Ethnobotanical Study on Traditional Use of Local Fruit Varieties in Gargano National Park (Apulia, Italy).

Nello Biscotti
Polytechnic University of Marche: Universita Politecnica delle Marche
Daniele Bonsanto (bonsantodaniele@gmail.com)
Polytechnic University of Marche: Universita Politecnica delle Marche
Gaetano Laghetti
IBBR CNR: Istituto di Bioscienze e Biorisorse Consiglio Nazionale delle Ricerche

Research Article

Keywords: Diversity of fruit trees varieties, Ethnobotany, Ethnomedicine, Traditional knowledge

Posted Date: May 5th, 2021

DOI: https://doi.org/10.21203/rs.3.rs-440235/v1

Ethnobotanical study on traditional use of local fruit varieties in Gargano National Park (Apulia, Italy).

NELLO BISCOTTI[1], DANIELE BONSANTO[1], GAETANO LAGHETTI[2]

[1]DEPARTMENT OF AGRICULTURAL, FOOD AND ENVIRONMENTAL SCIENCES (D3A), MARCHE POLYTECHNIC UNIVERSITY - I-60131 ANCONA, ITALY.

[2] INSTITUTE OF BIOSCIENCES AND BIORESOURCES (IBBR), CNR, VIA AMENDOLA, 165/A, IT70126 BARI, ITALY

Corresponding Author: Daniele Bonsanto (bonsantodaniele@gmail.com)

ABSTRACT. This study is a first attempt at documenting the ethnobotanical value of local fruit trees, the quantity of which has been decreasing along the past fifty years, while the cultivation has gradually been abandoned. The current study focuses on Gargano Promontory area, where some traditional agriculture practices are still in use. Many species and ethnobotanical categories are involved in a range of uses, such as domestic and craft products (22 species), agroforestry (16 species), and economic (13 species), not to say for food. In these cases, either fruits (62%), and other parts (leaves, flowers seeds, remnants of pruning, lumber) of a plant are important (38%). 217 fruit trees are involved (local varieties, ancient cultivars, accessions) and they belong to 33 species, mainly Rosaceae's (53%). Chestnut, pear, almond and walnut trees are most widely exploited, proving that an ethnobotanical heritage of great importance has developed thanks to the diversity of traditional fruit trees, whose relevance is far from being completely studied. In Gargano area case, the variety of traditional fruit trees has become a strong distinctive feature of the Mediterranean diet. This is in turn still the base of the nutritional regime of a community that developed a sound gastronomic knowledge based on fruits (salads, first courses, etc.). The socio-economic changes of the past fifty years have obviously led to abandoning most of said uses. The interest in foodstuff remains, but it is limited to few species, or to an even lower number of their morphotypes. In intercultural comparisons with other Italian regions (Campania, Basilicata) and other countries (Serbia), we have found common uses, but above all a great uniqueness. At the same time, there is evidence showing the close bound between the diversity of fruit trees in use, and the resulting biocultural abundance. The abandonment of traditional agricultural practices has also led to the loss of ethnobotanical values linked to local fruits. Hence, preserving the ethnobotanical knowledge is the only way of recovering and enhancing this precious heritage made of biological and cultural biodiversity.

Key words: Diversity of fruit trees varieties; Ethnobotany; Ethnomedicine; Traditional knowledge

INTRODUCTION

For the first time in Italy, this ethnobotanical study focuses on the variety of local fruit trees ("ancient fruits"), and the area considered is Gargano Promontory in Apulia (Italy). Its biodiversity heritage has been affected for many years now by a relentless loss of consistency, due to the changes in agricultural production models that in Italy have involved the lowlands, and that have left abandoned hill and mountain agriculture (Piccinin, 2000). The mixed cultivation model (arable crop with trees, arboreal combinations) that used to characterize these cultivations had created an incredible variety of species and infraspecific types, each with a name, a flavour, a use of its own, locally known, and shared. According to the last FAO - Coldiretti report (2019), in the last century in Italy there were around 8,000 kinds of fruits, while today only about 2,000 remain, 1,500 of which are considered at risk of disappearing. The related ethnobotanical knowledge – never studied – linked to the survival of said traditional fruit trees has been lost in turn. This loss affects consumers too, since they base their diet on very few species (mainly apples and pears), and cultivars. In this regard, governmental organizations such as FAO are strongly committing to helping local communities (closely linked to the cultivation of ancient fruits) to prevent the loss of their autonomy, and to recognize the social importance of historical cultivations (EU's rural development programmes).

In 2018 the first *Atlante dei fruttiferi autoctoni d'Italia* (Fideghelli, 2018) (Atlas of fruit trees indigenous to Italy) was published. It describes over 5,000 varieties and species of fruit native to the Italian peninsula: pear tree (*Pyrus communis* L.), apple tree (*Malus domestica* Borkh.), citrus and fig trees (*Ficus carica* L.), chestnut (*Castanea sativa* L), walnut tree (*Juglans regia* L.), almond tree [*Prunus dulcis* (Mill.) D.A.Webb], hazel (*Corylus avellana* L.), pistachio (*Pistacia vera* L.), cherry tree [*Prunus avium* (L.) L.], apricot [*Prunus armeniaca* (L.) Batsch], peach tree (*Prunus persica* L.), and plum (*Prunus domestica* L.). For Apulia, a census and recovery project for old cultivars and landraces was recently completed (ReGeFruP Project, National Research Council – Sinagri, Bari). A part of the material examined is in conservation (Istituto Basile Caramia of Locorotondo, Bari), while a voluminous publication (Palasciano et al., 2018) describes 500 "varieties" of local fruit trees (several of which have been found in Gargano area), belonging to 26 species and characteristic of the traditional fruit-growing of the region.

These first scientific attempts are undoubtedly important; nonetheless, they can only offer a partial representation of the ancient fruits that spread locally in Italy, their diffusion being at the same time the factor that provoked their decline. On the other hand, the ancient fruits are getting a clearly increasing interest from the social sphere: websites, Facebook pages, informal research, rediscovery of 'lost flavours', continuity of traditions (Angelini, 2005). Last,

ancient fruits have a place of their own in several market niches, such as among gastronauts and foodtrotters, in haute cuisine, etc.

There were so many ancient fruits that no one has ever been aware of the actual extent of their presence. With regards to the Gargano area, a rough figure can be obtained by examining the old agriculture censuses (ISTAT, 1971) still including the data about the mixed farming that used to focus mainly on the so-called "seminativi arborati" (tree crops). When in 1971 the abandonment phenomenon (rural exodus) was already significant, in Gargano area 1,855 hectares (3.4% of the cultivated land) were still fruit trees' - more than half of them almond groves, and around 480 hectares were specialized arboriculture's (citrus trees). If we consider just the tree crops and exclude the almond groves, there probably were around 120,000 trees (plant layout 8x8): fig trees, pear trees, Japanese medlar trees [*Eriobotrya japonica* (Thunb.) Lindl.], cherry, apple, plum, mulberry trees (*Morus alba* L.), pomegranate trees (*Punica granatum* L.), prickly pears [*Opuntia ficus-indica* (L.) Mill.], apricot trees; as for citruses, they must have been around 192,000 (70% orange trees, 20% lemon trees, 10% other). An unknown number of other fruit trees were probably used in typical mixed cultivation with vineyards, citrus groves and above all olive orchards. During the past fifty years every opportunity of evaluating the cultivation extent of these fruits has disappeared; we can only note its steady and relentless abandonment: based on our current observations, in Gargano area it is probably around 80%. Nevertheless, even though today Gargano territory is characterized by a strong tourism development, some interesting experiences, and the knowledge of traditional uses of these fruits are surviving, and they remain linked to few residual mixed cultivations. These have in turn helped to preserve meaningful evidence of ancient fruits, though they very close to the point of extinction.

In many cases, they are old cultivars passed down to the present, with names that can be found in classical botanists and pomologists' works (Mattioli, 1544; Le Lectier, 1628; Gallesio, 1811; Thomas, 1876; Leroy, 1873). Among such works there is *Pomona Italiana* (a series of booklets issued between 1817 and 1839) by Giorgio Gallesio, the first and most important collection of images and descriptions of fruits and fruit trees published in Italy (Ferraro, 1996, 2003).

These many fruit trees' varieties – only partially studied and described - are an ethnobotanical research field still to explore. The literature proposes several research studies on fruits in Italy and in Mediterranean area, but they just focus on few cultivated species, such as apple, pear, mulberry, chestnut (Signorini et al., 2007; Hadjichambis et al., 2008; Idolo et al., 2010; Saric´Kundalic, 2010; Motti, Motti, 2017; Mautone et al., 2019), without considering their infraspecific diversity, that must have been decisive in use traditions. A study conducted in Serbia analyzed the ethnobotanical uses (dietary, medicinal, domestic) of local pear trees' cultivars (Savic´ et al. 2019); such study

showed a remarkable biocultural richness, that the local communities have developed precisely based on infraspecific diversity. In the international scenario (Indonesia, Ethiopia, India, Namibia, Pakistan) the ethnobotanical value – mainly for medicinal use – of locally grown indigenous fruits stands out (Suwardi et al., 2020; Tallei et al., 2019; Cheikhyoussef and Embashu, 2013), even though the highest interest is for wild fruits (Bošnjaković et al. 2012; Sharma et al., 2017; Kidane et al., 2014; Abbasi et al., 2013; Deshmukh et al., 2011).

Therefore, our study analyzes the ethnobotanical uses of fruits diversity (species, ancient cultivars, landraces) as documented in Gargano Promontory (Apulia), where traditional fruit-growing has played a critical role in the region's economy, culture and of course diet, still strongly rooted in Mediterranean traditions. Our aim is to understand patterns, differences, links, cultural guidelines of uses that have gone far beyond the mere nutritional purpose. Within the ethnobotanical knowledge, there is a variety of traditional ecological know-hows too (Tek), that can be used in sustainable agriculture models, hence preventing their possible loss (Salma et al., 2010).

MATERIALS AND METHODS

The ethnobotanical data come from structured interviews with farmers (average age: 80 years), realized over the last ten years (2010-2020). The research has covered the whole Gargano area and has been complemented by photos and videos. The fruit trees studied are the same described in previous works, some already published (Angelicchio et al., 1993; Biscotti, 2001, 2008, 2010, 2013); during the last years, most of the mother plants (44 accessions belonging to 10 species) have been geo-referenced and stored at Centro di Ricerca, Sperimentazione e Formazione in Agricoltura "Basile Caramia" in Locorotondo (Ba).

Table 1 lists all documented ethnobotanical uses divided according to:

- Botanical species as described in 'The Plant List' (http://www.theplantlist.org/).
- Local name: in case of forgotten names, we have used a name attributed by us (e.g. "Mela di Valle Sgadea") that links it to the toponym of the place where it has been found; the acronym 'CRSFA' shows an accession characterized and conserved in the above mentioned 'Centro Ricerca e Sperimentazione di Locorotondo' (Ba). In the same column, 'photo' means that in the additional file there is a photo (Fig.S1).
- Pomology/size/ripening period: these details are used for ancient cultivars, local varieties or accessions characterized and conserved; the same column also gives information about fruit size (little, medium, large), and ripening period.
- Discovery territory: this definition is used for the Gargano municipality to which the fruit tree is linked.

- Categories of use: listed according to the ethnobotanical methodology (Caneva et al., 2013) and distinguished in food (A), domestic/crafts (DART), medicinal (M), ritual/symbolic/religious (RSR), economic (E), and agroforestry (ASP).
- Parts used: fruits, seeds, flowers, plant, leaves, wood, pruning remnants.
- Methods of use/Uses: they are divided by category of use.
- Level of use (according to Biscotti and Pieroni, 2015)
- Taste appreciation: for food use.

Table 1's dataset has been created using Windows Office programs, to realize histograms and pie charts.

The other four tables list the results of different processing carried out on the data: Table 2 collects the ethnobotanical categories of use, to check per species frequency for each of them; Table 3 records the results of cultural comparisons in ethnobotanical uses of fig in Gargano area, Basilicata, and Campania. Also, Table 4 reports the use levels divided into categories, and in Table 5 we can found the most frequent ethnobotanical uses of Gargano area's traditional fruits.

Last, Figure 7 shows the results of a principal components analysis (PCA) realized with Vegan Package (Oksanen et al., 2015) in the open source software R (R Development Core Team ,2015), based on a dataset consisting of pear and fig's morphotypes, with each use' difference listed in Table 1.

RESULTS

The research gathered an amount of meaningful data under the botanical and pomological aspect. Figure 1 shows the charts identifying the species' botanical family (A), genus (B), infraspecific diversity (C), and pomological value of all the fruits studied (D). The ethnobotanical uses documented concern mainly morphotypes (52%) of ancient cultivars belonging to 13 families (Rosaceae, 52%), 30 genera (*Pyrus*, 23%) and 33 species. The 'Others' category of the same chart collects other 15 species, among which there are orange [*Citrus sinensis* (L.) Osbeck], lemon [*Citrus limon* (L.) Burm.], cedar (*Citrus medica* L.), tangerine (*Citrus reticulata* Bianco), bergamot (*Citrus* × *bergamia* Risso and Poiteau), myrtle-leaved orange [*Citrus* × *myrtifolia* (Ker Gawl.) Raf.]. The infraspecific diversity is an important factor (Chart C) concerning many species, especially pear (23%), plum (16%), and fig (13). Pear alone has 49 morphotypes – ancient cultivars, landraces, and accessions.

