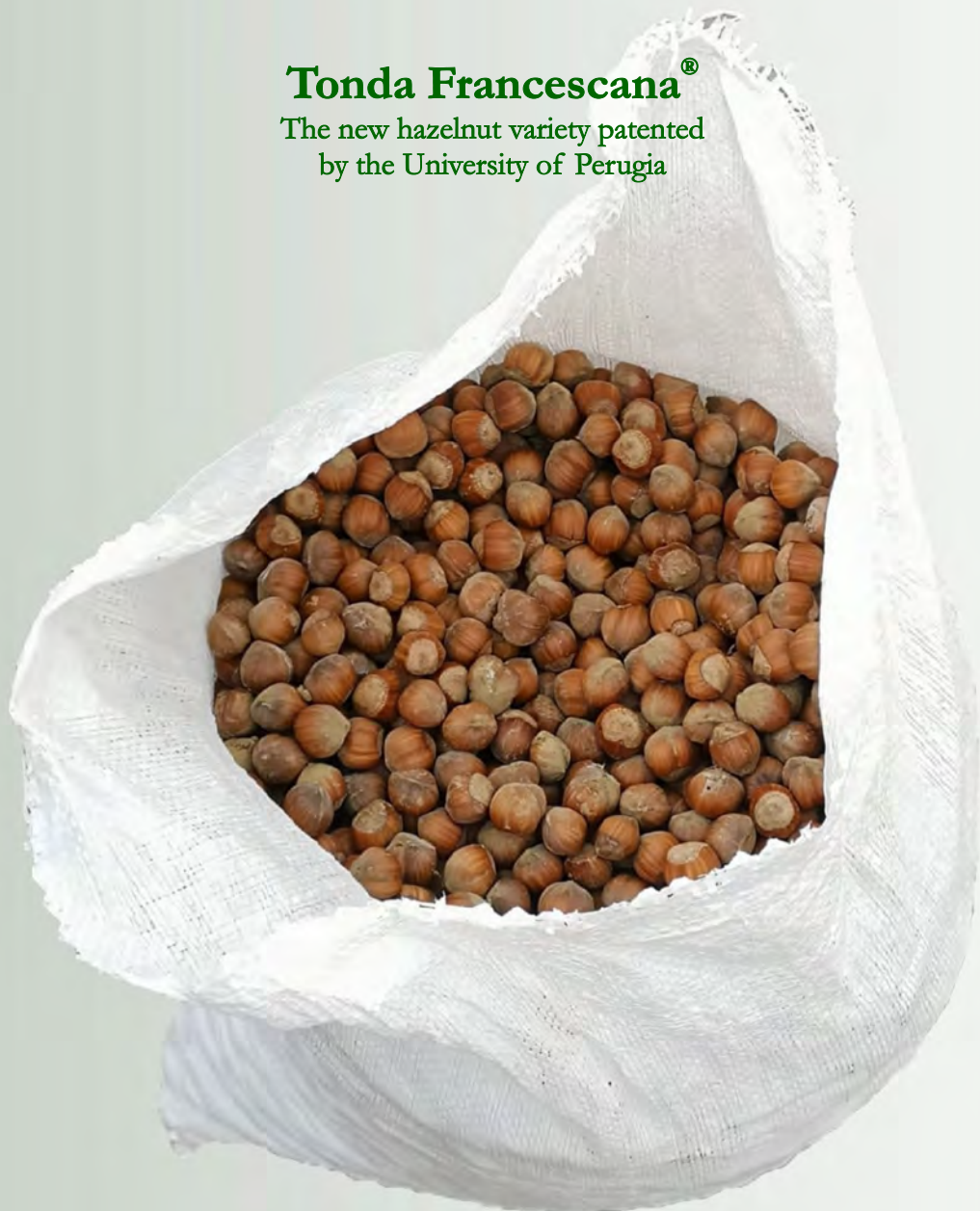




Regione Umbria

Tonda Franciscana®

The new hazelnut variety patented
by the University of Perugia



Tonda Francescana[®] Hazelnut

Highly productive hazelnuts with early harvesting

For some years now, a new focus on nuts has emerged in Italy, both in terms of production and as direct consumption, thanks also to the nutraceutical properties that can delay some of the ageing processes. In addition to walnuts, pistachios and almonds, a significant interest is also spreading for hazelnuts, consumed on their own or as components of confectionery products, including the well-known combination with cocoa-based products. Long-term projects, carried out by some multinationals engaged in confectionery production, have revived the interest in hazelnut growing by trade associations and many Italian farmers. Until now, the hazelnuts destined for companies in the sector were imported mainly from Turkey but, in the commercial landscape of the coming decades, also as a consequence of global geopolitical changes, the current balances could vary, leaving much more room for an increase in demand for hazelnuts produced in Italy.

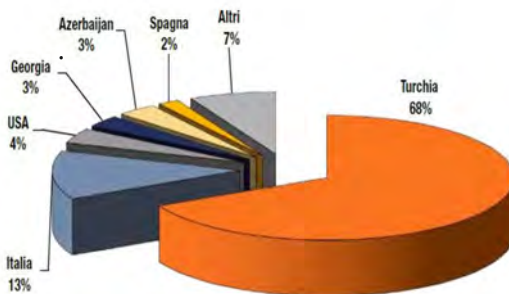
The commitments made by our most important agricultural trade associations currently provide for investments of a few thousand hectares, but in the next few years we can certainly speak of several tens of thousands of hectares allotted for hazelnut cultivation. Tonda Gentile delle Langhe, the Tonda Gentile Romana, the Tonda di Giffoni and the Nostrale or Siciliana.

