

Review Article

Origin, Domestication, and Dispersing of Pear (*Pyrus* spp.)

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The pear (*Pyrus communis* L.) is a typical fruit of temperate regions, having its origin and domestication at two different points, China and Asia Minor until the Middle East. It is the fifth most widely produced fruit in the world, being produced mainly in China, Europe, and the United States. Pear belongs to rosaceous family, being a close “cousin” of the apple, but with some particularities that make this fruit special with a delicate flavor. Thus, it deserves a special attention and a meticulous review of all the history involved, and the recent research devoted to it, because of the economic and cultural importance of this fruit in a range of countries and cultures. Therefore, the purpose of this literature review is to approach the history of the origin, domestication, and dispersal of pears, as well as reporting their botany, their current scenario in the world, and their breeding and conservation.

1. Introduction

Pear, a typical fruit of temperate climates, with delicate pleasant taste and smooth, has a wide acceptance throughout the world. By its shape, it inspires designers and architects. The fruit pleases generations; already in 1661, Jean-Baptiste de La Quintinie, lawyer and botanist, responsible for the gardens of the Versailles palace, passionate about the cultivation of pears, wrote in reports: “It must be confessed that, among all fruits in this place, nature does not show anything so beautiful nor so noble as this pear. It is pear that makes the greatest honor on the tables. . .”

The pear is mainly consumed *in natura*, pies, cakes, accompanying strong cheese or carpaccio, risotto, jams, and ice creams and is a great fruit to be consumed in diets because of its low caloric value. It has high nutritional value with reasonable amounts of vitamins A, B1, B2, B3, and C and minerals like sodium, potassium, phosphorus, calcium, magnesium, and iron. It has a lot of fiber, giving excellent results in the treatment of constipation and intestine inflammation. Many recommend pears to cure anomalies such as cystitis and kidney stones [1].

Belonging to the genus *Pyrus*, which originated in the Tertiary period, in Western China, the pear had its dispersion from northern Italy, Switzerland, former Yugoslavia, Germany, Greece, Moldova, and Ukraine to the East, in countries

such as Iran, Uzbekistan, China, Japan, Korea, and Bhutan. Commercially, it is divided into two major groups: European and Asian pears. The first, with elongated and full-bodied texture, and the second, with sandy texture and rounded body, make this fruit the ninth in world production, being mainly a commodity in China [2–4].

2. Taxonomy, Origin, and Speciation

The name pear is derived from Latin, *pera* or *pira*, with some variants like in French as *poire*, in German as *peer*, and in Greece as *acras* as wild type and *apios* as cultivated pear.

It belongs to Equisetopsida C. Agardh class of vascular plants, Magnoliidae Novák ex Takht subclass, characterized by plants that have ribbed leaves and flowers. Belonging to the Rosales Bercht. & J.Presl order, and Rosaceae Juss family, with hermaphrodite flowers, polypetalae and perigynics stamens, the pear, of *Pyrus* L., gender is a fruit of big importance for the agriculture of latitude moderate countries, being cultivated on a large scale in China, Western Europe, and the United States [5–7].

The Maloideae subfamily, where the *Pyrus* gender belongs, has a basic chromosome number as $x = 17$, which is fair if compared with other species of Rosaceae, where $x = 7$ or $x = 9$. Of the three hypotheses that emerged