Overall, the documented uses can be divided in 7 ethnobotanical categories (listed per species in Table 2); they make clear that every fruit is used in a variety of ways apart from food: domestic/crafts (22 species), agroforestry (16

147 species), and economic (13 species). In fact, only very few species have limited uses (frequency 1, 2, 3). Chestnut,
148 pear, almond and walnut are the species with more categories of use (frequency 5). Table 2 also reveals the
149 significant economic role of these fruits' many morphotypes for pear, pomegranate, cherry, orange, hazel, walnut,
150 almond and above all chestnut.
151 Charts in Figure 2 show the fruits' ripening period (Chart A), and their distribution in Gargano Promontory's
152 territories. In the first case, the fruits' wide availability almost over the whole year (at its top in August – 27%) is
153 clearly shown; though, spring and autumn months are important too, as local fruits are mainly available from May to
154 November, while from January to April Gargano area's communities enjoy citruses (Others, 7%). In the second case
155 (Chart B), we can see that almost every Gargano municipality is involved in growing and using these fruits, even
156 though said municipalities are mainly grouped in a northern zone of the Promontory whose borders are Vico del
157 Gargano (23%), Ischitella (19%), and Rodi Garganico (11%).
158 As shown in Figure 3, the recorded ethnobotanical uses concern mainly fruits (62%), but the whole tree is
159 particularly important, since every part is used, i.e., seeds, leaves (14%), pruning remnants (14%), and wood (3%).
160
161 **Categories of use**
162 Figure 4 shows in percentage in seven charts the processing as focused on use categories. In the food-related one
163 (Chart A), the most meaningful use is about consumption in the fresh state (50%), while the remaining part
164 undergoes different methods of use or processing (stored, dried, processed, cooked): some fruits (pears, apples) are
165 stored (12%) in warehouses, in inserts (Photos 1, 2); "Mele rosa" and "Mele decia" used to be kept in the cupboards,
166 to make the home more colourful, and add it some scent. Other fruits (figs, pears, plums) are sundried, then cooked
167 in the oven, and eventually eaten as dried fruits (dried, 11%); also, others undergo more complex processing
168 (processed, 14 %), and are used in jams (apricots, cherries), or concentrated (''Vincotto'' – cooked grapes' must -
169 made of figs, carobs), used in juices and homemade orangeade (citruses), drinks (almond milk), and Christmas cakes
170 (almonds). A part is cooked (apples and pears) and used as food for the children and the sick. Finally, some fruits are
171 used to prepare typical snacks (oranges rubbed on bread and seasoned with olive oil) and dishes (dish, 2%), like
172 salads (with oil and salt dressing) made of oranges, cedars and lemons, or soups (''acquasale'') of oranges and fried
173 olives, or pasta with walnuts. ''Pane e arance'' (bread and oranges) is a snack eaten during the work breaks in the
174 countryside (bread or grilled bread rubbed with oranges and seasoned with olive oil), and it was once a typical
175 children snack.

Other fruits with a high nutritional relevance are plums (Sino-Japanese plum), and damsons (European plum), respectively called “pironi” and “passole” (or “pernelle”). Also, the dietary value of dried fruits such as walnuts, hazels, and chestnuts (but above all of almonds) is high. Still now, many Christmas cakes contain almonds: they are used as ingredients of ‘‘cartellate’’, ‘‘crustele’’ (fried pieces of dough), biscuits (‘‘spumette’’), ‘‘mandorle atterrate’’ (almonds dried in the oven, then knead with icing sugar and ‘‘vincotto’’ or chocolate). The ‘‘ostie chijene’’ (‘‘mandorle atterrate’’ with ‘‘vincotto’’, put between two thin wafers) are special: they are still prepared in Monte Sant’Angelo and sold in every shop of typical food. Created in that village, in the past they could be found everywhere in Gargano area, and the mould with Jesus Christ on the cross was the same used by the parishes to prepare the Host for the Holy Communion. Monte Sant’Angelo’s ‘‘ostie chijene’’ are included in the national list of traditional agri-food products, and in the list of products branded ‘TSG’ (Traditional Speciality Guaranteed) issued by Ministry of Agricultural, Food and Forestry Policies. Chestnut jam too is peculiar, and adults still remember that ‘‘cartellate” used to be spread of chestnut jam, while some ‘calzoni’ (fried dough pies) were stuffed with it.

Some wild pears (“Perazzi gentili”) too are used for food, same as some kinds of figs (Cagnano Varano’s so-called ‘‘fichi sordi’’) with black, white, purplish skins, that are still eaten by itinerant shepherds.

Another species with several ethnobotanical qualities is citruses: bitter orange (*Citrus x aurantium* L.) is mainly used as sweet orange’s rootstock, but it also has relevance as food (for its quenching effect during summer), and medicinal (thanks to its low sugar content); bridal bouquets use sweet orange’s flowers. Vico del Gargano, Rodi Garganico, and Ischitella communities have a strong interest for citruses’ fruits, and there is even a very peculiar religious tradition: for centuries, oranges and lemons have been used in Vico del Gargano in place of flowers to adorn Saint Valentine’s statue (Photo 3) to show devotion to this saint, which from 17th century on has been considered the protector of Gargano’s citruses against frost. Citrus’ fruits are lovers’ symbol; they also have a low commercial value, and in the past the flowers used to be sold to cosmetics industries, while the zests were candied.

Some interesting ethnobotanical uses have been documented in the fig diversity, that offers fruits all along the year, ranging from the many biferous cultivars producing florons in June, to the uniferous ones, some of which ripen even in November. The biferous morphotypes are usually eaten in the fresh state, while the uniferous ones usually become ingredients of typical sweets: ‘‘fichi secchi’’ (dried figs) (“Dottato, Fico gentile, Fico Paradiso”), ‘‘fichi infornati’’ (“Fico degli uccellini”), ‘‘fichi a croce’’ (“Fico degli uccellini, Fico pento”). The ‘‘fichi secchi’’ are sundried, then scalded in hot water and stored in canvas bags, to get the characteristic whitish coating. The ‘‘fichi infornati’’ are sundried, then cooked in the oven to give them a longer shelf life and the typical gold or bronze colour; they can also be stuffed with almonds; among the ‘‘mandorlati’’ ones there are the ‘‘fichi a croce’’, split in halves and coupled in

206 a cross form. Between the end of August and the beginning of September they prepare ‘‘vincotto’’, a concentrated
207 product made of several morphotypes, very thick and rich in sugar, got through a long boiling. The same processing
208 is used for carobs too. Figs or carobs’ ‘‘vincotto’’ is the irreplaceable ingredient of many Christmas sweets, such as
209 ‘‘cartellate’’ and ‘‘puperate’’ (also called ‘‘poperate’’), traditional Gargano area’s biscuits, donut-shaped and sweet,
210 eaten to commemorate the dead; they need a long rising time and are made up of flour, ‘‘vincotto’’, and spices
211 (cinnamon, cloves). In Vico del Gargano, in the past they used to prepare the ‘‘gelateddé’’, thin homemade
212 spaghettis dipped into the freshly cooked ‘vincotto’, and eaten hot. Someone still prepares ‘‘vincotto con la neve’’, a
213 kind of granita or sorbet made of frozen snow flavoured with these sugary figs’ preparation.
214 The DART and ASP charts of Figure 4 show the processing of a tree's other parts: in the first one we can observe the
215 domestic/crafts uses, where almond, cherry, and apricot trees’ pruning remnants are particularly important (82%) as
216 firewood, and to cook food (roasts and soups). The remaining part concerns some interesting uses of walnut trees’
217 wood (for carpentry), medlars and bitter orange trees’ (to realize work tools’ handles), olive trees’ suckers to make
218 braided objects, mulberry trees to make swings, and finally vines of table grapes (“Uva pergola”) to make pergolas.
219 The second chart (ASP) lists the agroforestry uses, among which using leaves to feed the livestock (rabbits, goats,
220 donkeys, mules) is the prevalent one, even though it is also meaningful the use of seeds of some fruit trees (peach,
221 apricot, medlar trees) to reproduce plants and get rootstocks.
222 The uses of the other categories are displayed in charts E (economic), RSR (ritual-symbolic-religious), M
223 (medicinal), and L (recreational). Under the economic aspect (Chart E), some morphotypes’ sales on local markets
224 keep having a certain relevance, even though for some species (chestnut trees), the farmers depend on wholesalers’
225 purchases.
226 About the medicinal category (Chart M), in addition to the widespread awareness that fruits are a healthy food, the
227 use of pears (and above all, of bitter oranges) for some conditions (diabetes), and of cooked apples and pears for the
228 children and the sick is interesting; also, dried figs and carobs are used to prepare decoctions for cough and colds.
229 Very peculiar (Chart L) is the use even adults make of some kernels (walnuts and apricots’) to play (similary balls)
230 during the feast of St. Michael the Archangel; in summer, children used to keep the apricot kernels and to eat their
231 seeds like almonds, while their mums used to prepare the ‘‘mandorle atterrate’’.
232 The ritual value taken on by some fruits is especially interesting: the tradition of filling stockings (**Photo 4**) with
233 dried pears and figs, walnuts, persimmons (*Diospyros kaki* L.), quinces (*Cydonia oblonga* Mill.), and late-ripening
234 grapes (Photo 2) to commemorate the dead is still alive. In Manfredonia they still use to set the ‘‘tavola dei morti’’
235 (table of the dead), to offer their beloved dead ones some refreshments (bread, wine, chestnuts, and pomegranates)

when they visit their relatives on 1st November's night. This table is also set for Epiphany night, when the dead leaves the house and returns to the afterlife. In other villages (Vico del Gargano) there was the custom of preparing a dish of walnuts and dried figs, and to leave it on a windowsill, as a treat to the procession of dead passing in the streets on 1st November's night.

Finally, the ethnolinguistic value of these fruits' local names is not to be overlooked, since they show the deep links between communities and plants, and since such names relate to different aspects (morphological, ecological, agronomic): "Pero a campana" (bell-shaped pear), "Pera mezzorotolo" (wheel-shaped), "Pera a pudicin chjina" (pear with fleshy petiole), "Pera torsavolpe" (whose long shape would suffocate a fox), "Pera vennegghja" (harvest pear) "Pero pagghiònica" (arable crops' pear), "Pero invernale" (winter pear), "Pera austino o ustinella" (August pear), "Pera di giugno" or "San Giovanni" (June or St. John's pear). In other cases, some fruit takes the name of the farmer growing or spreading it (Pero Mastantonio, Pero Marcantonio), or its name relates to the taste ("Pera moscatiddone", i.e., tasting like Moscato), or it can have a name showing its origin ("Pero marchisciano, Pero Gerusalemme, Pero d'Ischitella"). The name "Gabbaladro" (duping the thieves) used for a plum's valuable ancient cultivar is especially interesting: it means that once ripened, it keeps a greenish colour that makes the "thieves" think it is still unripe, so they do not pick it.

With the PCA displayed in Figure 7 we have a convincing order of the detected biocultural diversity; therefore, we can easily check the elements involved and the importance of each of them. Given the strong infraspecific diversity that is characteristic of pear and fig, we have only considered their morphotypes. By analyzing the graph, we can confirm the different roles played by the uses, and the most relevant in differentiating the morphotypes is the use for food, especially in the fresh state. The graph highlights the differences: in economic use (local markets), agroforestry use (animal feed), and domestic use (firewood), where only pear morphotypes are involved, while in case of processing, either pear and fig morphotypes are transformed, preserved, cooked for the sick, or dried. From this sorting we can understand that each morphotype's group is characterized by its method of use, so we can see that the fruits' ethnobotanical tradition is closely linked to a morphotype, that sets its use.

Levels of use

All these uses have gradually lost their importance in the past fifty years, and many have been completely abandoned. Table 4 collects all the elaborations focusing on level of use, and divided by category and modality. The last column lists the number of morphotypes involved in each modality; it distinguishes the use in the fresh state (183) for fruits; the use of leaves to feed the animals (102), and the remnants of the pruning for firewood and cooking (104) for

266 plants. Also, there are 44 morphotypes with an economic value. The most worrying percentage is about fresh
267 consumption, with a value beyond 50% including 'Abandoned' (A) and 'Rare'; then we have the animal feeding,
268 that has been abandoned for the 92% of the morphotypes studied, while the use for firewood and cooking is
269 'Common' only for 1% of the morphotypes.
270 Table 4 clearly shows that the positive percentage of 'Common level' (C), and 'Very Common Level' (MC)
271 involves the category for food (A), and partly the economic one (E). In the use for food, many modalities have been
272 abandoned (cooked, dried), others have become extremely rare (Processing). As for the economic aspect, some fruits
273 keep a certain value (local markets, Both).
274 The worst expected results concern all the remaining categories; playing (L) with fruits (walnuts) is a completely
275 abandoned habit; oil for extreme unction, and brides bouquets too have been abandoned (ritual-symbolic-religious
276 use - RSR). Almost every modality in domestic/crafts (DART) category, and medicinal (M) is close to be abandoned.
277 Table 5 shows the remaining margin of relevance of the ethnobotanical heritage and the local fruits use' tradition in
278 Gargano area, by displaying only the 'Very Common' uses. Food and economic categories are clearly the most
279 important categories, involving only the agroforestry and ritual-symbolic-religious modalities. The number of
280 species involved (fig, pear, prickly pear, chestnut, olive), and of their morphotypes is low. In the 'Food' category,
281 the fresh consumption is still 'Very Common' only for some morphotypes of fig ("Fico d'agosto, Fico pento,
282 Columbre"), mulberry ("Gelso bianco piccolo"), prickly pear ("Fico d'India arancione"), pear ("Pero d'Ischitella,
283 Spatone estivo"), and cherry ("Napoletana rossa"). In the "Cooked" modality, roasted chestnuts, hence chestnuts in
284 general are still used ("Castagna tempestiva, Castagna rimmunnevola, Castagna di Gagnoliddo, Castagna di San
285 Michele, Castagna invernale, Castagna rigata"). Also, the tradition of using oranges ("Arancia squacciata, Arancia a
286 pera, Arancio Padre Nostro") to prepare salads continues. Thanks to their economic value, different chestnut
287 morphotypes keep on being traded in local markets (18%), and by wholesalers. Another information of great
288 ethnobotanical importance is the ancient religious use of oranges and lemons to adorn some statues (St. Valentine's).
289 If we watch at the 'Common' group, the data we get are less worrying about the survival of the ethnobotanical
290 tradition of local fruits. Though – and we can see it a first glance by observing Table 4, – they involve almost the
291 same categories. Few other pear morphotypes ("Pero d'Ischitella, Pero spatone") are involved in fresh consumption;
292 also, these pears, some local varieties of cherry ("Ciliegia maiatica, Ciliegia San Michele"), and of fig ("Fico
293 marinese, Fico gentile") can sometimes be found in local markets. These fruits are used even now to prepare jams
294 and preserves, meaning there is a strong interest for lost flavours, but at the same time the people interviewed are
295 very aware that these fruits are not going to be recovered.

