

Article

# “Language Is the Place from Where the World Is Seen”—On the Gender of Trees, Fruit Trees and Edible Fruits in Portuguese and in Other Latin-Derived Languages

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**Abstract:** Trees have always been important as natural entities carrying a strong symbolic and metaphorical weight, not to mention their practical uses. Therefore, words and their gender, used to name natural entities as important as trees and particularly fruit-trees and their fruits, are also important. Starting from the finding that Portuguese and Mirandese, the second official spoken language of Portugal, are Latin-derived languages in which ‘tree’ has feminine gender like it had in Latin, we investigated (1) the gender of ‘tree’ in Portuguese from the 10th to the 17th centuries sampling legal, literary, historical, scholar (mostly grammars and dictionaries), and religious manuscripts or printed sources; (2) the presumed variation in the gender of ‘tree’ during a short period in the 16th and 17th century; (3) the likely causes for that variation, which we found to be mostly due to typographic constraints and to composers’ errors; (4) the gender distribution of fruit trees and fruits produced by fruit trees in Latin and in twelve Latin-derived languages. Portuguese, together with the intimately related Mirandese and Barranquenho, forms a cluster distinct from all other Latin-derived languages in its use of the feminine in the names of fruit trees and fruits, and in the gender agreement between them.

**Keywords:** *árvore*; edible fruits; gender; Latin-derived languages; Portuguese; tree

## 1. Introduction

The title of this article opens with the translation of the first part of a statement made by the Portuguese novelist and essayist Vergílio Ferreira when receiving the Europalia Literary Prize of the European Communities almost twenty five years ago: “Language is the place from where the World is seen and where we are thought and sensitivity”<sup>1</sup>.

According to Ferdinand de Saussure [2] (p. 100), to William Whitney almost fifty years before de Saussure ([3] (p. 32); [4] (p. 19)), and Antoine Arnauld and Pierre Nicole about two and half centuries before Whitney ([5] (p. 39))<sup>2</sup>, linguistic signs, or words, are arbitrary. Nevertheless, such presumed arbitrariness is not always absolute because symbols, onomatopoeias and interjections are admittedly complete or partial exceptions [2] (pp. 101–103).

<sup>1</sup> Vergílio Ferreira (1916–1996) made this statement (“Uma língua é o lugar donde se vê o mundo e de ser nela pensamento e sensibilidade”) in the beginning of the acceptance speech of the prize Europalia in Brussels, 9 October 1991. The full speech, entitled “À voz do Mar” (“To the voice of Sea”) was printed posthumously and can be found in [1] (pp. 83–89).

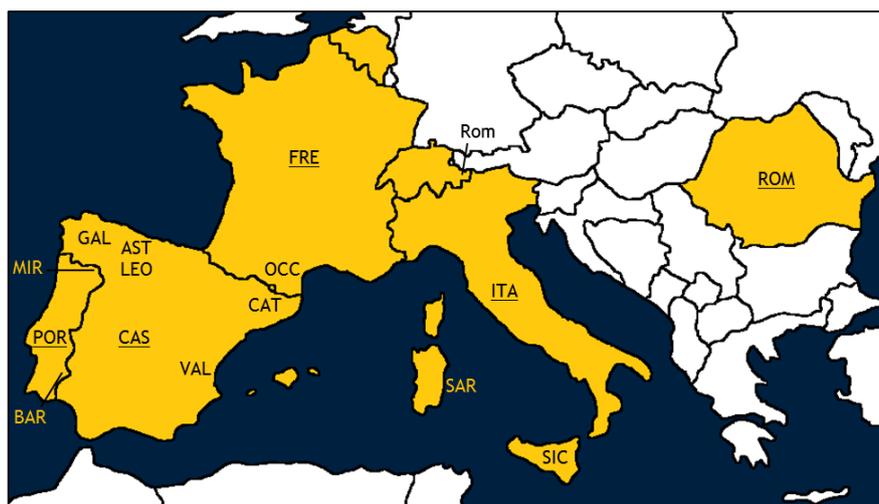
<sup>2</sup> Despite having been printed for the first time in 1662 the manuscript of the usually called *Logic of Port-Royal* certainly preceded the print by some years. Reference in the manuscript to arbitrariness and its discussion, which were retained in the five printed editions issued during authors’ life, can be found in [6] (p. 6).