Some Italian regions such as Piedmont, Lazio, Campania and Sicily have always been considered as productive districts suited to these precious nuts, with specific varieties linked to the respective territory, in turn derived from the work of centuries of selection carried out directly by farmers.



Tonda Francescana[®] plants grafted onto *Corylus colurna*

These include the Tonda Gentile delle Langhe, the Tonda Gentile Romana, the Tonda di Giffoni and Nostrale or Siciliana varieties.



Source: Ismea processing of Faostat data

National production quotas

Research results

Nowadays the hazelnut cultivation is spreading even outside the classic Italian hazelnuts districts, in response to the high demand, the sustained price of nuts that largely repays the investments made, to the greater knowledge of the crop also stimulated by the conferences dedicated to subject, as well as the presence of considerable financial resources made available to the sector by various Regions through the Rural Development Plans.

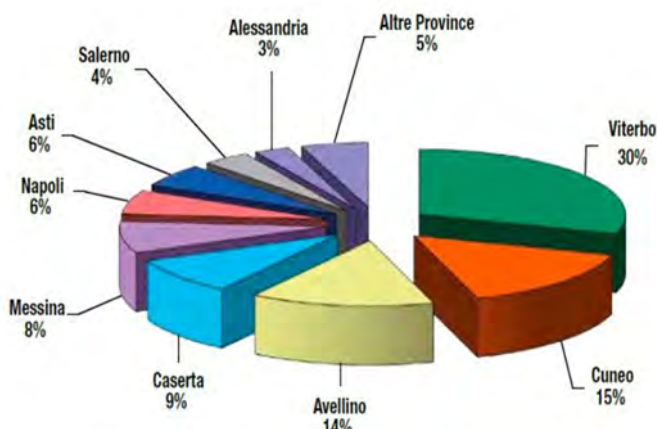
Moreover, unlike the other nut sectors, in the case of the hazelnuts, Italian research found itself adequately prepared for the innovations in the sector. In fact, there are many publications, including recent ones, dedicated to hazelnuts, as well as the results of the experiments that took place in the past decades.

The latter have made it possible to obtain new varieties, the result of years of work dedicated to crossing some of the best cultivars already fully established in Italy. The creation of the Tonda Franciscana® cultivar is one of the most interesting innovations in the sector.