Intercultural comparisons

Due to the lack of ethnobotanical research on specific and infraspecific local fruits, and despite the large quantity of data collected, getting consistent intercultural comparisons with other areas is not possible. Literature only offers studied focusing on ethnobotanical uses of single species. One of those is fig, a typical fruit (syconia) of Southern Italy. In a study on Campania and Basilicata (Salerno et al., 2017), uses common to different categories (human nutrition, animal food, medicinal, domestic/crafts) have been detected. If we compare the botanical uses of fig between Gargano area and the mentioned regions (Table 5), we note not only surprising common elements, but also habits that have become characteristic of some regions or territories. Under the nutritional aspect, a common habit is stuffing dried figs with citrus peel. Even more common uses can be found among medicinal and domestic/crafts traditions: dried figs are used in every compared territory to prepare decoctions and treat inflammations of the respiratory tract, with some interesting differences like the addition of dried carobs (Gargano, Basilicata), or other plants (Campania, Gargano) such as mallow (*Malva sylvestris* L.), or chamomile (*Matricaria chamomilla* L.). Fig latex is used to treat insect bites, get vegetal rennet to produce cheese, or remove warts (Gargano, Campania). In Gargano area and in Campania, its leaves (they are surprisingly efficient in degreasing) are used to wash dishes. In Campania, fig leaves are stored and used to feed the livestock; in Gargano area, the leafy branches become forage for goats; in Basilicata, with the youngest branches' wood they realize an irreplaceable component of flutes; both Campania and Basilicata treat gingivitis with dried figs.

Anyway, this comparison does not reveal the relationship between a species' morphotypes and its methods of use, while this can be proved in Gargano area, where a higher ethnobotanical richness can be found at the infraspecific level. In fact, the processing a fruit undergoes prior to being eaten (dried figs, 'fichi infornati, fichi a croce') is closely linked to their morphotype. Such relationship can also be proved by the results got through a comparison about pear's infraspecific diversity in food tradition in Gargano and Polimlje areas (Serbia), both with a high morphotypes' diversity. Figure 5's graph shows a comparison between ripening periods; in Polimlje area, pears are mainly available in spring/summer (May to July), and in autumn (October), while in Gargano area they are in summer (August/September). By comparing the ways of use, Figure 6 reveals that in Gargano the fresh consumption is strongly prevailing, while in Polimlje they prefer to process fruits (cakes, sweets, brandy, drinks, compotes, juices, jams, syrups…). This evidence can be explained by the diversity of morphotypes, that can be distinguished by the ripening period. Therefore, both these situations reveal a clear relationship with the seasons: the morphotypes that ripen in spring and at the beginning of summer are richer in water (hence not suited to be processed), and they are usually eaten as fresh fruits. But the morphotypes that ripen in summer and autumn (the greater part in Polimlje) are

most suited to be processed, hence the many kinds of cooking methods. On the other hand, in Gargano area, the higher availability of pears in spring/summer explains the lower need for processing, and the larger use of drying, to eat the fruits dried, or as special sweets ('pere infornate') that need to be sundried. The common elements – use as dried fruits, medicinal and therapeutic awareness - are important too.

It is nonetheless clear that the ethnobotanical value is issued from the intrinsic fruit's diversity. If we study the most recent literature about a few close regions like Campania (Mautone et al, 2019), Molise and Abruzzo (Mattalia et al., 2021), we can record some very relevant ethnobotanical data on species such as walnut, chestnut, carob, mulberry, olive (*Olea europea* L.), cherry, plum, rowan (*Sorbus domestica* L.), lemon, grapevines, pomegranate, and pear. The parts used include not only the fruits, but also leaves and wood, so also in these cases the reasons behind their use involve several domains (domestic, crafts, medicinal) apart from the nutritional ones. In Campania they claim a decoction made of walnut leaves is good for treating hyperglycemia, and the seeds are used to prepare cakes and pasta. In Molise and Abruzzo, they make an infusion in wine with fruits, known by the local name 'liquor'; in Campania, the dried fruits of carobs used to be a children's food; in Gargano they were dried, then quickly cooked in the oven, and considered "chocolate for kids". Again, in Campania mulberry leaves are used to prepare diuretic and antidiabetic decoctions. In Molise with pomegranate's fruits and peel, dried figs, apples, sugar, bay leaves (*Laurus nobilis* L.) and barley (*Hordeum vulgare* L.) they treat bronchitis. In the same region, pears are preserved with salt and vinegar, salt and water, wine and sugar, water and vinegar.

Coming back to fig, it is appropriate to make a comparison between the data about the Gargano area, and what we are documenting in the other parts of Apulia (Murgia, Salento), a region very rich in food, agronomic, and economic traditions based on this species, that is a symbol of the "dry" fruit-growing. Some recent works (Palasciano et al., 2018) describe 96 morphotypes (ancient cultivars and landraces), a number that cannot compare to a diversity that until the 1950s acknowledged that Apulia had the national record in fig-growing: around 1,000,000 quintals produced in 30,000 hectares out of the 50,000 cultivated in Italy (Minonne et al., 2011).

About Murgia - the central part of Apulia – the data collected (Sant'Eramo, Spinazzola, Gravina di Puglia) document an ethnobotanical tradition built on the diversity of several ancient cultivars and local varieties ("Ajjettate, Reggine nere e bianche, Musserosse, Chelubre, A vrazzole, Vernine, Acchjanute, Cipollotto, Fico dell'Unghia, Rosso di Trani, Trimone. Nero di Ruvo, Columbrario"). The early figs are eaten in the fresh state, while for the dried fig – as they do in Gargano area – only the "Ajjettate" fig (a "Dottato's" local variety) is used: figs are left on the trees until they are almost completely dried and get their typical whitish patina. Afterwards, they are put in glass containers (or in canvas bags like in Gargano) where they are stored. Other local varieties – "Reggine a buccia nera, Columbraro" –

ripening in summer are preferred to prepare ‘‘fico mandorlato’’ (fig with almonds): the figs are split in halves and sundried, then they are coupled with almond seeds; all the other morphotypes (“Ricotta, Cipollotto, Rosso di Trani, Trimone, Nero di Ruvo”) become ‘‘cotto di fico’’ (a concentrate paste of cooked fig), the main seasoning of Christmas cakes such as ‘‘cartellate’’ or ‘‘sasaneddé’’ (sassanelli), dry biscuits prepared with flour, ‘‘vincotto’’, almonds, cacao and several spices. Among other uses (and same as in Gargano territory), we find dried figs used for decoctions together with mallow and bay leaves, to treat diseases caused by cold; for the cough, in Sant’Eramo in Colle they use hot ‘‘cotto di fico’’ diluted in white wine. The leaves too, they are traditionally used to feed livestock, while latex has the same medicinal (warts) and domestic (rennet) applications documented in Gargano area and in Campania.

In Salento area, traditions are based on another astonishing abundance of ancient cultivars and local varieties: “Fico abate” (Lecce), “Fico a sangu, Abbondanza” (Brindisi, Taranto), “Cascitedda” (Lecce), “Fracassano rosso, Marangiana, Rizzeddha” (Lecce), “Mattepinta, Ricotta” (Brindisi, Taranto, Bari). In this territory too, the favourite sweets are dried figs (‘‘fichi zzuccarati’’), and the morphotype is some local variety of “Dottato” cultivar (“Fico secco di San Michele Salentino”). To dry the figs they use trellis (called ‘grate’ in Gargano, and ‘cannizzi’ in Salento) made of reed (*Arundo donax* L.*),* or they prepare flat surfaces on the ‘‘trulli’’ (Cisternino in Valle d’Itria); apart from trellis, they still use ‘‘spase’’ (stone slabs), and ‘‘littere’’ (stone shelves), where they arrange a layer of dried plants (among which there is thyme - *Thymbra capitata* (L.) Cav.), putting on top the figs to dry (split in halves but not separated, or left as they are in Gargano and Taranto area). On the ‘‘spase’’ and among the figs there are also pears of the local “Giammaria” cultivar, as recorded in Ceglie Messapiche (Brindisi). Then, the figs are stuffed with roasted almonds (Gargano, Murgia), while in Salento with walnuts and wild fennel (*Foeniculum vulgare* Mill.). Once dried, the figs are stored in glass containers like they do in Murgia (‘‘vasineddé’’ - clay containers in Gargano area), arranged in layers and sprinkled with coffee powder (Gargano), or sugar decorations (in Manduria - Taranto area). Dried figs shapes are typical, like in ‘‘crocette’’, i.e., two figs coupled and bound with spiny rush (*Juncus acutus* L.) in the form of a cross. As in Gargano and Murgia areas, in Salento too dried figs are a typical present: in Marittima (a hamlet of Diso, Lecce) we can find the ‘‘iette’’ (diamond-shaped dried figs tucked on reeds), a typical gift for Epiphany. Some ritual elements exist in Salento too (where dried figs are linked to the dead commemoration), and in Gargano area. However, there (in Fasano) for the ‘table of the dead’, instead of the rosary they create a crown of dried figs, ready since September.

In Salento too, most morphotypes are processed to get ‘‘miele di fichi’’ (fig honey – Gargano’s ‘‘vincotto’’, or Murgia’s ‘‘cotto di fico’’), while the quintessential Christmas sweets are ‘cartellate’. In winter, either in Gargano

386 and in Salento, children and adults enjoy the preparation of ‘‘vincotto con la neve’’. Salento’s fig honey is also used
387 to cook, especially the ‘‘ndreme di viecchie’’ (Locorotondo), a plate close to be abandoned where homemade pasta
388 is cooked in fig honey (something close to Gargano’s ‘‘gelateddé’’).
389 Other experiences concern the domestic uses of fruits and parts of plants: in Gargano area, house painters used to
390 make their brushes out of fig wood; latex was used to curdle milk and soothe insect bites, while the leaves (original
391 use) were used to clean wounds and abscesses. Dried figs supplied some original medicinal remedies, such as
392 poultice of chopped figs that eradicated boils and abscesses, prepared by soaking figs in water at night; also, figs
393 used to be eaten in the morning for constipation relief. Including in Salento, dried figs were considered a panacea for
394 respiratory tract diseases: to treat cough, they cooked dried figs (like in Gargano and Murgia areas) together with
395 almond peels, bay leaves, mallow, pomegranate grains, and slices of quince. For colds, the dried figs needed to be
396 boiled in wine, added of walnuts, mallow, and honey. In Gargano zone, this ‘syrup’ is used in case of cough and cold,
397 but it is mixed with dried carobs and bay leaves.
398
399 **DISCUSSION**
400 The abundance of data collected in Gargano area clearly shows that local fruits are proof of a wide ethnobotanical
401 tradition, developed from the importance they already had with regards to the nutritional aspect. Such tradition is
402 based on species’ diversity, and above all, on infraspecific diversity as a unique adaptation requirement to the
403 bioclimatic and morphological diversity of territories. Diversity represented a winning strategy to ensure availability
404 of fruits – as in Gargano case – almost all year long, given that fruits ripe in every season. Eating fruits (bread and
405 cherries, or bread and grapes) used to be a habit during breaks from work in the countryside, or a snack to enjoy at
406 any time. Nuts too (walnuts, hazels, almonds, chestnuts) used to enrich the festive tables. In winter, Gargano
407 communities also enjoyed citruses, a daily reserve of vitamin C available for many months. These fruits have had a
408 very wide consumption, so that their value has gone far beyond the common idea of “fruits”, since they have often
409 changed into true food, helpful in facing famine, therefore they were stored (dried, baked, preserved) during the long
410 and occasionally cold Mediterranean winter. Given what has been said so far, the nutritional use of local fruits shows
411 the knowledge local communities relied upon, hence acknowledging the ‘food supremacy’ (Nyélèni Forum, 2007)
412 that supports safe and fair local food of high quality, and that protects a community’s right to keep its own eating
413 habits.
414 The different characteristics under the pomological (colour, fruit structure, taste quality) and agronomic aspect
415 (resistance against pathologies, ripening period, durability) of local fruits have created the right conditions to

successfully experiment different processings, ranging from jam, to concentrate (‘‘vincotto’’). Above all, they have boosted the creation of easy and efficient conservation techniques: inserts of winter cultivars (pears, persimmons, pomegranates, prickly pears) hanging from walls or inside warehouses, while drying methods, oven cooking (roasting) of figs, pears, and plums give the fruits’ a longer shelf-life. For pears and apples ripening in autumn, storage in special wooden boxes kept in a warehouse was enough, but for other fruits (rowan, some pear’s cultivars, persimmons) conservation was essential to get the fruits ripen and become edible. Then there were jams and concentrates, prepared to keep most of the abundant harvest of figs, cherries, table grapes, plums, apricots.

