ha, calculated considering an interest rate of 3% on the total value of the assets.

### *Inflows*

- revenues from the sale of Long A rice, 2640 €/ha, this value has been obtained considering a production of 80 quintals/ha and an average selling price of 33 €/quintal;
- revenues from the sale of Long B rice, 2320 €/ha, this value has been obtained considering a production of 80 quintals/ha and an average selling price of 29 €/quintal;
- green manure, 180 €/ha, compensation from the previously mentioned practice of sowing wheat, legumes, or crucifers as a method of soil fertilization (practice 10.1.1 integrated production);
- basic commitments, 180 €/ha, compensation derived from the application for a five-year period of a series of basic commitments and actions by the farmer (practice 10.1.1 integrated production);
- CAP, 708,58 €/ha, 2020-2027, which in the following case is given by the sum of the compensation for basic title (reduced by a contribution for the national reserve for young farmers), greening and coupled aid for rice.

The analysis of the individual components of the Common Agricultural Policy contribution presents the values shown in the table below (*table 6.2*):

**Table 6.2:** *Common Agricultural Policy contribution*

Contribution	€/ha
Compensation for basic title	381,18
Reduction for the national reserve for young farmers contribution (2,87%)	10,94
Total base title	370,24
Greening (50%)	185,12
Coupled aid for rice	153,22
<b>Total</b>	<b>708,58</b>

Having described, in the previous chapter, the main hypotheses for the renewal of the Common Agricultural Policy and taking the above balance sheet as a reference, a quantitative analysis was then carried out to assess what the actual impact of the various scenarios of action could be.

### *First Scenario – Flat Rate Hypothesis*

If this were to be the hypothesis actually implemented by the 2023-2027 CAP reform, the relative contribution would fall from 708,58 €/ha to 159 €/ha with a percentage decrease of around 78%. This decrease brings the net income from 2.166,53 €/ha to 1.616,95 €/ha with a percentage decrease of about 26%. The calculations are shown in the table below (table 6.3).

**Table 6.3: First Scenario**

	Expenses	Income	Notes
Labor	882,00 €	- €	Considering 3 full time workers
Labor contribution	290,00 €	- €	Considering 3 full time workers
Irrigation contribution	234,00 €	- €	By contract with Ovest Sesia consortium
Long A seeds cost	119,00 €	- €	Considering 175 kg/ha
Long B seeds cost	156,00 €	- €	Considering 175 kg/ha
Long B Clearfield rights	15,00 €	- €	
Fertilizers	290,00 €	- €	
Pesticides	310,00 €	- €	
Wheat seeds cost	50,00 €	- €	
Fuel	160,00 €	- €	
Electricity	55,00 €	- €	
Insurance	120,00 €	- €	Civil, hail, vehicles and buildings
Depreciation	300,00 €	- €	Building and machinery depreciation
Rent	855,00 €	- €	Cost for all non-owner farmers, for owners it is an interest in land value
Fees	15,00 €	- €	Chamber of commerce registration, stamps etc.
Agrarian income tax	- €	- €	IRPEF exemption for direct rice farmers
Passive interest	1,05	- €	3% of capital assets
Revenues from the sale of Long A rice	- €	2.640,00 €	Long A rice - considering 80 quintals/ha and price = 33 €/quintal
Revenues from the sale of Long B rice	- €	2.320,00 €	Long B - considering 80 quintals/ha and price = 29 €/quintal
Green manure	- €	180,00 €	Practice 10.1.1
Basic Commitments	- €	170,00 €	Practice 10.1.1
CAP	- €	159,00 €	Pre 2020-2027 reform value
<b>Total</b>	<b>3.852,05</b>	<b>5.469,00 €</b>	
<b>Net income/ha</b>		<b>1.616,95 €</b>	



### *Second Scenario – Hypothesis distribution support with pre-convergence securities*

This second hypothesis, as explained in the previous chapter, turned out to be the most probable one with consequent convergence of securities at 85%. This regulation foresees that the allocation to 2023 will be made in proportion to the value of the basic payment plus greening received by each beneficiary before the reform (year 2022), calculating the value on the basis of the new resources available. In this second scenario, the impacts of CAP reform are assessed, based on the value of pre-convergence titles. The effect of the resulting 85% securities convergence is evaluated in the next scenario. If this were to be the hypothesis actually implemented by the 2023-2027 CAP reform, the relative contribution would fall from 708,58 €/ha to 364 €/ha with a percentage decrease of around 49%. This decrease brings the net income from 2.166,53 €/ha to 1.821,95 €/ha with a percentage decrease of about 16%. The calculations are shown in the table below (*table 6.4*).