Incomplete, relative arbitrariness is also to be found in so called relatively motivated signs [2] (pp. 180–181). Names, and especially toponyms, also lack the presumed arbitrariness of words because they are attributed to associate a specific meaning to the entity being named [7].

Adding to the preceding statements, experiments done by Wolfgang Köhler [8] (p. 224) and later by Martin Lindauer using *takete* or *taketa* and *maluma* [9], or by Vilayanur Ramachandran and Edward Hubbard using *kiki* and *bouba* [10], all of them on word-matching to contrasting shapes, and by Brent Berlin on word-matching Huambisa (north central Peru) names of birds and fishes by subjects ignorant of Huambisa [11], suggest that the arbitrariness of words might be much more reduced than previously stated.

However, before and beyond the debate on the arbitrariness of words, for a long time, the main role of discourse was to give names to things. By giving names, and naming the being of things, names have the same realness as the things they named [12] (pp. 136, 180). Therefore, words used to name natural entities as important as trees and particularly to name fruit-trees and their fruits are undoubtedly also important. The same can be said for the gender attributed to them.

In this article, which extends shorter and less developed versions previously published in Portuguese [13,14], we will start by briefly illustrating the importance and significance of tree and trees, following which we will deal with gender in Portuguese nouns as well as with the way the gender of ‘tree’ will be presented throughout the article.



**Figure 1.** Location of Latin-derived languages (main languages underlined) in Europe considered in relation with the gender of tree, fruit-trees and their fruits. AST: Asturian; BAR: Barranquenho; CAS: Castilian; CAT: Catalan; FRE: French; GAL: Galician; ITA: Italian; LEO: Leonese; MIR: Mirandese; OCC: Occitan; POR: Portuguese; ROM: Romanian; Rom: Romansh; SAR: Sardinian; SIC: Sicilian; VAL: Valencian. We will use Castilian instead of Spanish although the latter is probably more frequent in the English-speaking world, in order to clearly distinguish it from other Spanish languages and because the Spanish Constitution itself [15] (article 3, no. 1) considers that Castilian is the official Spanish language of Spain. Barranquenho is a contact language strongly influenced by Castilian and still used today in the county of Barrancos (Portugal) despite not having been recognized by the Portuguese state. It was first studied in the first half of 20th century, the founding study being authored by José Leite de Vasconcellos [16]. For an historical and linguistic introduction in English see [17], Chapter 8, “Barranquenho”. Mirandese is a language used in northeastern Portugal essentially in the county of Miranda do Douro. Like Barranquenho it was first studied by José Leite de Vasconcellos [18] but contrary to Barranquenho it is officially recognized as a language since 29 January 1999 [19]. Mirandese is an Astur-Leonese derived language and the only language not rooted in the Galician-Portuguese still in use in Portugal. Nevertheless, it shares with Portuguese the feminine gender for tree in contrast with Asturian and Leonese with which it shares a common ancestry. See also [20,21].

Thereafter we will (1) examine the gender attributed to the word ‘tree’ in Latin-derived languages<sup>3</sup> (Figure 1); (2) exemplify the variation of gender of ‘tree’ in Portuguese that is said to have occurred during a relatively short period in the second half of the 16th century spanning into the beginning of the 17th century; (3) discuss such variation at the light of typographic constraints and compositors’ errors; (4) compare the gender attributed in Portuguese and in other Latin-derived languages to individual fruit trees and to the edible fruits they produce.

## 2. Importance and Significance of Trees

Trees were and still are important as commodities, raw materials, and food sources for people in addition to their role in ecosystems integrity and nutrient cycling. Boats, ships and houses were, and in many cases still are, made from trees. The same can be said for furniture, utensils and tools, boxes and packing cases, music instruments, sport instruments, religious and profane sculptures, painting surfaces, stoppers, paper pulp, paper and cardboard, not to mention the widespread use of trees as fuel.