Fruit diversity has also involved bio-nutritional differences – yet to be studied – that have been without any doubt critical in influencing the value of the Mediterranean diet. Here we touch another relevant point related to such diet, that is still typical of Gargano and Apulia communities, places rich in food excellences ranging from the widely used olive oil, to fruits and vegetables (Biscotti et al., 2018; Biscotti et al., 2020). When we talk about Mediterranean diet (Naska and Trichopoulou, 2014), we tend to underestimate the fact that it can have different ingredients, and – for example – different kinds of fruits can make the difference in a diet’s value. Gargano area’s diet was characterized by a steady consumption of pears, very different from each other for taste, colour and nutritional value; there is no doubt such diversity played a preeminent role in this type of diet, where pears were considered very good for stomach and intestine. In fact, in the use for food of this fruit, the awareness of their therapeutical/nutraceutical properties has always been present: pears were good for diabetic patients, they were cooked and given to the sick, and decoctions of dried pears, carobs and figs were the usual therapy for dealing with the frequent respiratory tract diseases the farmers working in the countryside were especially prone to get affected by. Even cholera was dealt with by using Gargano’s citruses (Biscotti, 2017). Many ‘varieties’ of bitter orange are still consumed by diabetic patients due to their very low sugar content, and lemon juice mixed to hot water is considered a panacea for every abdominal pain (indigestion etc.).

The medicinal use of dried fruits (pears, figs, carobs) was peculiar, since they were thought of as essential ingredients for decoctions to treat cough together with other plants, some always present (mallow and bay leaves, orange and lemon zests). In addition, other plants used to mark the differences between municipalities: in Manfredonia it was chamomile, in Mattinata almonds (in Vico del Gargano and San Giovanni Rotondo, their peels), in Monte Sant’Angelo they were sage leaves (*Salvia officinalis* L.), in Vieste carobs, in San Giovanni Rotondo licorice roots (*Glyccyrrhiza glabra* L.), in Cagnano Varano barley seeds. It is important to remember that some fruits have acquired a special relevance in the medicinal domain, contrary to many wild plants used for food and thought of as medicine/food (Etkin, 1996; Pieroni, 2000). Once properly processed, fruits used to change into medical

preparations (decoctions), so there seems to be a clear distinction between food and medicine, unlike wild plants, where such distinction seems less clear or not easy to describe (Pieroni, Quave, 2006; Anywar et al., 2014, Benitez et al., 2017).

Thus, also about fruits there is an ethnobotanical knowledge that can stimulate the research to identify active ingredients to use in the medical/therapeutic (Salerno et al., 2017) and domestic domains, like in using fig leaves to degrease pans and dishes. For example, scientific data about pears are abundant: pears contain antioxidants (Kaur, Arya 2012) and can be used against hypertension, diabetes, high cholesterol, constipation, rheumatism, and even to prevent cancer (Savic et al., 2019). In addition, pears contain glycoside and phenolic compounds (arbutin, quercetin, kaempferol, fredielin, sterols, isoquercitrin, ursolic acid, sorbitol) that have anti-inflammatory, antioxidant, antibacterial, analgesic, astringent, spasmolytic effects (Kaur et al. 2012). Pears are especially recommended to diabetic patients, thanks to their typical low sucrose content.

Another significant aspect to think of is the economic value the local fruits used to have in Gargano area, that is, something that might ensure some opportunities for the future. Dried or quickly baked pears and figs used to have some value too. Several documents (Libetta, 1833; Nardini, 1914; Vocino, 1914) emphasize the large quantity of dried figs produced in Gargano, of which today we only find a marginal familiar use. Most pears in Apulia ripen in spring/summer; by studying old historical sources, it results that Apulia has a record of early varieties (Pantanelli, 1930): little in size and available in large quantities, they were ready to be consumed before those of any other part of Italy (Pantanelli, 1929), they were very juicy and free from the flesh' 'grains' typical of the valuable varieties of Northern Italy. A monograph of the 1960s (Brazanti Sansavini, 1964) focuses on pear production in Apulia and estimates for Foggia province 170,000 quintals (76% regional production); 98% was of local varieties (82% on a regional level). The monograph mentions the local varieties called "Mela Rosa, Perelle di maggio (Puredde), Pero Marchese, Pero Ciccantonio, Mezzorotolo, Muzzaduro, Ustinella, Rignanese" – all of them rooted in Gargano area's pear cultivation, and "whose very early production… is appreciated not only in local markets, but also in some national ones". Many of the kinds of cultivated pears come from Ischitella zone. It is a rich germplasm issued from 'semi-specialized' models, so to say (arable land mixed with pears, pear/olive mixed cultivation), that the mixed farming pattern created with pear trees.

Nuts too (especially chestnuts - once they were sold even in Avellino general markets - and almonds) had a commercial/economic value. Until 1960s, almonds harvest was a big income source for farmers in Gargano (San Giovanni Rotondo, Monte Sant'Angelo), thanks to a heritage of 50 varieties (Fanelli, 1939). Since decades, such products have unfortunately lost every commercial value, and their harvest has been abandoned. The trade interests

476 have been changing, and the sweet industry (especially confectionery) looks for unique seed's fruits, shelled,
477 immediately available and low-cost, coming from intensive cultivation of the almonds (mechanization of the harvest
478 and shelling). The uncountable Gargano almonds' morphotypes have on the contrary hard shells, often containing
479 two seeds (a characteristic farmers were interested in). On the other hand, softer, thinner shells expose almonds to
480 fungi only phytopharmaceuticals can face, a problem many Gargano cultivars did not have.
481 The economic value of Gargano's traditional fruit-growing reaches its peak thanks to the citruses (only 500 or 600
482 hectares) grown in 'I Giardini' that rely on a stream (Torrente Asciatizzo) fuelled by several sources (Angelicchio et
483 al., 1993; Biscotti, 2017). We have evidence that starting from 1000 a.C., bitter oranges, lemons, sweet oranges were
484 grown together with tangerines, cedars, and bergamots, and protected by windbreaks made of holm oaks (*Quercus*
485 *ilex* L.) and laurel. Towards the end of the 19th century, they ranked third among the Italian cultivations: around 3%
486 of national production - first in Italy, a country that over the whole century was first per citrus growing. In season, in
487 the period 1870-1920 around 100,000 quintals of citruses left from Rodi and San Menaio for Trieste, Paris, Vienna,
488 Moscow, Liverpool, New York; in a famous monograph about Gargano we read that in 1847 "the income coming
489 from lemons has outpassed the value of the ground" (De Leonardis, 1870). Around 60% of the production usually
490 left for the United States of America. Later, the US have imposed a duty increase, and since then Gargano's citruses
491 have gradually lost all their importance.
492 In this wide range of fruits and related uses, we can easily discover the value of the biodiversity expressed by local
493 fruits. The agriculture methods capable of harvesting huge amounts of food, with a relevant economic aspect
494 (despite being practiced in very different environment, and in difficult conditions) are rooted on species and
495 infraspecific diversity. Thus, local fruits offer a significant ecologic and agronomic (growing and reproducing
496 methods) knowledge. Basically, it is a biodiversity still far from being completely understood: some names of
497 Gargano area's pears ("Pero moscatello, Pero angelico") can be found in Gallesio's *Pomona* (1819-1839), and even
498 before - in Matthioli's work (1568) - we find "Moscadelle, Giugnole, Ciampoline, Ghiacciuole, Spinose, Campane".
499 These are all names revealing something about what we can find today in Gargano, and currently they are known by
500 the names "Pero ghiacciolo, Pero moscatello, Pero a spina, Pero campanone".
501 The variety of citruses (whose centuries-old trees still can be seen) range from morphotypes of sweet orange, to
502 lemon (the most cultivated ones), to bitter orange, cedar, bergamot, and chinotto, e.g., a valuable proof of rural
503 biodiversity the historical Italian agriculture had developed upon. Also, there are orange's morphotypes ("Arancia a
504 pera, Arancia squacciata, Arancia tosta o Duretta del Gargano"), and ancient cultivars belonging to the type of
505 Biondo comune, while lemon's ("Limone fusillo, Limone lustrino") are issued from the group of "Femminello

506 *comune"* (both are protected by PGI as 'Arancia Bionda del Gargano' and 'Limone Femminello del Gargano'). This
507 is all that is left of a diversity described for the first time by Giuseppe Del Viscio (1900), a very influential author
508 that followed the taxonomic path of prominent scholars specializing in the difficult citrus classification, either
509 French (Risso and Poiteau, 1818), and Italian (Giorgio Gallesio, 1818). Del Viscio described 28 'varieties' of citrus
510 that used to be grown in Gargano: oranges (6 varieties out of the 6 then known in Italy), ''melangoli'' (*Citrus x*
511 *aurantium* L.), lemons and cedars (*Citrus medica* L.) among the 169 species or varieties then known in every
512 farming area of Europe. For each, Del Viscio supplies common name, dialect name, uses and binomial nomenclature
513 mentioned in the *Histoire naturelle des orangers* (1818) by Risso and Poiteau, and partly in *Traité du citrus* by
514 Gallesio.
515 Eventually, the importance of biodiversity can be understood in choosing the many species suited to a particular
516 environment's features (soil, climate): almond, pear and fig trees are the only possible choices, since they can bear
517 fruits in a dry climate, and on a rocky, poor soil. In addition, pear and fig trees respond to a practical knowledge that
518 adapts to Gargano area vegetation's potential. So, we find wild pear trees (*Pyrus spinosa* Forsk.) that are pear trees
519 traditional rootstocks; the massive presence of wild fig trees (*Ficus carica* subsp. *caprificus*) ensures an abundant
520 harvest of cultivated figs, thus preventing the use of caprification. The same principles can be observed in the
521 widespread presence of almond trees, an aridophilic species that finds a favourable space in the steep and dry slopes
522 of Monte Sant'Angelo and Mattinata, and on San Giovanni Rotondo plateaus, a dissemination probably encouraged
523 also in this case by the presence of the wild almond trees [*Prunus webbi* (Spach) Vierh], an element that can be
524 found in wild olive groves and that has often been exploited as a rootstock.
525 The use of these fruit trees portrays a very interesting anthropological dimension, since they are linked to single
526 farmers that have learnt not only how to grow them, but also how to create a wider know-how all around them. They
527 are all issued from the establishment of some characteristics following very long selection processes within every
528 species. They exist because someone has chosen, grown, protected, and passed on them over the time, so the specific
529 knowledge of every farmer is crucial.
530 The aspect offering conclusive elements for a discussion focuses on the social and cultural role of local fruit trees:
531 they are the collective heritage of the communities, that preserve their memory and pass it on; starting from the plays
532 made with fruits, they have marked the meeting point of a place and a culture. Besides, fruit trees have a long history
533 in common with people, that through them preserve life witness, work, techniques - an authentic immaterial culture
534 bond to food, to its production and processing. Every fruit has taken on a really important place in the intellectual,
535 symbolic, magic, and social universe. Trees have offered shade and refreshment, they have marked borders,

sheltered birds, supported other plants, they keep on supplying firewood, and – until some decades ago – they were mainly used to have wood to cook food. Fruit trees wood is an excellent fuel, because - as 'hard wood' - it burns slowly, makes little smoke, and releases aromas that gives the food a unique taste. Thanks to the fruit trees' pruning remnants, the peasants and their families had enough wood stocks to face the winter.

Fruit trees' social value can be seen in pears, that in Gargano area have always been considered a water source. In summer in Gargano area, no other fruit can relieve thirst like the many pear varieties - everyone's property - we can find along the roads and the paths, almost always born from grafts on wild pears from July to October. Same role have figs (extremely rich in sugar), available to everyone along the roads, ready to satisfy the hunger that some old people still remembers from the past. The poor and those who were hungry used to be given a handful of dried pears, or carobs, figs, plums or 'infornate' - a present for children too. The rich enjoyed the fruits of ''Pero dei signori'' (the rich's pear tree), or ''Pero marchese'', whose gradual ripening (July to October) made it a tree only the rich could afford to grow, enabling its owner to eat a fruit a day for a long period. Fruit is a child's happiness, particularly when it comes to mulberries, cherries, medlars, apricots, grapes, strawberries: the harvest used to be a feast enjoyed by several generations (grandparents, relatives, children) that gathered and used to share tastes, colours, shapes and above all abundance of food.

The cultural diversity born around local fruit trees is further enhanced by the (though scarce) ethnobotanical literature about them. In intercultural comparisons made about fig in Gargano area, Basilicata and Campania, surprisingly some common uses have been found: awareness of medicinal value of dried fig (it heals cough and colds), ethnobotanical traditions focusing on leaves, wood, latex - especially the effectiveness of latex in soothing toothache. These experiences deserve to be studied in-depth, and they can prove to be interesting for other domains such as domestic – leaves used to 'clean' the dishes (Gargano area, Campania) - in a search for new useful molecules with a lower impact on the environment in comparison with the detergents we have been using for decades. They are peculiar uses, and they help to enrich the biocultural heritage of local fruit's trees varieties, a heritage unfortunately still totally unexplored.