from the 1920s to explain the event, the most accepted theory [8] suggests an allotetraploid or allopolyploid from the cross between two primitive forms of Rosaceae family, Prunoideae with $x = 8$ and Spiraeoideae with $x = 9$. This theory was based on the observation of a predominance of univalent (unpaired chromosomes) and not from multivalent chromosomes during meiosis. Subsequently, isozyme studies supported this theory [9]. Most cultivated pears are diploid ($2n = 34$), but there are a few polyploid cultivars of *P. communis* and *Pyrus × bretschneideri*. According to some authors [9], the speciation of *Pyrus* occurred without a change in chromosome number. It is believed that gender *Pyrus* originated during the Tertiary period (65 to 55 million years ago) in the mountainous regions of western China where a very large number of species of the gender Pomoideae and Prunoideae are concentrated. Taking into consideration the areas of distribution of the various genres of Pomoideae, it is likely that the common ancestor of these was widely distributed in that territory during the Cretaceous or Paleocene and prior to the Tertiary. Evidence suggests that pear dispersion and speciation followed the mountain ranges to both the east and the west [10, 11]. In this period, only few traces of leaves in some localities from eastern Europe and the Caucasus were found, as the village of Parschlug, Austria, and the Kakhelia mountains, where *Pyrus theobroma* fossils were found. Whereas in eastern Georgia, Horizon Akchagyl, Azerbaijan, and Turkey, *Pyrus communis* L. fossil leaves were also found. In postglacial records, traces of fruits were found in lacustrine deposits in Switzerland and Italy [12]. It is believed that the process of domestication followed what is currently seen in the Caucasus, where one can find many types of pear trees that grow abundantly [13].

There are two domestication centers and primary origin of the genus *Pyrus*: the first is located in China, the second located in Asia Minor to the Middle East, in the Caucasus mountains, and a third secondary center located in Central Asia [14, 15].

The number of cataloged species varies greatly according to the interpretation of each author, 20 to 75 species [16]. There are 23 wild species cataloged, all native to Europe, temperate Asia, and northern mountainous regions of Africa [7, 17, 18]. Pears are classified into three groups according to the number of carpels and fruit size: small fruits that have two carpels known as Asian pears, large fruits with five carpels, and fruits with three to four carpels that are hybrids of fruits mentioned above. Asian pears have a crisp texture, while the European pear has a buttery and juicy texture, with characteristic flavor and aroma. Pears are propagated by grafting, where the graft is adapted against stresses such as soil alkalinity, drought, cold. Species diversity is concentrated in western Eurasia to eastern Asia and especially in China (Table 1), but several species are mentioned by many authors, without a consensus, which hampers an organization, as many are hybrids between species, and in some cases, different regions use different names for the same cultivars [10, 19, 20]. In these two regions, two distinct groups of species, eastern and western, are formed

(Table 2). Studies indicate that there is a large genetic distance between these two groups [21]. The first is focusing on most cultivated pears, found in Europe, North Africa, Asia Minor, Iran, part of Soviet Central Asia, and Afghanistan. The second group includes species that are concentrated in East Asia, the Tien-Shan and Hindu Kush mountains, and Japan. In the latter, there is a very large group of cultivars in China and Japan [11, 22]. Currently there are several works that aim to estimate the genetic distance among the different cultivars, concentrated in gene banks and breeding programs.

Researchers at the University of Lleida (UDL-ETSIA) could estimate the genetic distance of 141 Spanish accessions of *P. communis* (past and current) through eight SSR markers. Thirteen well-known Spanish cultivars that represent their diversity were also used, but all thirteen were grouped into a single cluster, showing the narrow genetic base of cultivars *P. communis* in Spain, mainly caused by market demands [23].

Another study was conducted by a group of Chinese researchers, in which, through six SSR markers, it was possible to verify the genetic distance of 98 species of *Pyrus*, including 51 *Pyrifolia*, Japanese and Chinese *Pyrus*, 11 *P. ussuriensis*, 24 Chinese white pears, six wild types, two Korean species, two *P. communis* cultivars, and 2 unidentified types. The results showed the grouping of these cultivars in 10 groups, with 4 groups composed of white and sandy pears of Chinese and Japanese origin. The results showed that Japanese cultivars have as parents, Chinese sandy pear. Western cultivars formed separated and distant groups from the eastern pears [24].

Many studies have been conducted in the context to identify genetic variations and clustering of populations of cultivated pear in China, since the fruit is a commodity of great importance to this country, as a study of 233 landraces of *P. pyrifolia*, the “sandy pear,” was able to determine the level of genetic diversity and relatedness of companies by 14 SSR markers [25].

In 2013, the pear genome sequencing was completed by combining the illumina sequencing technology and a BAC by BAC (bacterial artificial chromosome) strategy in an Asian pear named “Suli” [26]. This strategy minimized the limitation of the sequencing of a heterozygous genome. The results showed a frequency of 1.02% of SNPs and 53.1% of repeated sequences in the pear genome. It was verified that the genomic portion of pear and apple is very similar, and the major differences between them are the repeated sequences that are actively transposing.