Parallel to those immediately practical uses and roles, trees were and still are present in mythologies and religions, where they are themselves sacred,<sup>4</sup> in tales,<sup>5</sup> and in metaphors and in two-dimensional representations of information and knowledge, frequently intermingling all of these features into powerful and easily recognizable objects, adding to the visual fascination they provoke.

To illustrate the wide presence of trees in myths and religions around the world we will briefly refer to a few cases besides the frequently quoted “the tree of life also in the midst of the garden, and the tree of the knowledge of good and evil” from *Genesis* [24] (p. 2).

The favorite trick of the hairy and “large blood-shot eyes” Sasabonsam, of Ashanti beliefs (Ghana, Côte d’Ivoire, and Togo), was to sit in high branches of trees and entangle unwary hunters with his long legs. Uaica, a sort of primordial patron of medicine of the Juruna living along Xingu river (Brazil), one day came across a lot of dead animals under a large tree, felt dizzy, fell in the ground and in the ensuing sleep listened to what Sinaa, the jaguar ancestor of the Juruna wanted to tell him. He later made a beverage from the bark of the tree from which he acquired many powers, and in the end he becomes a powerful medicine-man that could cure with the touch of his hands alone. In Hawaii, there was a tree that grew over the “waters of generation” and held the waters together with its roots, otherwise water would submerge all valleys. Yggdrasil, the cosmic ash-tree of ancient Germanic people, had branches reaching and covering all worlds and piercing through heavens, with three powerful roots, one reaching Giant land, other being gnawed from below by the dragon Nidhoggr, the last embedded in heaven with the judgement site of gods beneath it. The fig-tree under which Buddha sat in meditation until his quest was completed also sheltered in its roots the serpent Muchalinda which protected him with his gigantic body from a world-shaking tempest [25].

Finally, the Pārijāta tree (also known as the tree-of-sorrow, *Nyctanthes arbor-tristis* L.), the third entity to spring from the sea of milk churned by the gods and the Daityas and Dānavas, is a celestial tree that was the delight of nymphs of heaven and that perfumes the entire world with the scent of its blossoming flowers [26] (pp. 75–76).

Metaphorical trees have also been and still are everywhere, representing all kinds of complex issues and relationships, including trees of life, family and genealogic trees, consanguinity trees and trees of affinity, trees of virtues and trees of vices, trees of interdictions, of substitutions, of exceptions and of fiefs, Porphyry trees, trees of music, of science and of knowledge<sup>6</sup> or more recently trees of

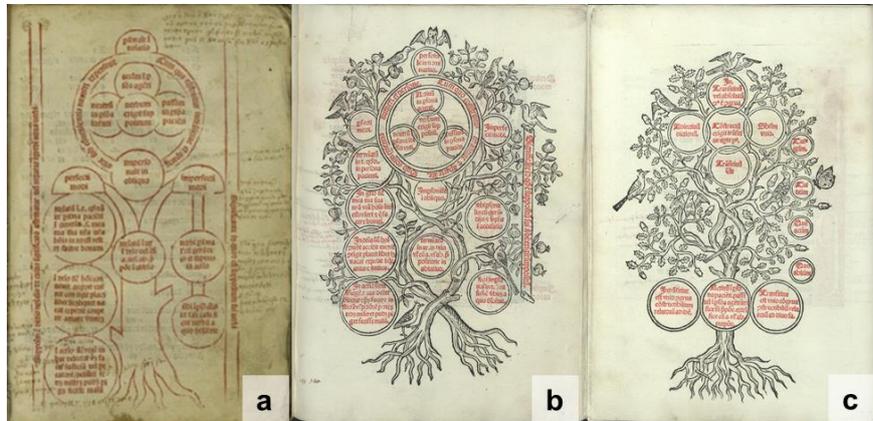
<sup>3</sup> We will use “languages” in a wide sense, encompassing languages and dialects. Similarly, we will use Latin-derived languages or just Latin languages instead of using the more technical “Romance languages”.