Patented in 2019 by the University of Perugia after about 30 years of experiments carried out by Prof. Agostino Tombesi and his collaborators, aimed at obtaining new varieties that were superior to the previous versions, it was identified among the thousands of seedlings derived between the Tonda di Giffoni and Tonda Romana.

The new cultivar fully responds to the intentions of the breeders and has managed, in a few years, to attract the interest of many farmers and some multinationals known for their commitment in the production of important hazelnut-based confectionery items.

Italian hazelnut production by province



Source: Ismea processing of Istat data

Valuable characteristics of the Tonda Franciscana® cultivar

Hazelnut plants might all look the same to an inexperienced eye. Instead, the differences are substantial and the choice of the cultivar most suited to the business conditions of each producer can determine the fortune or misfortune of the farm that intends to try its hand in the cultivation of nuts. The results of the tests that have been carried out in the fields by the University of Perugia for many years can be of help in making this choice.

These tests have made it possible to publish a series of data that always place the Tonda Franciscana® in the lead in comparison with the other cultivars widespread in Central Italy. The comparison concerned the parameters that contribute to the good profits of the farmer, highlighting the advantages, better described below, that the Tonda Franciscana® has compared to other varieties and that make it particularly interesting not only in Italy but all over the world.

That means:

a) fruit production begins already by the third year, and is often present in small quantities even in the second year. This is about two years in advance compared to the other varieties and also their direct parents;

b) productivity is much higher than that of the best-known cultivars. The greater production of hazelnuts is linked to the presence of twigs with shorter internodes from which a greater availability of flowers derives, including the female ones destined for the production of the fruit;

c) the bud breaking period is medium-late, later than both of the Tonda di Giffoni and that of the Tonda Gentile delle Langhe, a characteristic that puts it in a better position compared to the earliest cultivars due to the risks associated with late cold spells;

d) the development cycle of the fruit is shorter, compared to other cultivars. This feature gives the Tonda Franciscana® at least three competitive advantages that make it excel and in particular:

1) flowering and budding are medium-late, later than the Tonda di Giffoni variety, so as to more easily escape the risks of unseasonable frosts;

Average budding period													
March													
5	7	9	11	13	15	17	19	21	23	25	27	29	31

2) ripening takes place in the second half of August, earlier than the other varieties, allowing the hazelnuts to be safely collected well before the late summer rains affect the harvest and limit access to the field by mechanical means;

3) the rapidity of the fruit development process and their early ripening (see tables) make it possible to reduce the time of exposure to the risks associated with bad weather and potential adversities deriving from fungi and insects.

e) the fruit has a globular shape with prevailing sizes between 17 and 21 mm, light brown in color with many streaks. After shelling, the seed also has a predominantly globular shape, with an elliptical section, covered with fibers with a cork appearance. The characteristics of the Tonda Francescana® correspond exactly to the type requested by the market. In fact, hazelnuts have dimensions and shapes in line with the needs of the confectionery industry, as well as being distinguished by a good shelling yield (46-48%), a very good peelability, a long shelf life and an excellent flavor;

f) as is known, all the plants generated by pure lines by crossing, as a result of heterosis, improve the phenotypic characteristics compared to the parents, with an increase in both fertility and resistance to diseases. This is also the case for the Tonda Francescana® which, in addition to producing much more fruit than its parents Tonda di Giffoni and Tonda Romana, also showed a lack of sensitivity towards hazelnut eriophyid (*Phytoptus avellanae*).

Ripening period of hazelnuts (Umbria)													
August				September									
20	23	26	29	1	4	7	10	13	16	19	22	25	28
Tonda Gentile Langhe													
Tonda Francescana®													
				Tonda Romana									
				Tonda di Giffoni									

The future of the new cultivar

The University of Perugia, holder of the EU patent 52157, has granted the multiplication license of the Tonda Francescana® to the Foundation for Agricultural Education in Perugia. The latter, in its own nurseries in Deruta and Marsciano (PG), produces the plants of the new variety as well as those of the necessary pollinators. Much of the nursery production of Tonda Francescana® is exported to countries such as Chile, Serbia, Bulgaria, etc., while on average about 100,000 plants per year are reserved for the Italian market, obtained both from micropropagation and from grafting on *Corylus colurna* rootstocks.