The pear genome sequencing project concluded that the average density of genes is one per 12 kb in at least 42,812 gene loci, a similar number comparing to other plants, and that the pear and apple genome are almost equal in gene numbers. The project also showed that the lignin content found in pear is similar to that of poplar, indicating that this lignin content is involved in the stone cell formation [26]. From the genomic approaches used in this project, a better understanding of this fruit crop has been achieved, which will reflect on future improvements.

TABLE 1: *Pyrus* species and hybrids from Asia.

Species	Site of origin	Crop
<i>Pyrus alnifolia</i> (S. and Z.) Franch. and Sav.	Russian Far East, China, Japan, Korea, Taiwan	*
<i>Pyrus armeniacaifolia</i> T. T. Yu	China	*
<i>P. aucuparia</i> var. <i>randaiensis</i> Hayata	Taiwan	*
<i>Pyrus baccata</i> L.	Russia, Mongolia, China, Korea	*
<i>Pyrus baccata</i> var. <i>aurantiaca</i> Regel	Russia, Mongolia, China, Korea	*
<i>Pyrus baccata</i> var. <i>himalaica</i> Maxim.	China, Bhutan, India, Nepal	*
<i>Pyrus baccata</i> var. <i>mandshurica</i> Maxim.	Russia, China, Japan, Korea	*
<i>Pyrus betulifolia</i> Bunge	China, Laos	*
<i>Pyrus</i> × <i>bretschneideri</i> Rehder	China	*
<i>Pyrus calleryana</i> Decne.	China, Korea, Taiwan, Vietnam	USA, Canada
<i>Pyrus calleryana</i> var. <i>dimorphophylla</i> (Makino) Koidz.	Japan	*
<i>Pyrus calleryana</i> var. <i>fauriei</i> (C. K. Schneid.) Rehder	Korea	*
<i>Pyrus calleryana</i> var. <i>koehnei</i> (C. K. Schneid.) T. T. Yu	China	*
<i>Pyrus cathayensis</i> Hemsl.	China	*
<i>Pyrus delavayi</i> Franch.	China	*
<i>Pyrus discolor</i> Maxim.	China	*
<i>Pyrus doumeri</i> Bois	China, Taiwan, Laos, Vietnam	*
<i>Pyrus folgner</i> (C. K. Schneid.) Bean	China	*
<i>Pyrus foliolosa</i> Wall.	Burma, Bhutan, India, Nepal, China	*
<i>Pyrus glabra</i> Boiss.	Iran	*
<i>Pyrus gracilis</i> Siebold and Zucc.	Japan	*
<i>Pyrus harrowiana</i> Balf. f. and W. W. Sm.	China, India, Nepal, Burma	*
<i>Pyrus heterophylla</i> Regel and Schmalh.	Kyrgyzstan, Tajikistan, China	*
<i>Pyrus hondoensis</i> Nakai and Kikuchi	Japan	*
<i>Pyrus</i> × <i>hopeiensis</i> T. T. Yu	China	*
<i>Pyrus hupehensis</i> Pamp.	China, Taiwan	*
<i>Pyrus indica</i> Wall.	South Asia and Far East Asia	*
<i>Pyrus japonica</i> Thunb.	Japan	*
<i>Pyrus keissleri</i> (C. K. Schneid.) H. Lev.	China, Myanmar	*
<i>Pyrus kansuensis</i> Batalin	China	*
<i>Pyrus lanata</i> D. Don	Afghanistan, India, Nepal, Pakistan	*
<i>Pyrus matsumurana</i> Makino	Japan	*
<i>Pyrus nussia</i> Buch.-Ham. ex D. Don	Far East, South Asia	*
<i>Pyrus</i> × <i>phaeocarpa</i> Rehder	China	*
<i>Pyrus pohuashanensis</i> Hance	Russia, China, Korea	*
<i>Pyrus prattii</i> Hemsl.	China	*
<i>Pyrus prunifolia</i> Willd.	China	*
<i>Pyrus pseudopashia</i> T. T. Yu	China	*
<i>Pyrus pyrifolia</i> var. <i>pyrifolia</i>	China, Laos, Vietnam	*
<i>Pyrus ringo</i> Wenz.	China, Korea	*
<i>Pyrus ringo</i> var. <i>kaido</i> Wenz	China	*
<i>Pyrus scabrifolia</i> Franch.	China	*
<i>Pyrus scalaris</i> (Koehne) Bean	China	*
<i>Pyrus</i> × <i>serrulata</i> Rehder	China	*
<i>Pyrus sieboldii</i> Regel	China, Japan	*
<i>Pyrus sikkimensis</i> Hook. f.	China, Bhutan, India	*
<i>Pyrus sinensis</i> var. <i>maximowicziana</i> H. Lev.	Korea	*
<i>Pyrus</i> × <i>sinkiangensis</i> T. T. Yu	China	*
<i>Pyrus spectabilis</i> Aiton	China	*
<i>Pyrus taiwanensis</i> Iketani and H. Ohashi	Taiwan	*