**Table 6.4: Second Scenario**

	Expenses	Income	Notes
Labor	882,00 €	- €	Considering 3 full time workers
Labor contribution	290,00 €	- €	Considering 3 full time workers
Irrigation contribution	234,00 €	- €	By contract with Ovest Sesia consortium
Long A seeds cost	119,00 €	- €	Considering 175 kg/ha
Long B seeds cost	156,00 €	- €	Considering 175 kg/ha
Long B Clearfield rights	15,00 €	- €	
Fertilizers	290,00 €	- €	
Pesticides	310,00 €	- €	
Wheat seeds cost	50,00 €	- €	
Fuel	160,00 €	- €	
Electricity	55,00 €	- €	
Insurance	120,00 €	- €	Civil, hail, vehicles and buildings
Depreciation	300,00 €	- €	Building and machinery depreciation
Rent	855,00 €	- €	Cost for all non-owner farmers, for owners it is an interest in land value
Fees	15,00 €	- €	Chamber of commerce registration, stamps etc.
Agrarian income tax	- €	- €	IRPEF exemption for direct rice farmers
Passive interest	1,05	- €	3% of capital assets
Revenues from the sale of Long A rice	- €	2.640,00 €	Long A rice - considering 80 quintals/ha and price = 33 €/quintal
Revenues from the sale of Long B rice	- €	2.320,00 €	Long B - considering 80 quintals/ha and price = 29 €/quintal
Green manure	- €	180,00 €	Practice 10.1.1
Basic Commitments	- €	170,00 €	Practice 10.1.1
CAP	- €	364,00 €	Pre 2020-2027 reform value
<b>Total</b>	<b>3.852,05</b>	<b>5.674,00 €</b>	
<b>Net income/ha</b>		<b>1.821,95 €</b>	

### *Third Scenario – Hypothesis with 85% securities convergence*

This third hypothesis represents a deeper evaluation of the second scenario. Convergence at 85% is estimated to reduce the value of pre-convergence securities by about 30%. The relative contribution would fall from 708,58 €/ha to 255 €/ha with a percentage decrease of around 64%. This decrease brings the net income from 2.166,53 €/ha to 1.712,95 €/ha with a percentage decrease of about 21%. The calculations are shown in the table below (table 6.5).

**Table 6.5: Third Scenario**

	Expenses	Income	Notes
Labor	882,00 €	- €	Considering 3 full time workers
Labor contribution	290,00 €	- €	Considering 3 full time workers
Irrigation contribution	234,00 €	- €	By contract with Ovest Sesia consortium
Long A seeds cost	119,00 €	- €	Considering 175 kg/ha
Long B seeds cost	156,00 €	- €	Considering 175 kg/ha
Long B Clearfield rights	15,00 €	- €	
Fertilizers	290,00 €	- €	
Pesticides	310,00 €	- €	
Wheat seeds cost	50,00 €	- €	
Fuel	160,00 €	- €	
Electricity	55,00 €	- €	
Insurance	120,00 €	- €	Civil, hail, vehicles and buildings
Depreciation	300,00 €	- €	Building and machinery depreciation
Rent	855,00 €	- €	Cost for all non-owner farmers, for owners it is an interest in land value
Fees	15,00 €	- €	Chamber of commerce registration, stamps etc.
Agrarian income tax	- €	- €	IRPEF exemption for direct rice farmers
Passive interest	1,05	- €	3% of capital assets
Revenues from the sale of Long A rice	- €	2.640,00 €	Long A rice - considering 80 quintals/ha and price = 33 €/quintal
Revenues from the sale of Long B rice	- €	2.320,00 €	Long B - considering 80 quintals/ha and price = 29 €/quintal
Green manure	- €	180,00 €	Practice 10.1.1
Basic Commitments	- €	170,00 €	Practice 10.1.1
CAP	- €	255,00 €	Pre 2020-2027 reform value
<b>Total</b>	<b>3.852,05</b>	<b>5.565,00 €</b>	

<b>Net income/ha</b>	<b>1.712,95 €</b>
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### *Fourth Scenario – Hypothesis of the aid coupled with rice*

This latter appears to be the final assumption that will be applied for the 2023-2027 CAP reform. Taking into consideration various reasons explained in the previous chapter, the decision seems to be to apply a redistribution of the value of aids on the basis of securities with 85% convergence, but also to increase to 340 €/ha the coupled aid for rice so that farmers do not suffer a considerable reduction in their subsidies. In this case, the relative

contribution would fall from 708,58 €/ha of the second scenario to 595 €/ha with a percentage decrease of around 16%. This decrease brings the net income from 2.166,53 €/ha to 2.052,92 €/ha with a percentage decrease of about 5%. The calculations are shown in the table below (*table 6.6*).