<sup>4</sup> See for example chapters 21–24 in [22].

<sup>5</sup> All or almost all characters appearing in Brothers Grimm’s tales go to forests that have the power to change lives and destinies, and have their fate decided there. See [23].

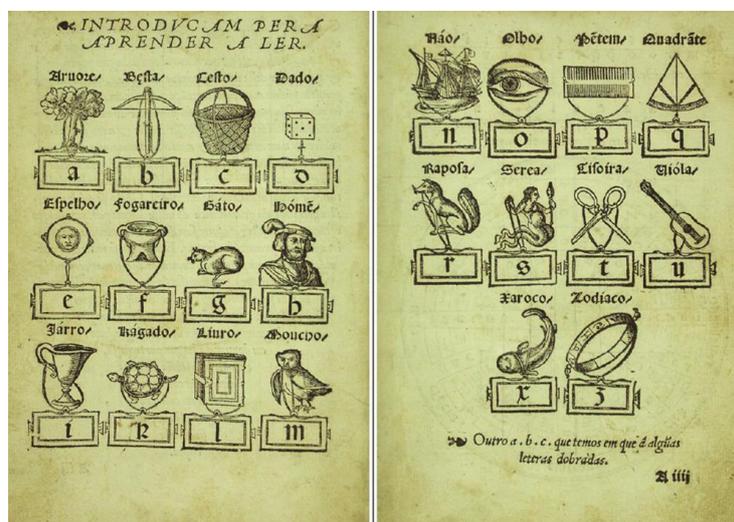
<sup>6</sup> An extensive review and discussion of the history, iconography and relationships among metaphorical trees can be found in [27].

classification and regression [28]. In addition, and closer to the matter of this article, grammatical trees which were used as relatively simple, powerful and more or less adorned ways of synthesizing and presenting information (Figure 2).



**Figure 2.** Grammatical trees from Juan de Pastrana’s: (a) *Compendium Grammaticae* ... published in 1492 in Salamanca [29] (f. 17 front)<sup>7</sup>; (b,c) *Grammatica Pastranae* ... published in 1497 in Lisbon [31].

In 1539, one year before the first printing of his grammar, the Portuguese grammarian and historian João de Barros published a profusely illustrated guide for learning Portuguese which might have been primarily written for teaching Portuguese to four leading individuals coming from Malabar, south-western India [32] (f. ii back); [33] (pp. 46–47). It might have occurred by chance alone, but remarkably *Aruore* ('Tree') was the word chosen to illustrate the first letter of the alphabet in the beginning of Barros’ guide (Figure 3)<sup>8</sup>.



**Figure 3.** Illustrated alphabet of twenty-two letters under the title “Introduction to learn how to read” with representative illustration of each letter, published in Lisbon (Portugal) in 1539. *Aruore* (Tree) illustrates the first letter [32] (ff. iii back–iiii front).

<sup>7</sup> For an earlier edition of the grammar (but lacking the grammatical tree) dated from 1462 and filed without mention of publisher and place of publication see [30].

<sup>8</sup> Maybe also by chance, some centuries later de Saussure chose ‘tree’ to define, discuss and graphically illustrate *sign*, *signified* and *signifier* [2] (pp. 97–100).

### 3. Gender in Portuguese Nouns

In Portuguese and contrary to what happens in English for example, nouns not only have quantity (singular or plural) but have also gender, being with few exceptions either masculine or feminine.

In nouns ending in *-o*, *-u* or *-a* in the singular (*-os*, *-us* or *-as* in plural) gender are easy to identify. The former two are almost without exception masculine and almost undistinguishable to the ear while the latter is almost always feminine. When ending in *-e* (*-es* in plural) nouns are frequently feminine but numerous exceptions exist, while nouns ending in *-i* (*-is* in plural) are too few in Portuguese to be worth considering. When ending in a consonant, the identification of the gender is considerably more difficult unless the sentence includes an article, an adjective or both, because articles, nouns and adjectives have to agree in quantity and gender.