Compared to other Apulia's areas (Murgia, Salento), some ethnobotanical uses characterize a whole territory: figs are food that need to be stored (dried or roasted), or changed into a concentrated product (fig honey, ''cotto di fichi'', ''vincotto'') to be used in winter; few figs were a tasty food for children's breakfast, or food for the poor, or 'bread' for the whole day (Nardone et al. 2012).

It is from these traditions that some of the typical excellent Apulian sweets (dried fig, fig with almonds, ''cartellate'' and ''sassanelli'') were born.

In Gargano area, Basilicata and Campania, the ethnobotanical tradition about figs has several points in common, such as medicinal use and for food, with dried figs being the main ingredient of a 'syrup' that is like a true medicine for colds etc.

In comparison with other realities out of Italy, and focusing on few species, it results that - in Gargano area and in Polimlje region - the morphologic and pomological characteristics and the ripening period are crucial for use modalities, that can anyway change according to a territory, due to ethnic, cultural and environmental reasons. Certainly, species is per se a decisive element, and it determines if a certain wood can be used for crafts, or if certain leaves are suitable as food for livestock. However, it is the morphotypes diversity that - by ensuring a greater availability of fruits - allows the variety of uses that distinguish the territories. Infraspecific diversity's role is clear in the PCA that ordered the pear and fig morphotypes recorded in Gargano: in drying figs, a certain accession of "Dottato" cultivar (Photo 5) is ideal, just like only some local varieties of pear are, while others are better in the fresh consumption. Morphotypes determine the processing to choose, and its economic value. The interesting fact is that every morphotype has played a role within a community's social, economic, domestic, crafts', and cultural space. Given the requirements of modern agriculture (that basically aim to agronomic-commercial purposes, i.e., fruit aspect, resistance to handling and transport), out of 49 pear tree's morphotypes no more than 2 or 3 would have a role today. PCA graph shows that diversity is the foundation of bio-cultural wealth, that has shaped the local economy's socio-economic development.

In conclusion, crucial factors can be recognized in the low levels of use of this extraordinary fruit diversity. Those factors though are unfortunately harming the chances of surviving for said diversity: among the different categories of use, there is some interest (though more and more marginal) in the use for food, limited to a reduced number of morphotypes of few species (orange, pear, cherry, chestnut), in other words, the same fruits that still have an economic value. They are sold in local markets, where occasionally one can find (in winter) "Arancia Bionda del Gargano and Limone Femminello"; or "Pera d'Ischitella, Pera spatone, Ciliegia napolitana" (in summer). There is a new interest for chestnut morphotypes ("Castagna tempestiva, Castagna rimmunnevola, Castagna di Gagnoliddo, Castagna di San Michele, Castagna invernale, Castagna rigata"), the only fruit that can offer the farmers a significant income. Unfortunately, chestnuts are mainly sold to brokers and wholesalers, which get most of the profits.

Finally, there are many abandoned uses in domestic, crafts', medicinal fields, some of them already recorded some years ago (Bianchi, Gallifuoco, 2004), and that used to concern some fruit trees' species; anyway, they are carved in the memory of elderly people: olive oil to treat every burn; olive leaves' decoction (Manfredonia) used for its beneficial effects on liver, or to treat gallstones; olive bark to help healing wounds (San Giovanni Rotondo). They

used to eat prickly pear's fruits to take advantage of their laxative effect, and in Mattinata hemorrhoids used to be treated with decoctions of the fruit's peel and some bark's parts. Last, the sap of the wild grapevine (*Vitis vinifera* L.) was once used to treat eye inflammations (Biscotti et al., 2015); the sap of the cultivated grapevine too was used to rinse eyes affected by inflammations, redness, and conjunctivitis. Now abandoned uses, fig's latex and carob's unripe fruits (*Ceratonia siliqua* L.) were cut in pieces and rubbed on warts to eradicate them (Vico del Gargano, Monte Sant'Angelo), while in Manfredonia it was known the effectiveness of carobs' unripe fruits crushed and applied on wounds. In Mattinata, bitter orange's zests were used to prepare decoctions recommended to prevent heart attacks. In addition, there is a peculiar use found in Sannicandro and Vico del Gargano, where walnut leaves were boiled in decoctions and used to prepare an antiperspirant footbath. Even the use of cultivated dyeing plants has been abandoned since long: in Carpino the walnut fruit's hulls were once used to dye blankets and clothes, while sour black cherries (*Prunus cerasus* L.) were macerated in alcohol to obtain a red dye they added salt to (to fix the colour). These last examples only supply a partial representation of what has been lost of the ethnobotanical heritage linked to local fruit trees, whose current knowledge is yet to be documented, and whose diffusion is very wide, since after all it overlaps with historical rural Italy's.

CONCLUSIONS

The ethnobotanical heritage of Gargano area's local fruits has proved to be especially rich, since it is based on the diversity of 207 morphotypes belonging to 33 species. Our research has found an abundance of ethnobotanical know-hows held by the last farmers, that still use traditional growing methods. They share their knowledge with modern biotechnology's methods, thus supplying tools that can face either changing environmental conditions, and unforeseen human needs. They keep passing on habits - such as the nutritional ones - once based on specific and infraspecific diversity, now on just few varieties of figs, pears, citruses but that are still playing a role (though never studied) on the positive effects of the Mediterranean diet on Gargano communities. Some symbolic and religious values continue being pillars of the local culture; the old species and cultivars do not leave neither fossils nor remains, and the related ethnobotanical knowledge is particularly at risk, as the oral tradition that used to pass them on got interrupted since a long time. The risk is forgetting how to use fruits and plants of the historical Italian agriculture, and we mean nutritional, gastronomic, ecological know-hows the attempt of recovery of biodiversity heritage is based upon. Despite a long abandonment, the resilience of the plants and the bio-cultures linked to them is strong: chestnuts, citruses, pears keep their economic interest in local markets, so that local fruits still have an economic influence that might play an important role in restoring the local economy. The traditional growing

methods alone are not enough, and the only alternative is tourism (not enough either), hence the loss of what remains of rural Italy (villages and hamlets) seems unavoidable. The example of Gargano area highlights the potential of the traditional Italian farming's resources, able to feed and shape a local economy devastated by the rural abandonment following the Northern Italy's industrialization process.

Gargano area's case therefore opens some interesting perspectives in the ethnobotanical research on local fruits; all the traditional fruit species are still to be studied, but first, the infraspecific diversity that best suits these territories is yet to be studied, to record traditions that in the current literature reveal astonishing experiences that can be exploited in nutritional, medicinal, nutraceutical and economic fields.

Declarations

Acknowledgments: A special thanks to numerous farmers, our precious informants

Afferrante Vincenzo, Biscotti Rocco, Bulzacchelli Francesco, Canestrale Nicola, Cannarozzi Raffaele, Cataneo Antonio, Giovanna Troccolo Ciccomascolo Domenico, Cilenti Leonardo, Di Carlo Franco, D'Avolio Matteo, , Di Iasio Livio, Damiani Orazio, D'Errico Filomena, Dattoli Michele, De Filippis Michele, Del Viscio Michele, Della Vella Francesco, Di Monte Nicola, Di Nunzio Paolo, Diurno Giovanni, Fiorentino Nini', Fontana Antonio, Nicola Gentile, architetto Iavicoli Michele, Iacovone Valentino, Isa Mastromatteo, Lanzetta Rosaria, Laganella Tommaso, Manicone Francesco, Maggiano Michele, Munno Fausta, Nardini Cristina, Ognissanti Luigi, Perna Carlo, Ricucci Alfredo, Saggese Dino, Scirpoli Matteo, Sebastiano Florindo, Michele Tomaiuoli, Tavaglione Libero Antonio, Valente Antonio, Valente Enzo, Vergura Giuseppe, Vergura Salvatore, Vitillo Domenico.

Funding: This study was not funded.

Conflicts of Interest: The authors declare no conflicts of interest.

Availability of data and material : All data related to this article are available and transparent.

Code availability: not applicable.

Author Contributions:

Biscotti Nello: Investigation, Conceptualization, (Methodology), Writing.

Bonsanto Daniele: Investigation, Statistical analysis, Writing.

Laghetti Gaetano: Supervised the Ms.

Ethics approval : Compliance with ethical standards.

Consent to participate: All the authors agreed to participate in this trial and contribute to this study.

Consent for publication: Agree to publish.

Bibliography

Abbasi MA, Khan MA, Khan N, Shah MH (2013) Ethnobotanical survey of medicinally important wild edible fruits species used by tribal communities of Lesser Himalayas-Pakistan. J Ethnopharmacol 9;148(2):528-36.

Angelicchio N, Biscotti N, Fiorentino F (1993) Landscape in the Gargano (in Italian). Edizione Schena, Brindisi.

Angelini M (2005) Traditional varieties, local products: words and experiences (in Italian). Ecologist Italiano 3: 230-275.

Anywar G, Oryem-Origa H, Kamatenesi-Mugisha M. (2014) Wild plants used as Nutraceuticals from Nebbi District, Uganda. European Journal of Medicinal Plants 4(6):641-660.

Benítez E, Paredes D, Rodríguez E, Aldana D, González M, Nogales R, Campos M, Moreno B (2017) Bottom-up effects on herbivore-induced plant defences: a case study based on compositional patterns of rhizosphere microbial communities. Scientific Reports volume 7, Article number: 6251.

Bianchi A, Gallifuoco G (2004) Gargano folk pharmacopoea (in italian). Natural 1(32): 54-66.

Biscotti N (2001) Viticultural archaeology in the Gargano National Park (in Italian).Gargano Parco 10.

Biscotti N (2013) Chestnuts and chestnut groves of Gargano (in Italian). In: Biondi E (ed) Quale futuro per il bosco dell'appennino Atti convegno di Fabriano (Ancona, novembre 2007).Artigrafiche Stibu. Urbania 148-152.

Biscotti N (2017) Stories of citrus fruits and landscapes. The citrine of the Gargano (in Italian). MIFAAF, Roma.

Biscotti N, Biondi E (2008) The Ancient Fruits of Gargano. A unique treasure at risk of extinction (in Italian).. Biodiversità italiana. Ministero dell'Ambiente e Tutela del Territorio e del Mare 2.

Biscotti N, Bonsanto D, Viscio GD (2018) The traditional food use of wild vegetables in Apulia (Italy) in the light of Italian ethnobotanical literature. Italian Botanist 5: 1–24. doi: 10.3897/italianbotanist.5.22297

681 Biscotti N, Del Viscio G, Bonsanto D, Casavecchia S, Biondi E. (2015) Investigations on wild populations of *Vitis*
682 *vinifera* L. found in the Gargano National Park (Foggia), Puglia (in Italian). Informatore Botanico Italiano, 47(2)
683 179-186.
684 Biscotti N, Guidi S, Forconi V, Piotto B (2010) Forgotten fruits and recovered biodiversity (in Italian). Quaderni
685 natura e biodiversità. ISPRA, Roma
686 Biscotti N, Pieroni A (2015) The hidden Mediterranean diet: wild vegetables traditionally gathered and consumed in
687 the Gargano area, Apulia, SE Italy. Acta Societatis Botanicorum Poloniae 84(3): 327–388.
688 https://doi.org/10.5586/asbp.2015.031
689 Biscotti N., Bonsanto D. (2020) Grassy ways. Wild herbs in Mediterranean food biocultures (in Italian). Centro
690 Grafico, Foggia.
691 Bošnjaković D, Ognjanov V, Ljubojević M, Barać G, Predojević M, Mladenović E, Čukanović J (2012) Biodiversity
692 of wild fruit species of Serbia. - Genetika, Vol 44, No. 1, 81 - 90.
693 Tallei TT, Pelealu JJ, Pollo HN, Pollo GAV, Akroman AA, Effendi Y, Karuniawan A, Rahimah S, Idroes R (2019)
694 Edible local fruits, medicinal use of local fruits. Journal Data in Brief.
695 Brazanti E, Sansavini S (1964) Importance and diffusion of apple and pero cultivars in Italy (in Italian). Inf Agr.
696 Edagricole, Bologna.
697 Caneva G, Pieroni A, Guarrera P.M (2013) Ethnobotany. Preservation of a cultural heritage as a resource for
698 sustainable development (in Italian). Edipuglia. Bari.
699 Cheikhyoussef A, Embashu W (2013) Ethnobotanical knowledge on indigenous fruits in Ohangwena and Oshikoto
700 regions in Northern Namibia. Journal of ethnobiology and ethnomedicine, 9-34.
701 De Leonardis P. (1858) Monograph of the Gargano promontory (in Italian). Napoli.
702 Del Viscio G (1900) Cultivation, diseases and trade in citrus fruits (in Italian). Stab. Tip. P. Losasso, Bari.
703 Deshmukh, BS, Waghmode A (2011) Role of wild edible fruits as a food resource: Traditional Knowledge.
704 International Journal of Pharmacy and Life Sciences 2(7):919–924.
705 Etkin NL (1996) Medicinal cuisines: diet and ethnopharmacology. Int J Pharmacogen 34:313-326.
706 Fanelli L (1939) Apulian varieties of almonds (in Italian). Ed. Flavia, Bari-Roma.
707 FAO-Coldiretti (2019) 1971census of agriculture (in Italian). ISTAT.
708 Ferraro C (1996) Giorgio Gallesio (1772 - 1839). Life, works, writings and unpublished documents (in Italian).
709 Accademia dei Georgofili, Firenze.