TABLE I: Continued.

Species	Site of origin	Crop
<i>Pyrus ussuriensis</i> Maxim.	Russia, China, Japan, Korea, Brazil	Brazil
<i>Pyrus</i> × <i>uyematsuana</i> Makino	Japan, Korea	*
<i>Pyrus vestita</i> Wall. ex G. Don	China, Bhutan, India, Nepal, Myanmar	*
<i>Pyrus vilmorinii</i> (C. K. Schneid.) Asch. and Graebn.	China	*
<i>Pyrus xerophila</i> T. T. Yu	China	*
<i>Pyrus yunnanensis</i> Franch.	China, Myanmar	*
<i>Pyrus zahlbruckneri</i> (C. K. Schneid.) Cardot	China	*
<i>Pyrus tschonoskii</i> Maxim.	Japan	*
<i>Pyrus cydonia</i> L.	Iran, Armenia, Azerbaijan, Russia, Turkmenistan	*
<i>Pyrus germanica</i> (L.) Hook. f.	Middle East and Northern Asia	*
<i>Pyrus korshinskyi</i> Litv.	Afghanistan, Tajikistan, Uzbekistan	*
<i>Pyrus kumaoni</i> Decne.	Middle East, Far East and South Asia	*
<i>Pyrus salicifolia</i> Pall.	Iran, Armenia, Turkey, Arzebaijão	*
<i>Pyrus trilobata</i> (Poir.) DC.	Israel, Lebanon, Turkey, Bulgaria, Greece	*
<i>Pyrus turkestanica</i> Franch.	Kyrgyzstan, Tajikistan, Turkmenistan, Afghanistan	*

*The same origin.

Source: USDA (2012) [5].

3. Domestication and Breeding

Domestication has as a consequence the change in gene frequencies regarding to the original populations. A fully domesticated species is dependent upon man for its survival; in other words, it cannot reproduce in nature itself. The domestication of fruits began only around 6,000 years ago, through vegetative propagation, due to high rate of heterozygosity in them. As a consequence, self-fertility in pear and peach trees, hermaphroditism in grape, parthenocarp, seedless fruits on banana, and absence of spines in some fruits [27] emerged. During this period, ancient Mediterranean fruits such as grape, olive, fig, and pomegranate have been domesticated. Even citrus, banana, apple, pear, quince, medlar, almond, apricot, cherry, peach, and plum were domesticated in Central and East Asia. Some fruits such as kiwi, blueberry, and pecan were domesticated only in the 19th and 20th centuries. The earliest mention of growing pears in Europe was made by Homer in ancient Greece, a little less than three thousand years ago, who wrote that “Pears are a gift of God” [2]. It was then that breeding started and also the history of the pear as a cultivated plant. Theophrastus (371–287 BC), another Greek, also made important reports on pear. The same distinguished the wild forms from cultivated ones and suggested that bred genotypes received a special name and other important observations on breeding in general [28]. A large contribution to pear cultivation was made by the Romans. Portius-Cato (235–150 BC) described the methods of propagation, grafting, and caring for fruit and also described six cultivars of pear. Another great writer of ancient Rome, Terentius Varro, dedicated some of his work to agriculture (116–27 BC), describing grafting methods and storage. Among the Roman historians, the most important of all was Pliny the Elder (23–79 AD), who described in detail almost all varieties of the season, in a manuscript with more than sixty editions. In summary, the ancient Romans