Like nouns, in Portuguese and in Latin-derived languages, definite, indefinite and with few exceptions, partitive articles which exist only in French and Italian, have quantity and gender. Definite articles ('the') in Portuguese are *o* and *a* (masculine and feminine, both singular), *os* and *as* (masculine and feminine, both plural), the corresponding indefinite articles ('a'/'an', 'some') being *um*, *uma* (singular) and *uns*, *umas* (plural). Fortunately for the identification of the gender of *árvore* 'tree', in Portuguese there is not the ambiguity in the gender of articles that sometimes occur in other Latin-derived languages.<sup>9</sup>

In the screening of the gender of *árvore* through time we will, whenever appropriate, quote the original sentence italicized with the word *árvore* underlined and the portion of the word or words that allow the identification of the gender, generally an article, in bold, followed if necessary by the update of spelling inside parentheses keeping the underline and bold, and finally the translation to English. As a general rule we will also transcribe *arvore* without the acute accent because its obligatory use is recent in Portuguese. An example might be as follows: in the manuscript on the Natural History of Maranhão *ibomguíua he hũa aruere tamanha como macieira* (*Ibomguíua é uma árvore tamanha como macieira*; 'Ibomguíua is a tree as large as an apple-tree') tree has feminine gender [34] (f. 178 back and p. 108).

The rationale for updating the spelling arises from the frequent variation of ways used to spell words either in different or in the same document. Such variation can be found at least until the first half of 17th century in printed texts or in manuscripts, a good illustration being provided by the manuscript referred to above [34] written somewhere from 1624 to 1627 as a draft of the first attempt of Natural History devoted to Brazil [35]. In the manuscript, *árvore* or *árvores* appear 41 times with four different spellings plus the form *arvores* in the cover page and in the index. In the first 13 times, it appears as *aruere*, *arueres*, *arueris* or *haruera*, in the last 28 times it always appears as *aruore*. In this case, such variation almost certainly resulted from the manuscript (a sort of field book for further elaboration which never fully happened) being written by someone probably much less proficient in writing than Friar Cristóvão de Lisboa, given his high rank, necessarily was [34] (p. 27).

### 4. Gender of Tree in Portuguese

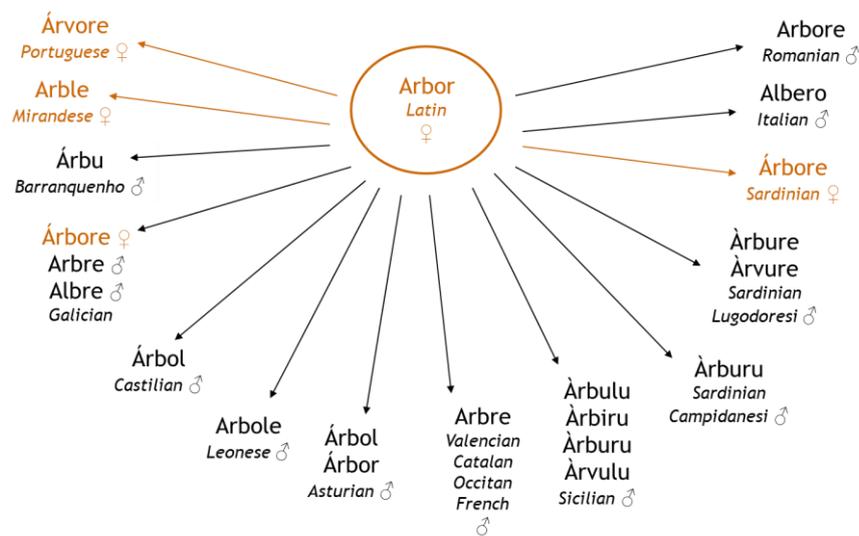
*Árvore* is the only word used in modern Portuguese to name a lignified plant that may have a variety of habits or growth forms with a stem that only forms branches in the upper part [36,37].

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<sup>9</sup> In French, the definite article in the plural is the same in masculine and feminine (*les*); in Italian, French and Catalan, in certain circumstances the definite article in singular is also the same in masculine and feminine (*l'*); in Castilian when immediately before a feminine noun beginning with a stressed *a* the definite article *la* (singular, feminine) is replaced by the usually masculine article (in this case neuter) *el*.