710 Ferraro C (2003) The correspondence Gallesio-Littardi, 1811-1839 (in Italian). Centro per la promozione degli
711 studi su Giorgio Gallesio, Prasco.
712 Fideghelli C (2018) Atlas of the native fruit trees of Italy (in Italian) .MIPAAF, Roma.
713 Gallesio G (1811) Traité du Citrus.Libr. L. Fantin, Paris.
714 Gallesio G (1817-1839) Pomona Italiana, i.e. Treaty of fruit trees (in Italian). Nic. Capurro, Pisa.
715 Hadjichambis Ach, Paraskeva-Hadjichambi D, Della A, Giusti ME, De Pasquale C, Lenzarini C, Censorii E, Reyes
716 Gonzales-Tejero M, Sanchez-Rojas CP,.Ramiro-Gutierrez JM, Skoula M, Johnson C, Sarpaki A, Hmamouchi M,
717 Jorhi S, El-Demerdash M, El-Zayat M, Pieroni A (2008) Wild and semi-domesticated food plant consumption in
718 seven circum-Mediterranean areas. International Journal of Food Sciences and Nutrition 59(5): 383-414.
719 Idolo M, Motti R, Mazzoleni S (2010) Ethnobotanical and phytomedicinal knowledge in a long-history protected
720 area, the Abruzzo, Lazio and Molise National Park (Italian Apennines). Journal of Ethnopharmacology 127- 379–
721 395.
722 Kaur R, Arya V (2012) Ethnomedicinal and Phytochemical Perspectives of *Pyrus communis* Linn. J Pharmacogn
723 Phytochem 1(2):14–19.
724 Kidane B, Van Der Maesen LJG, Van Andel T, Asfaw Z, Sosef MSM (2014) Ethnobotany of Wild and Semi-Wild
725 Edible Fruit. Species used by Maale and Ari Ethnic Communities in Southern Ethiopia. Etnobotanyjour-
726 nal.org./vol.12/i1547-3465-12455.pdf.
727 Le Lectier P (1628) Catalogue des arbres cultivez dans le verger et plan du Sieur Le Lectier: procureur du Roy à
728 Orléans. Privately Printed.
729 Leroy A (1873) Dictionnaire de Pomologie contenant l'Histoire, la Description, la Figure des Fruit anciens et des
730 Fruits modernes les plus généralement connus et culktivés. Chez l'Auteur Angers,Paris.
731 Libetta G (1833) Quick look at the different products of Monte Gargano (in Italian). Atti Società Economica di
732 Capitanata, Foggia.
733 Mattalia G, Sõukand R, Corvo P, Pieroni A (2021) “We Became Rich and We Lost Everything”: Ethnobotany of
734 Remote Mountain Villages of Abruzzo and Molise, Central Italy. Human Ecology 123.
735 Mattioli PA (1554-1568) The Speeches... in Pedacio Dioscoride Anazarbeo's six books of Medicinal Matter (in
736 Italian). Seconda edizione ed. Appresso incenso Valgrisi, Venetia.
737 Mautone M, De Martino L, De Feo V (2019) Ethnobotanical research in Cava de’ Tirreni area, Southern Italy.
738 Journal of Ethnobiology and Ethnomedicine 15: 50.

739 Motti R, Motti P (2017) An Ethnobotanical Survey of Useful Plants in the Agro Nocerino Sarnese (Campania,
740 Southern Italy). Hum Ecol https://doi.org/10.1007/s10745-017-9946-x

741 Nardini G (1914) Agriculture and farmers of Gargano (in Italian).Tesi di Laurea, pubblicata dalla Facoltà di Agraria
742 di Portici, Napoli.

743 Nardone D, Di Tonno NM, Lamusta S (2012) Beans and faveles. The plants of peninsular Puglia in the dialect
744 voices in use and tradition: aphorisms, ways of saying, drugs, cosmetics (in Italian). Centro di Studi Salenti, Lecce.

745 Naska A, Trichopoulou A (2014) Back to the future: the Mediterranean diet paradigm. Nutr Metab Cardiovasc Dis
746 24:216–219.

747 Oksanen J, Guillaume Blanchet F, Kindt R, Legendre P, Minchin PR, O'Hara RB, Simpson LG, Solymos P, Stevens
748 MHH, Wagner H (2015) Vegan: community ecology package. R package vegan, vers. 2.2-1.

749 Palasciano M, Ferrara G, Lipari E, Mazzeo A, Pacucci C, Todisco MC, Losciale P, Gaeta L, Minonne F, Biscotti N,
750 Del Viscio G, Turco A, Venerito P (2018) Atlas of the ancient fruits of Puglia (in Italian).Progetti integrati per la
751 Biodiversità, Recupero del Germoplasma Frutticolo Pugliese (Re.Ge.Fru.P.). Regione Puglia. Digita Stampa,
752 Locorotondo (BA).

753 Pantanelli E (1929) Convenience and address of dry fruit growing (in Italian). Economia della Capitanata, Foggia.

754 Pantanelli E (1930) The future of fruit growing in the Apulian region (in Italian). Propaganda agraria, Bari.

755 Piccinin L (2000) Role of agricultural activity in landscape evolution (in Italian). Agricoltura e paesaggio 3:119-136.

756 Pieroni A (2000) Medicinal plants and food medicines in the folk traditions of the upper Lucca Province, Italy. J
757 Ethnopharmacol 70:235- 273.

758 Pieroni A, Quave CL (2006) Functional Foods or Food-Medi-cines? on the Consumption of Wild Plants among
759 Albanians and Southern Italians in Lucania. In Eating and Healing: Traditional Food as Medicine, edited by Pieroni
760 and L. L. Price, 101–129. NY: Ha- worth Press, Binghamton.

761 R Development Core Team (2015) R: A language and environment for statistical computing. R Foundation for
762 Statistical Computing, Vienna.

763 Risso JA, Poiteau A (1818) Histoire Naturelle des Orangers. Herissant de Doux, Paris.

764 Salerno G, Stinca A, Giaccone M, Scognamilio P, Basile B (2017) Ethnobotanical use of fig (Ficus carica L.) in
765 southern Italy. Acta Hortic. 1173. DOI 10.17660/ActaHortic.2017.1173.64

766 Salma I, Khadijah A, Raziah ML, Masrom H, Mohd NA, Azuan A, Abd. Rahman M (2010) Traditional use of
767 underutilized fruit species for medicines and healthcare. 2nd National Agrobiodiversity Conference, Kuala Lumpur.
768 11-13 May.

769 Saric´-Kundalic´ B, Dobes˘ C, Klatte-Asselmeyer V, Saukel J (2010) Ethnobotanical study on medicinal use of wild
770 and cultivated plants in middle, south and west Bosnia and Herzegovina. J Ethnopharmacol 131:33–55.

771 Savic´A, Jaric´S, Dajic´Z, Dajic´-Stevanovic´Z, Duletic´-Lausevic´S (2019) Ethnobotanical study and traditional use
772 of autochthonouspear varieties (*Pyrus communis* L.) in southwest Serbia (Polimlje). Genet Resour Crop Evol. DOI:
773 10.1007/s10722-018-00734-w

774 Sharma PI, Kantha C, Semwal SC, Goswani N (2017) Wild Fruits of Uttarakhand (India): Ethnobotanical and
775 Medicinal Uses. International Journal of Complementary & Alternative Medicine 8:3.

776 Signorini MA, Lombardini C, Bruschi P, Vivona L (2007) Ethnobotanic knowledge and traditional knowledge in the
777 territory of San Miniato (Pisa) (in Italian). Atti Soc Tosc Sci Nat, Mem Serie B 114: 65-83.

778 Suwardi AB, Navia ZI, Harmawan T, Mukhtar E (2020) Ethnobotany and conservation of indigenous edible fruit
779 plants in South Aceh, Indonesia. Biodiversitas Journal of Biological Diversity 21(5):1850-1860. DOI:
780 10.13057/biodiv/d210511.

781 Tallei TE, Johanis Jullian Pelealu , Hard Napoleon Pollo, Gracia Alice Victoria Pollo, Ahmad Akroman Adam, Yunus
782 Effendi, Agung Karuniawan, Souvia Rahimah, Rinaldi Idroes, 2019 - Edible local fruits, medicinal use of local
783 fruits. Journal Data in Brief Volume 27, 104681.

784 Thomas O (1876) Description et culture de plus de 5000 varietés de fruits.Ed. E. Réau, Nancy.

785 Vocino M (1914) The spur of Italy (in Italian). G. Scotti casa editrice, Roma.

786

787 **Tables**

788 **Tab. 1.** Ethnobotanical diversity and uses of traditional Gargano fruit growing. For categories of used and use levels
789 see materials and methods.

790 **Tab. 2.** Fruit species breakdown by category of use (see materials and methods).

791 **Tab. 3.** Cultural comparisons between Gargano area, Basilicata and Campania about ethnobotanical uses of fig
792 (*Ficus carica*).

793 **Tab. 4.** Levels of use by category (see materials and methods).

794 **Tab. 5 .** Local fruits' most relevant ethnobotanical uses in Gargano area.

795

796 **Figures**

797 **Fig. 1**. Breakdown (in percentage) of Gargano area's traditional fruit trees by botanical family (A), genus (B),
798 infraspecific diversity (C), and pomological value (D).

799 **Fig. 2**. Breakdown (in percentage) of ripening period and distribution of traditional fruit trees (A) in Gargano area.

800 **Fig. 3**. Breakdown (in percentage) of fruit trees' used parts.

801 **Fig. 4.** Breakdown (in percentage) of modes of use by categories: A. (Food); DART. (Domestic/crafts); ASP.
802 (Agroforestry); E. (Economic); RSR. (Ritual-symbolic-religious); M. (Medicinal); L. (Recreational).

803 **Fig. 5.** Comparison of pears' ripening period (in percentage) between Gargano Promontory (Apulia) and Polimlje
804 region (Serbia).

805 **Fig. 6**. Comparison between pears' food uses in Gargano area (left) and Polimlje region (Serbia) (right).

806 **Fig. 7**. PCA analysis of pear and fig trees' morphotype diversity in Gargano area: the 8 variables (red arrows)
807 ordering their morphotypes as per the way of use are evident. In the upper left and right boxes, the most important
808 variables are (left) 'Fresh consumption' (Food category), and (right) 'Animal nutrition' (Agroforestry category) and
809 'Firewood and food cooking' (Domestic/crafts category).

810

811 **Photos**

812 **Photo 1.** Winter pear insert ("Pera Spatone d'inverno") in front of a window. Photo by Biscotti, 2015.

813 **Photo 2.** Insert of a grape's local cultivar ("Nardobello"). Photo by Biscotti, 2012.

814 **Photo 3.** Statue of Saint Valentine decorated with citrus. Chiesa Matrice, Vico del Gargano. Photo by Biscotti, 2018.

815 **Photo 4.** 'Stocking of the dead' filled with walnuts, dried figs, citrus, and pomegranate. Manfredonia. Photo by
816 Sipontino.net.

817 **Photo 5.** Figs sundrying ("Dottato" cultivar's accession) on ''grate'' (trellis). Carpino. Photo by Biscotti, 2018.

Figures

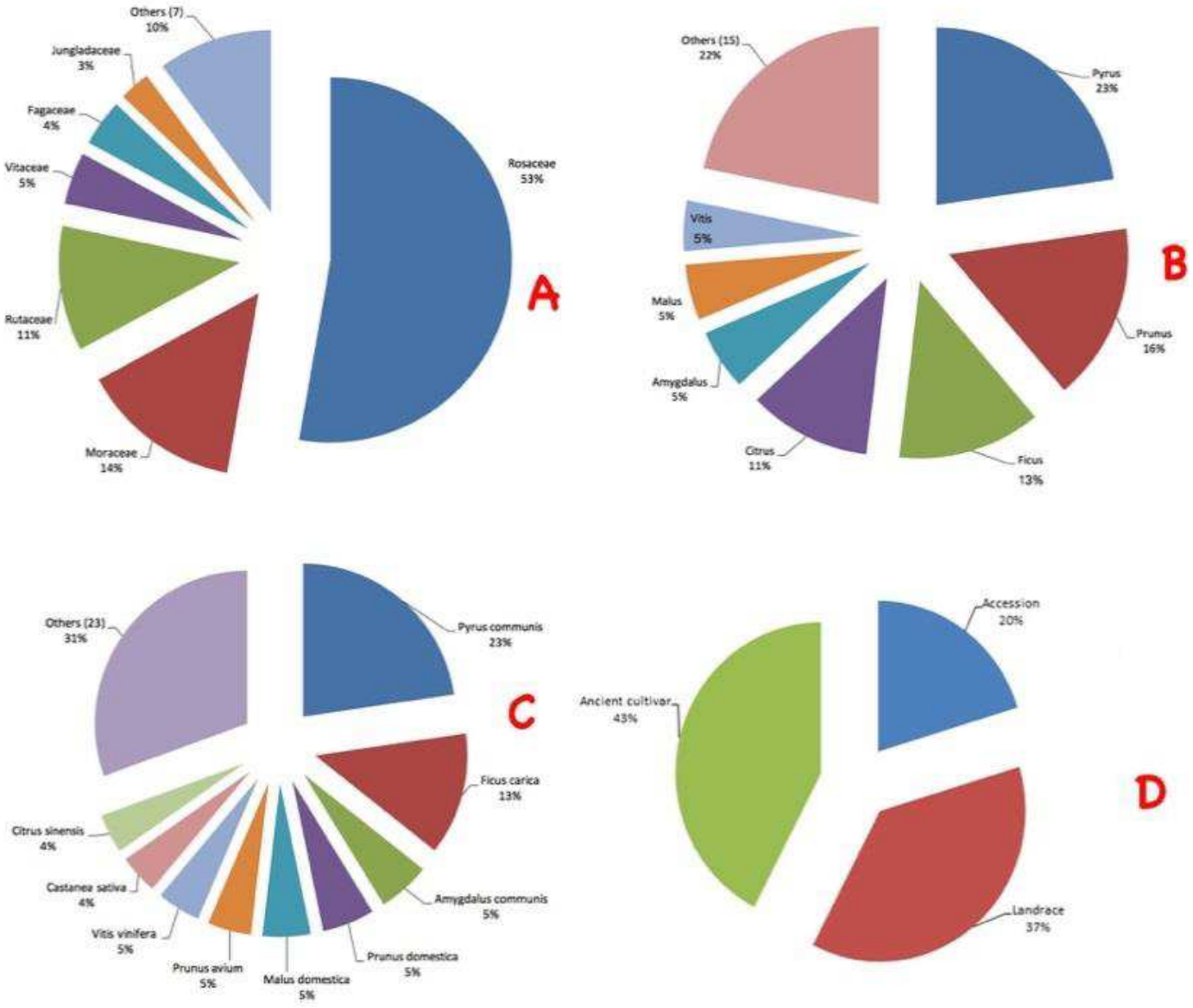

Figure 1

Breakdown (in percentage) of Gargano area's traditional fruit trees by botanical family (A), genus (B), infraspecific diversity (C), and pomological value (D).