The two types of plants - micro propagated and grafted - have been tested for years especially in Central Italy, in Deruta (PG), directly on the fields managed by the Department of Agricultural, Food and



Recent Tonda Franciscana® plantation

Environmental Sciences of the University of Perugia, Research Unit of Tree crops, with results that went well beyond the best expectations since the first tests. In

the same plots there are both the adult plants of Tonda Franciscana®, obtained in the beginning of the hybridization program, and some more recently plantations. These have the purpose of comparing the different Italian plants cultivars, which were planted with different planting distances and with different propagation material (sucker plants, micro-propagated and grafted plants), so as to be able to obtain application results to be transferred directly to the companies that will dedicate themselves to the cultivation of the kernel. Both in Italy and in Bulgaria there are specialized plantations, with abundant and constant production, now in their fourth or fifth year of age. All the results of the research program of the University of Perugia have been published and, for this reason, visits to the experimental fields are not lacking. In recent years, the collections have been visited by delegations from many parts of Italy and the world, representing both the most important multinationals in the confectionery sector (Ferrero, Nestlé Perugia, Loacker, etc.), and the most well-known research and production organizations.

In order to bear fruit, hazelnut plants need pollen from other plants of the same species, which in turn is compatible with the flowers to be fertilized (cross-fertilization). In fact, the plant has a total self-incompatibility, to which a second genetic type is added which prevents fertilization whenever the pollen and the female flower have alleles in common.

This also applies to the Tonda Francescana® which, due to the higher annual production of hazelnuts compared to the other varieties, needs a number of pollinators that is proportionate to the greater fertilization needs of female flowers. Studies carried out so far have ascertained that the best pollinators are, in



Tonda Francescana® at the 3rd years after plantation grafted onto *Corylus colurna*

order, above all individuals of the cultivars: Nocchione, Camponica and Tonda Gentile delle Langhe (Farinelli D., 2021: in press publication). The Tonda Francescana® has become part of a memorandum of understanding signed by Nestlé Italy, University of Perugia and the Foundation for Agricultural Education of Perugia, together with other institutions and commercial structures in the sector. The agreement foresees the launch of a new line, characterized by superior quality, of a famous confectionery product whose ancient brand refers to the city of Perugia. The future chocolate product will be produced using hazelnuts from the new Tonda Francescana® variety, the availability of which will increase as the new plantations reach productive maturity.

Nursery quality of Tonda Francescana® plants

To guarantee the highest quality to farmers who buy the plants, the Foundation for Agricultural Education of Perugia, licensee for the multiplication and marketing of the new patented variety, has entrusted the maintenance of pre-basic nursery materials to the Centro Attività Vivaistiche di Tebano in Faenza.

In fact, the certification legislation provides that the "mother plants" are kept, for the maximum phytosanitary guarantee, in the "screen houses" of the Preservation Center for Premultiplication authorized by Mipaaf (Ministry of Agricultural, Food and Forestry Policies).

Starting from these "pre-basic" materials, we then proceed to the vegetative propagation of the Tonda Franciscana® plants destined for future hazelnut groves. With this process, provided for by the most recent European directives already transposed by Italy, the hazelnut plants put up for sale can boast, which is quite rare in Italy, the National Qvi Certification (Italian Nursery Quality) with a blue card which, in addition to the health aspects and varietal correspondence, it also guarantees



A three-year-old Tonda Franciscana® plant

that the plants are virus-free. As described so far, those who are interested in the cultivation of the Tonda Franciscana® hazelnut can count on structures and products that are the result of the best knowledge currently available in the sector:

- cutting-edge and innovative university research;
- nursery structures managed by a staff of technicians who are also able to offer competent support in the project and plant management phases;
- plants that are guaranteed by the highest quality certification existing in Italy today.



Fruits of the Tonda Franciscana®

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