**Table 6.6: Fourth Scenario**

CAP	Expenses	Income	Notes
Labor	882,00 €	- €	Considering 3 full time workers
Labor contribution	290,00 €	- €	Considering 3 full time workers
Irrigation contribution	234,00 €	- €	By contract with Ovest Sesia consortium
Long A seeds cost	119,00 €	- €	Considering 175 kg/ha
Long B seeds cost	156,00 €	- €	Considering 175 kg/ha
Long B Clearfield rights	15,00 €	- €	
Fertilizers	290,00 €	- €	
Pesticides	310,00 €	- €	
Wheat seeds cost	50,00 €	- €	
Fuel	160,00 €	- €	
Electricity	55,00 €	- €	
Insurance	120,00 €	- €	Civil, hail, vehicles and buildings
Depreciation	300,00 €	- €	Building and machinery depreciation
Rent	855,00 €	- €	Cost for all non-owner farmers, for owners it is an interest in land value
Fees	15,00 €	- €	Chamber of commerce registration, stamps etc.
Agrarian income tax	- €	- €	IRPEF exemption for direct rice farmers
Passive interest	1,05	- €	3% of capital assets
Revenues from the sale of Long A rice	- €	2.640,00 €	Long A rice - considering 80 quintals/ha and price = 33 €/quintal
Revenues from the sale of Long B rice	- €	2.320,00 €	Long B - considering 80 quintals/ha and price = 29 €/quintal
Green manure	- €	180,00 €	Practice 10.1.1
Basic Commitments	- €	170,00 €	Practice 10.1.1
CAP	- €	595,00 €	Pre 2020-2027 reform value
<b>Total</b>	<b>3.852,05</b>	<b>5.905,00 €</b>	

<b>Net income/ha</b>	<b>2.052,95 €</b>
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## 7 *Conclusion*

This thesis is aimed to provide an overview of the rice market, especially the Italian one, assuming the perspective of primary producers.

In Italy the production is completely concentrated in the North-West regions with hectares of cultivated land and production volumes with small deviations over the years: this country is the undisputed production leader in Europe, but it does not even come close to the major world players in the Asian regions.

In the last decade the issue of rice imports to Italy from Third countries has been the subject of great discussion and concern for Italian farmers: the volume of imports has in fact doubled. The supply of rice on Italian tables depends heavily on Pakistan, India and Vietnam, nations for which import duties have been greatly reduced in recent years or no longer applied.

The worldwide trend in rice consumption seems to be steadily growing and the largest producers are also the largest consumers. This also happens in Italy, where the northern regions are the major purchasers, with the sole exception of Sicily. A survey conducted by Ente Nazionale Risi on the buying behaviors of rice in Italy shows that the demand for traditional rice tends to be inelastic, but this trend, however, is no longer valid for derived products, such as desserts or drinks.

Considering that rice cultivation strongly depends on environmental factors, the Common Agricultural Policy (CAP) has been introduced in 1962 in the form of a subsidy, in order to protect farmers. A 2023-2027 reform of the CAP is foreseen in order to achieve ambitious sustainability goals: the consequences for the agricultural world are still under discussion.

The ultimate aim of this thesis has been to evaluate the impact of these changes on the balance sheet of companies and this has been done taking as a reference a rice producer located in the Vercelli Area. This reform led to more than a year of debate about the choice of the most effective strategy to implement in order to incentivize farmers to make their work more sustainable without seeing their economic returns decrease dramatically. Starting from an initial strategy hypothesis that led to a reduction in the company's net income of around 26%, it seems that a plan has been drawn up according to which the company would see a reduction of only 5%: this result has been achieved after several

proposal to renew the policy. Nevertheless, it is not excluded that there will be further developments before the end of 2022.

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