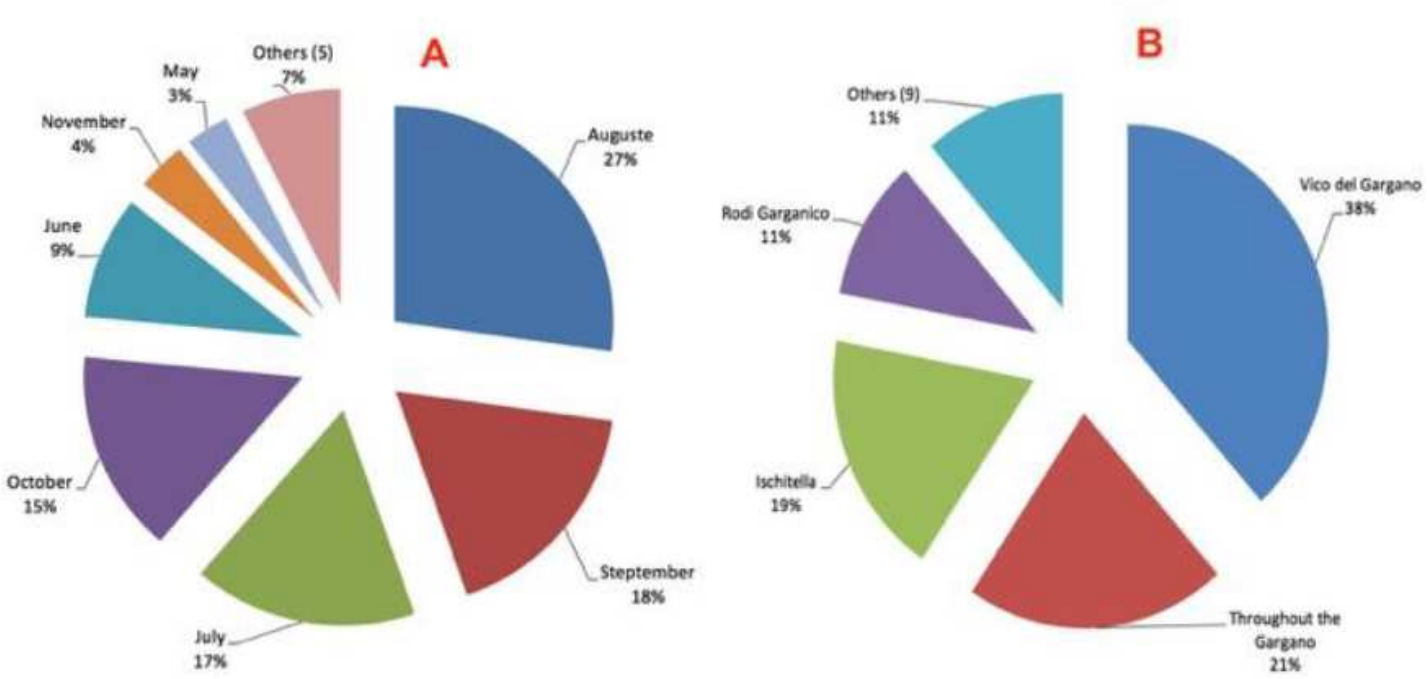

Figure 2

Breakdown (in percentage) of ripening period and distribution of traditional fruit trees (A) in Gargano area.

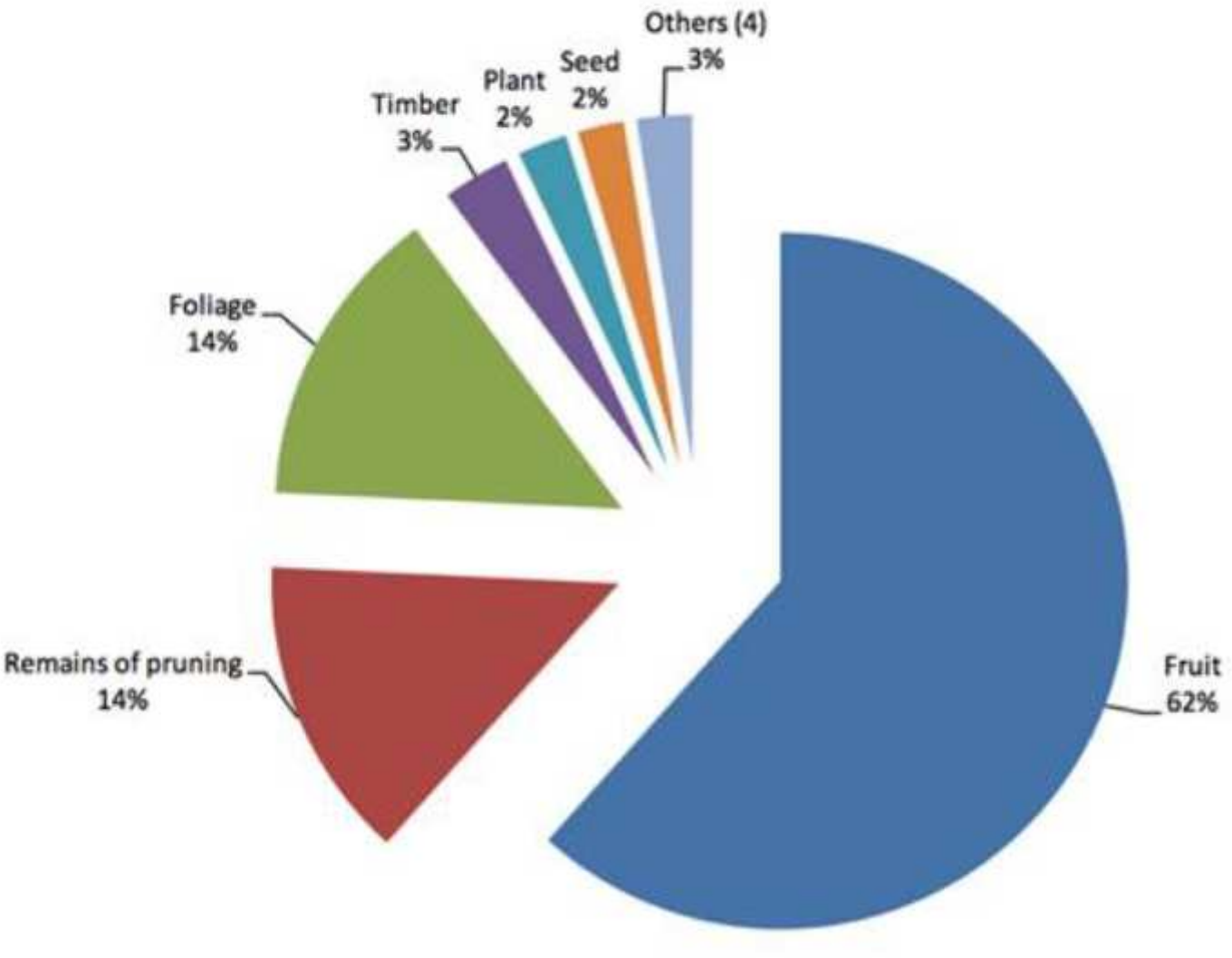

Figure 3

Breakdown (in percentage) of fruit trees' used parts.

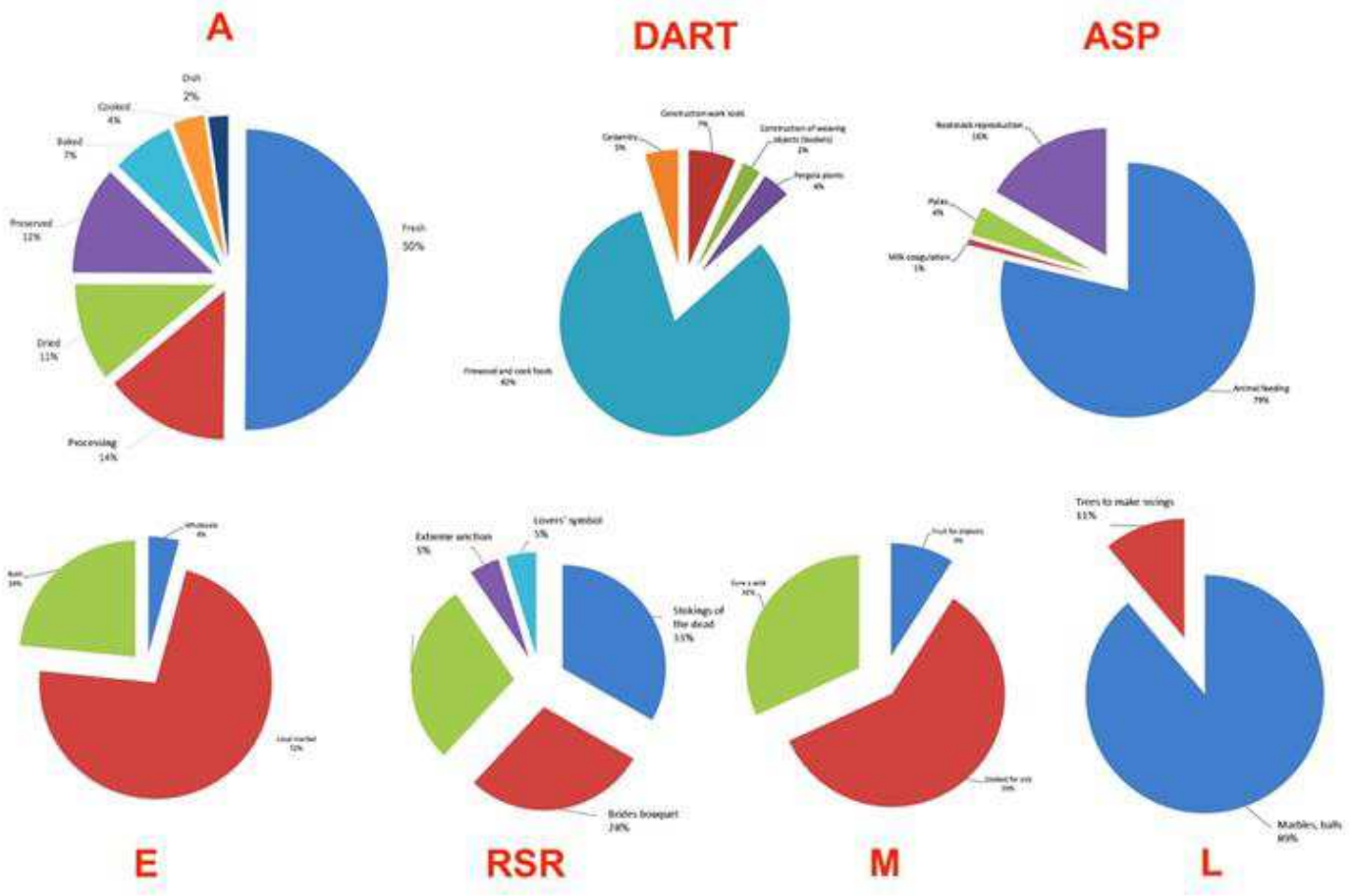

Figure 4

Breakdown (in percentage) of modes of use by categories: A. (Food); DART. (Domestic/crafts); ASP. (Agroforestry); E. (Economic); RSR. (Ritual-symbolic-religious); M. (Medicinal); L. (Recreational).