reported more than 40 cultivars existing in the 1st century BC and described methods of cultivation similar to the practiced currently [2, 28]. Little is known about introducing pear in France, but in the mid-800, the cultivation has developed very well on site, making the country in the sixteen and seventeen centuries the world’s largest producer of the fruit. During the eighteenth century, Belgium developed numerous cultivars, including some that are important even today, as the varieties “Beurre Bosc,” “Beurre d’Anjou,” “Flemish Beauty,” and “Winter Nelis” [2].

The pear improvement happened in Europe from two species: *Pyrus communis* and *P. nivalis*. The first, European Common pear, is completely barren and has in its gene pool an influence of other species such as *P. eleagrifolia*, *P. spinosa*, *P. nivalis*, and *P. syriaca* [29]. The second, used to make wine, has been of great importance in Britain and France for over 400 years. Most cultivars released in Europe were developed via open pollination and fruits were selected according to their softness and buttery aspect.

In Asia, the cultivation began over 2500 years ago, with the main species *Pyrus pyrifolia*, *Pyrus serotina*, and *Pyrus ussuriensis*. The result was reported in written Chinese (Shi Jing) and other books for at least 1500 years [30]. In Japan, pear seeds dating from the years 200–300 were found. During the Edo period in Japan (1603–1868) over 150 cultivars were documented; this time the pears were planted in the corners, like a talisman to avoid the “evil eye.”

One of the main characteristics of Asian pears is the crispy, sweet, and juicy acid pulp. The pulp is characterized by having “stone cells” which are sclerenchyma cells that differ from fiber because they are very elongated. They also offer a sandy texture to the fruit [2]. The sizes vary from rounded as apples, these being the most cultivated, until pears to the top and bottom elongated bulbous pears, similar to the European pears. The fruits are very sensitive to physical damage, both at harvest and in the classification as storage and marketing.

TABLE 2: *Pyrus* species and hybrids originating in Europe and Southern Africa.