Today in Portuguese *árvore* is a feminine noun like *arbor*, from where it has originated, was in Latin. Likewise, *arbor*, *arbōris* is the Latin root of almost all words used to name trees in Latin-derived languages. Somehow surprisingly, in almost all of them tree is a masculine noun.<sup>10</sup>

In Italian *albero* is a masculine noun. The same happens in Castilian for *árbol*; in Asturian for *árbol* and *árbor*; in Leonese for *arbole*; in Barranquenho for *árbu*; in Catalan, French, Occitan and Valencian for *arbre*; in Romanian for *arbore*; in Sicilian for *àrbulu*, *àrbiru*, *àrburu* and *àrvulu*; in Campidanese and Lugodoresi Sardinian for *àrburu*, *àrbure* and *àrvure* despite that the use of the feminine in the Sardinian *àlbore* has been attested from about 1100 to the middle of the 13th century [38]. Other exceptions to the predominance of the masculine are the Mirandese *arble* and the Galician *árbove* (Figure 4). However, in Galician, in addition to *árbove* in the feminine, the masculine forms *albre* and *arbre* are also used, the latter mostly in literary contexts [39].



**Figure 4.** Present names and gender (♀for feminine, ♂for masculine) of tree in Latin and Latin-derived languages in which the word for tree derives from the Latin *arbor*.

Also derived from the Latin word *arbor* we can find *jârbol* in the non-Latin Serbo-Croatian, meaning ‘ship mast’, which clearly retains a functional relation with its Latin origin. Conversely, in the Latin-derived Romansh, the word for ‘tree’ is *planta* (feminine) while in Romanian besides the masculine gender for *arbore*, ‘tree’ can be named *copac* and *pom*, the latter meaning ‘fruit-tree’ [40] (p. 276), respectively neuter and again masculine.<sup>11</sup>

The oldest reference we could find to the word tree, dated from 984, is quoted from *Portugalia Monumenta Historica (Diplomata et Chartae)* and was written in Latin-Portuguese, a mixture of Latin and of the predecessor of Portuguese, *Rationem iam dictatum cum suas casas e suas aruores*

<sup>10</sup> It is worth noting the singular position of the word ‘tree’ in terms of the solitary preservation of the feminine gender in Portuguese while in a number of other Latin-derived words, also with a high symbolic status, either the original Latin gender is preserved in all main Latin-derived languages (Portuguese, Castilian, Catalan, French, Italian, Romanian), as happened with ‘soul’ and ‘God’ (feminine and masculine respectively) or changes are not limited to a single language, as happened with ‘blood’ (masculine in Latin, feminine in Castilian and Catalan, neuter in Romanian) or, from an original Latin neuter noun, some became masculine and others feminine as happened with ‘sea’.

<sup>11</sup> Sources for the name and gender of tree, of fruit, of fruit-trees, and of their fruits are: Asturian from [41]; Barranquenho by Luis Rodrigues [42]; Castilian from [43,44]; Catalan from [45]; French from [46]; Galician from [47,48]; Italian from [49]; Latin from [50,51]; Leonese from [52]; Mirandese by Amadeu Ferreira [53]; Occitan from [http://www.lexilogos.com/occitan\\_langue\\_dictionnaires.htm](http://www.lexilogos.com/occitan_langue_dictionnaires.htm) (accessed on 4 October 2010); Romansh by Lia Rumantscha ([www.liarumantscha.ch](http://www.liarumantscha.ch)); Romanian by Ana Vrajițoru [54]; Campidanese and Lugodoresi Sardinian, Serbo-Croatian and Sicilian from <http://en.wiktionary.org> (accessed on 4 October 2010); Sardinian from [38]; Valencian from [55].

(*Rationem iam dictatum com suas casas e suas árvoes*; ‘Reason was given with their houses and their trees’). In it, ‘tree’ is in the feminine [56] (p. 327).