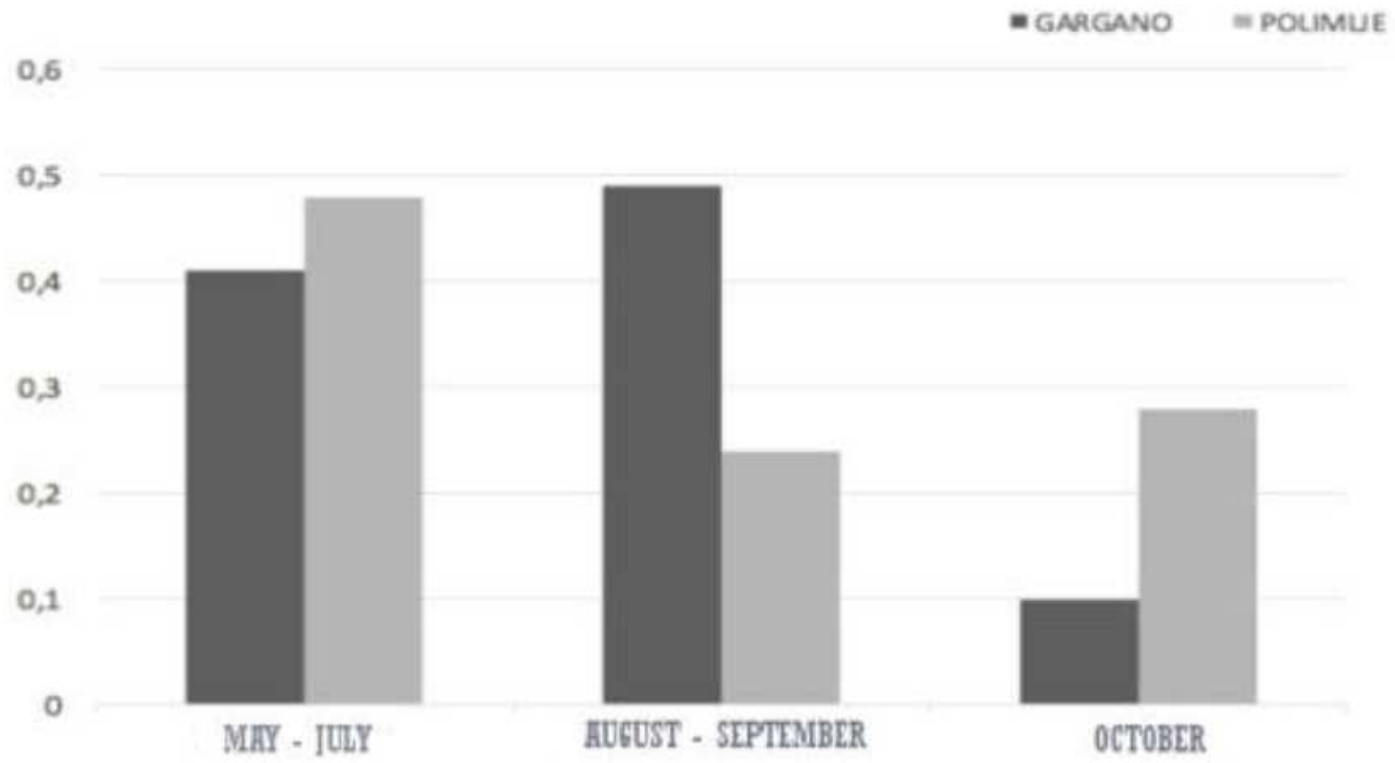

Figure 5

Comparison of pears' ripening period (in percentage) between Gargano Promontory (Apulia) and Polimlje region (Serbia).

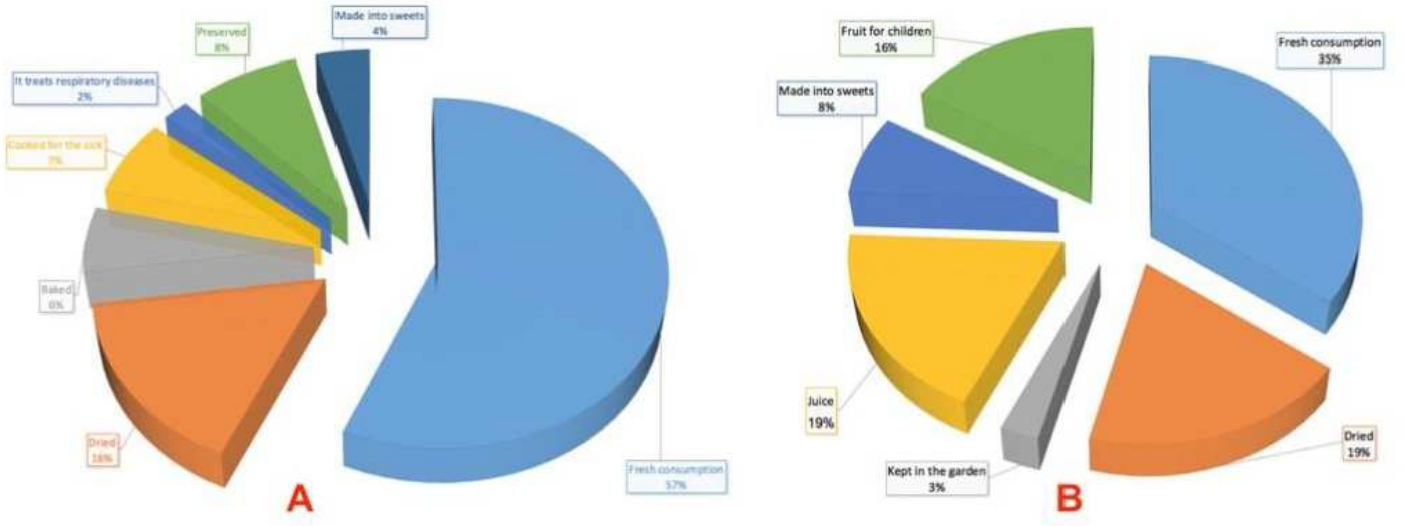

Figure 6

Comparison between pears' food uses in Gargano area (left) and Polimlje region (Serbia) (right).

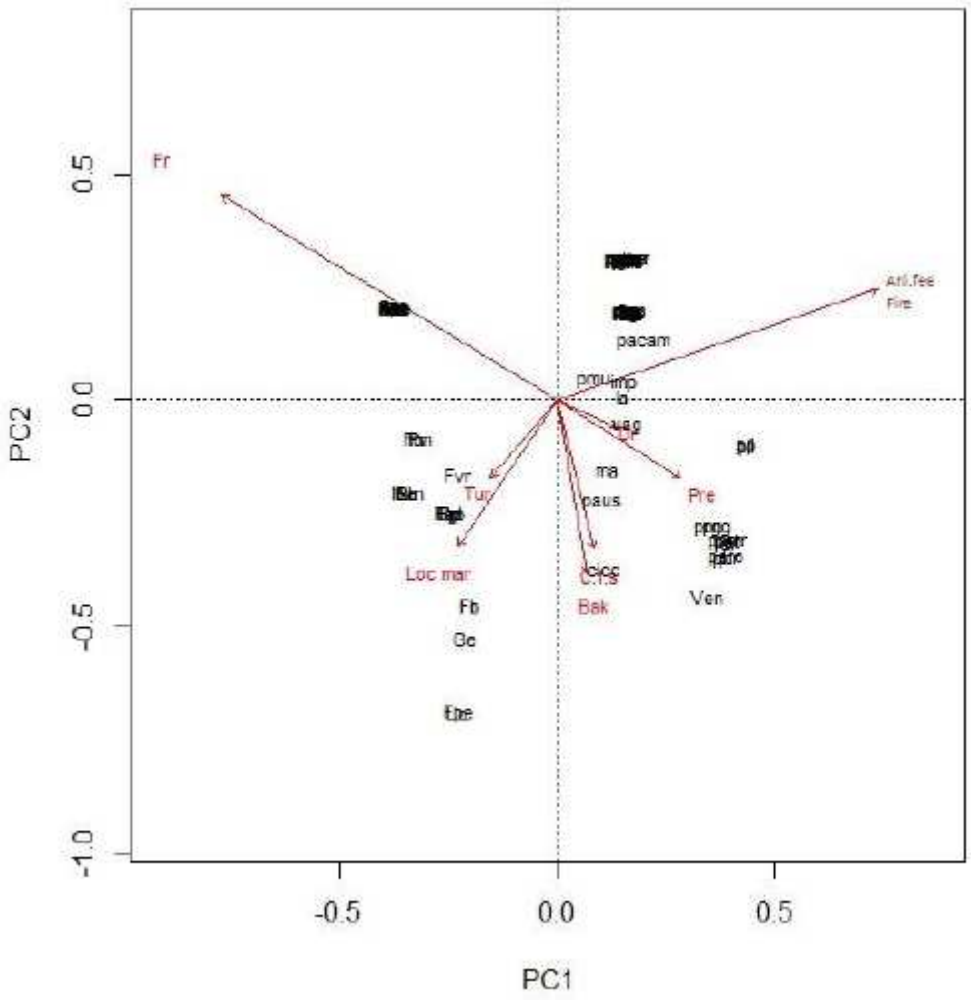

Figure 7

PCA analysis of pear and fig trees' morphotype diversity in Gargano area: the 8 variables (red arrows) ordering their morphotypes as per the way of use are evident. In the upper left and right boxes, the most important variables are (left) 'Fresh consumption' (Food category), and (right) 'Animal nutrition' (Agroforestry category) and 'Firewood and food cooking' (Domestic/crafts category).

Figure 8

Photo 1. Winter pear insert (Pera Spatone d’inverno) in front of a window. Photo by Biscotti, 2015.

Figure 9

Photo 2. Insert of a grape's local cultivar (Nardobello). Photo by Biscotti, 2012.

Figure 10

Photo 3. Statue of Saint Valentine decorated with citrus. Chiesa Matrice, Vico del Gargano. Photo by Biscotti, 2018.

Figure 11

Photo 4. Stocking of the dead’ filled with walnuts, dried figs, citrus, and pomegranate. Manfredonia. Photo by Sipontino.net.

Figure 12

Photo 5. Figs sundrying (“Dottato” cultivar’s accession) on ‘grate’ (trellis). Carpino. Photo by Biscotti, 2018.

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- Fig.S10.jpg
- Supplementarydidascalie.dotx
- Fig.S100.jpg
- Fig.S101.jpg
- Fig.S102.jpg
- Fig.S103.jpg

- Fig.S104.jpg
- Fig.S105.jpg
- Fig.S106.jpg
- Fig.S107.jpg
- Fig.S108.jpg
- Fig.S109.jpg
- Fig.S1.png
- Fig.S111.jpg
- Fig.S112.jpg
- Fig.S113.jpg
- Fig.S114.jpg
- Fig.S115.jpg
- Fig.S116.jpg
- Fig.S117.jpg
- Fig.S118.jpg
- Fig.S119.jpg
- Fig.S110.jpg
- Fig.S2.png
- Fig.S121.jpg
- Fig.S122.jpg
- Fig.S123.jpg
- Fig.S124.jpg
- Fig.S125.jpg
- Fig.S126.jpg
- Fig.S120.jpg
- Fig.S128.jpg
- Fig.S129.jpg
- Fig.S127.jpg
- Fig.S3.jpg
- Fig.S131.jpg
- Fig.S130.jpg
- Fig.S4.jpg
- Fig.S5.jpg
- Fig.S6.jpg

- Fig.S7.jpg
- Fig.S8.jpg
- Fig.S9.jpg
- Fig.S11.jpg
- Fig.S12.jpg
- Fig.S14.jpg
- Fig.S15.jpg
- Fig.S16.jpg
- Fig.S17.jpg
- Fig.S18.jpg
- Fig.S19.jpg
- Fig.S20.jpg
- Fig.S21.jpg
- Fig.S22.jpg
- Fig.S23.jpg
- Fig.S24.jpg
- Fig.S25.jpg
- Fig.S26.jpg
- Fig.S27.jpg
- Fig.S28.jpg
- Fig.S29.jpg
- Fig.S30.jpg
- Fig.S31.jpg
- Fig.S32.jpg
- Fig.S33.jpg
- Fig.S34.jpg
- Fig.S35.jpg
- Fig.S36.jpg
- Fig.S37.jpg
- Fig.S38.jpg
- Fig.S39.jpg
- Fig.S40.jpg
- Fig.S41.jpg
- Fig.S42.jpg

- Fig.S43.jpg
- Fig.S44.jpg
- Fig.S45.jpg
- Fig.S46.jpg
- Fig.S47.jpg
- Fig.S48.jpg
- Fig.S49.jpg
- Fig.S50.jpg
- Fig.S51.jpg
- Fig.S52.jpg
- Fig.S53.jpg
- Fig.S54.jpg
- Fig.S55.jpg
- Fig.S56.jpg
- Fig.S57.jpg
- Fig.S58.jpg
- Fig.S59.jpg
- Fig.S60.jpg
- Fig.S61.jpg
- Fig.S62.jpg
- Fig.S63.jpg
- Fig.S64.jpg
- Fig.S65.jpg
- Fig.S66.jpg
- Fig.S67.jpg
- Fig.S68.jpg
- Fig.S69.jpg
- Fig.S70.jpg
- Fig.S71.jpg
- Fig.S72.jpg
- Fig.S73.jpg
- Fig.S74.jpg
- Fig.S75.jpg
- Fig.S76.jpg

- Fig.S77.jpg
- Fig.S78.jpg
- Fig.S79.jpg
- Fig.S80.jpg
- Fig.S81.jpg
- Fig.S82.jpg
- Fig.S83.jpg
- Fig.S84.jpg
- Fig.S85.jpg
- Fig.S86.jpg
- Fig.S87.jpg
- Fig.S88.jpg
- Fig.S89.jpg
- Fig.S90.jpg
- Fig.S91.jpg
- Fig.S92.jpg
- Fig.S93.jpg
- Fig.S94.jpg
- Fig.S95.jpg
- Fig.S96.jpg
- Fig.S97.jpg
- Fig.S98.jpg
- Fig.S99.jpg
- Tables.pdf