Species	Geographic distribution-site of origin	Crop
<i>Pyrus aria</i> (L.) Ehrh.	Canary Islands, North Africa, All of Europe	*
<i>Pyrus aria</i> (L.) Ehrh. var. <i>cretica</i> Lindl.	North Africa, Middle East, Central Europe Oriental and Southern and Turkmenistan	*
<i>Pyrus aucuparia</i> var. <i>dulcis</i> (K.) A. and G.	All Europe	North America
<i>Pyrus boissieriana</i> Buhse	Azerbaijan, Turkmenistan, Iran	*
<i>Pyrus korshinskyi</i> Litv. subsp. <i>bucharica</i> (Litv.) B. K.	Former Soviet Union	*
<i>Pyrus bulgarica</i> Kuth. and <i>Sachokia</i> (<i>Pyrus</i> × <i>nivalis</i> Jacq.)	Western Europe, Central Eastern and Southern	*
<i>Pyrus caucasica</i> Fed.	Eastern Europe and Central Greece	*
<i>Pyrus chamaemespilus</i> (L.) Ehrh.	Western Europe, Central Eastern and Southern	*
<i>Pyrus communis</i> L.	All Europe	Eastern Europe Central, South and West, and South America
<i>P. communis</i> var. <i>cordata</i> (Desv.) H.f.	UK, Portugal, Spain, France	*
<i>P. communis</i> subsp. <i>gharbiana</i> (T.) Maire	Algeria, Morocco	*
<i>P. communis</i> subsp. <i>marmorensis</i> (Trab.) Maire	Morocco	*
<i>P. communis</i> subsp. <i>pyraster</i> (L.) Ehrh.	Western Europe, Central Eastern, and Southern	*
<i>Pyrus</i> × <i>complexa</i> Rubtzov	Former Soviet Union	*
<i>Pyrus cossonii</i> Rehder	Algeria	*
<i>Pyrus crataegifolia</i> Savi	Turkey, Albania, Serbia, Greece, Italy, Macedonia	*
<i>Pyrus cuneifolia</i> Guss.	Central Eastern Europe, South and Central	*
<i>Pyrus decipiens</i> Bechst.	All Europe and North Africa	*
<i>Pyrus domestica</i> (L.) Sm.	Algeria, Cyprus, Eastern Europe Central West and Meridional	*
<i>Pyrus elaeagrifolia</i> Pall.	Turkey, Ukraine, Albania, Bulgaria, Greece, Romania	*
<i>Pyrus elaeagrifolia</i> subsp. <i>kotschyana</i>	Turkey	*
<i>Pyrus germanica</i> (L.) Hook. f.	Middle East, Eastern Europe, Central, Southern and Northern Asia	*
<i>Pyrus gharbiana</i> Trab.	Algeria, Morocco	*
<i>Pyrus intermedia</i> Ehrh.	All Europe	*
<i>Pyrus malus</i> subsp. <i>paradisiaca</i> (L.) Schubl. and G. Martens	Western, Eastern, and Central Europe and Greece	*
<i>Pyrus minima</i> Ley	UK	*
<i>Pyrus nebrodensis</i> Guss.	Italy - Sicily	*
<i>Pyrus pinnatifida</i> Ehrh.	All Europe	*
<i>Pyrus praemorsa</i> Guss	South of Italy, France	*
<i>Pyrus sachokiana</i> Kuth.	Georgia	*
<i>Pyrus spinosa</i> Forssk.	Central Eastern Europe, South, and Central	*
<i>Pyrus sudetica</i> Tausch	Western Europe, Central Eastern, and Southern	*
<i>Pyrus syriaca</i> Boiss.	Caucasus and Middle East Region	*
<i>Pyrus torminalis</i> (L.) Ehrh.	North Africa, Middle East, South Caucasus, whole Europe	*
<i>Pyrus trilobata</i> (Poir.) DC.	Turkey, Bulgaria, Greece, Israel, Lebanon	*

*The same origin.

Source: USDA (2012) [5].

TABLE 3: *Pyrus* species and hybrids originating in the Americas.

Species	Place of origin	Crop
<i>Pyrus americana</i> DC	Greenland, USA, Canada	*
<i>Pyrus angustifolia</i> Aiton	USA, Canada	*
<i>Pyrus arbutifolia</i> (L.) L. f.	USA	*
<i>Pyrus arbutifolia</i> (L.) L. f. var. <i>nigra</i> Willd.	USA	Northern and Eastern Europe Center
<i>Pyrus coronaria</i> L.	Canada, USA	*
<i>P. coronaria</i> var. <i>ioensis</i> Alph. Wood	USA	*
<i>Pyrus diversifolia</i> Bong.	USA, Canada	*
<i>Pyrus floribunda</i> Lindl.	USA, Canada	Korea, Russia, Sweden, Czech Republic, Slovakia, Germany, Latvia, Bulgaria
<i>Pyrus fusca</i> (Raf.) C. K. Schneid.	USA, Canada	*
<i>Pyrus sanguinea</i> Pursh	Canada, USA	*

*The same origin.

Source: USDA (2012) [5].

Pear was introduced by the English and French settlers in the United States and Canada, and in 1629, there was record of its cultivation in New England [28]. Unlike Europe, which grew via grafting pears, pear in the United States was initially cultivated by seeds, which resulted in a much higher genetic variability than in Europe [31], resulting in a number of different varieties in America. Currently, many European pears are well established in North America; however, the U.S. genotypes cannot adapt to the climate and European soil (Table 3). In the United States, in the latter half of the nineteenth century, breeders have used the pear wild type (crosses between Asian and European pears) to their crosses, in order to obtain greater resistance to cold and “fire blight” disease caused by the bacterium *Erwinia amylovora* that is widely spread, though causing a large reduction in the quality of the fruit, which was repaired with successive backcrosses. The most notable difference between these junctions is undoubtedly the texture [31–33]. Wild type pears are used today as a rootstock because of their cold tolerance and adaptability to different environments [31].

4. Production and Economic Importance

A medium-sized fruit has about 58 calories, 6 grams of fiber, and 7.0 mg of vitamin C, besides being free of fat and sodium and possessing significant amounts of calcium, iron, magnesium, phosphorus, potassium, zinc, copper, manganese, and phytosterols [5]. Pears, because they are part of the family Rosaceae, have sorbitol as their main translocated sugar that is converted into glucose, fructose, and sucrose. The sugar content varies greatly among Japanese, Chinese, and European pears [34]. Japanese and Chinese pears are those with higher and lower sucrose content, respectively, and the European pears are those with a high content of fructose.

Pear is used mostly for fresh consumption or for the production of jams [35], being the ninth most important cultivated fruit in the world (Table 4). China is the world's largest producer (Asian pear) and the United States is the second largest producer, being the first producer of European

TABLE 4: World production of fruit crops in the years 2010 and 2012 in tonnes.

Type of fruit	2010	2012
Watermelons	101,342,555	105,372,341
Banana	105,726,175	101,992,743
Apples	70,581,492	76,378,738
Orange	69,045,495	68,223,759
Grape	67,460,130	67,067,129
Melon	31,495,365	31,925,787
Fruit fresh nes	29,414,585	31,447,977
Tangerines	23,867,076	27,060,756
Pears	22,705,619	23,580,845
Pineapples	20,377,660	23,333,886

FAO 2010 and 2012.

pear type. Together, the top ten producers occupy an area of 1.360.230 HA annually (Table 5).

The European pear (*P. communis*) is grown into five major regions: Europe, North America, South America, South Africa, and Oceania, while production of Asian pear (*P. pyrifolia*) is concentrated in Asia.

China's pear production has increased steadily during the 1980s and early 1990s because of the expensive planting. This rate of growth generated an amount of 7.74 million metric tons of fresh pear in that time. Data show that China produces more than twice the total world production, making the crop a commodity of great importance to this country [4].

5. Conclusion

Documentation of botanists and biologists over the last hundred years was of great importance to collect the available data in this review.

Undoubtedly, a fruit that produces around 24 billion tonnes per year is considered a great success in the world market. This success is mainly due to the wide commercial acceptance around the world, its nutritional importance, and

TABLE 5: World production of pear in 2012 (tonnes) and the area (ha) harvested in the ten most productive countries.

Position	Country	Production (tonnes)	Area harvested (ha)
1	China	16,266,000	1,136,700
2	USA	778,582	22,015
3	Argentina	700,000	26,500
4	Italy	645,540	35,195
5	Turkey	439,656	34,067
6	Spain	400,600	25,000
7	Republic of Korea	394,596	14,353
8	India	340,000	38,500
9	South Africa	338,584	13,000
10	Japan	299,000	14,900

FAO, 2012.

its adaptability in places with large planting conditions and marketing.

The recent advances achieved in the last year with the pear sequencing genome project will provide new opportunities for developing improved genotypes tolerant to biotic and abiotic stresses and also high quality fruits regarding nutritional and sugar content.

The understanding of the history of pear for agriculture is of paramount importance, since scientists and students could have a better grasp of the richness of this fruit crop and its trajectory associated to humankind.

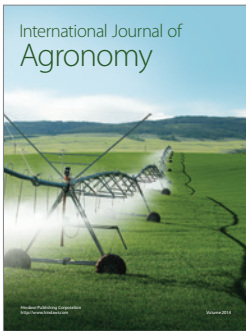
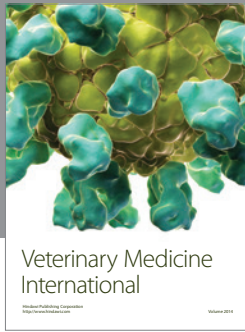
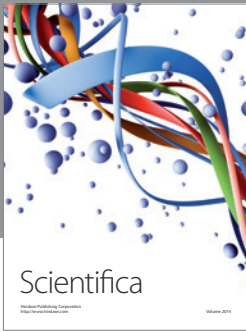
Conflict of Interests

The authors declare that there is no conflict of interests regarding the publication of this paper.

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