The first book known to have been printed in Portuguese in Portugal was printed on 8 August 1489 in Chaves, Portugal ([57] (p. 12); [58]), entitled *Tratado de Confissom* (*Treatise of Confession*), author unknown.<sup>12</sup> In it, *tree* is mentioned one time, *talhou algũas aruoes* (*cortou algumas árvoes*; ‘cut some trees’) [57] (p. 143); [58] (f. 12 front b, lines 26–27), and is in the feminine. It is worth noting that the incunabular might have been composed by Antonio de Centenera, a Spanish composer from Zamora (Spain) [57] (pp. 29–37), some 140 km from Chaves, thereby justifying the frequent Castilianisms it presents [60] (pp. 19, 21, 430, 431).

The status of *Tratado de Confissom* as the first printed book in Portuguese is sometimes disputed by the first Portuguese printed edition of *Sacramental*, presumably also done in Chaves in 1488. *Sacramental* was written by Clemente Sánchez de Vercial between August 1421 and March 1423 and was not only probably also the first printed book in the Iberian Peninsula but also a sort of Iberian bestseller until it was included in the list of prohibited books in Spain in 1559 and in Portugal in 1561 [61] (pp. 9–15). The only copy known to exist of the putative 1488 Portuguese edition of *Sacramental* [62] lacks the initial pages and the colophon, its composition being exceptionally bad. In addition, it is full of Castilianisms [61] (pp. 16–21). Nevertheless, ‘tree’ is mentioned four times, three in the feminine and in one the gender is not attributable.<sup>13</sup>

In 1712, the first volume of the 10-volume encyclopedic bilingual dictionary authored by Father Raphael Bluteau was published in Coimbra (Portugal).<sup>14</sup> In it, *árvore* is in the feminine [66].

Therefore, starting in the end of 10th century until the beginning of the 18th century when the printing of the encyclopedic dictionary of Bluteau started, passing through the first books printed in Portuguese, the word *árvore* has consistently the feminine gender in Portuguese as a comprehensive review of literature [67–104] undoubtedly demonstrates (see Supplementary Materials, Supplementary S1).

According to Pagel et al. [105], the rate of evolution and change of individual words reflects the frequency of their everyday use, implying that words frequently used change less throughout time than words rarely used. Thus, the word *tree* in Latin-derived languages would belong to the group of very frequently used words because of the negligible variation of its spelling among these languages (Figure 4). However, and despite its almost total invariance and the widespread use implied by it, in most of the documents written in Latin-Portuguese, Galician-Portuguese, and Portuguese that we examined, *árvore* is either absent or when present is infrequent [68,82,83,99,106–128], with the remarkable but understandable exception of Barreira’s treatise on the meaning of plants, mostly trees, cited in the Holy Scriptures [96,97]. An illustrative review on the paucity of use of *tree(s)* is presented in Supplementary Materials, Supplementary S2.

Nevertheless, whenever *tree* or *trees* are used in such way that gender is identifiable, *trees* seem to be always in the feminine from the 10th to the 18th century when the publication of monolingual Portuguese dictionaries reflected and resulted in the fixing and normalization of Portuguese. The gender of *tree* is necessarily included in such normalization.

<sup>12</sup> The first book printed in Portugal was the *Pentateuch*, in Hebrew, which was finished in Faro on 30 July 1487 in the printing house of Samuel Gacon [59] (pp. 20–21).

<sup>13</sup> *Tree* in the feminine is mentioned in ff. 25 back a lines 9 and 12, f. 66 back a line 25.

<sup>14</sup> Raphael Bluteau was a French Theatin born in 1638 in London, raised in France and Italy, who came to Portugal by 1668 where he had an intense oratory and preaching activity. In 1712 the first two volumes of his *Vocabulario Portuguez e Latino* (*Portuguese and Latin Vocabulary*) are published in Coimbra. The publication of the *Vocabulario*, including two supplementary volumes, was completed in 1728 and involved four printing houses. The end result is ten volumes totaling about 7000 pages in folio (approximately A4 size), making it almost certainly “a dictionary more bulky than any other language can shew” in its time. See [63] or preferably, because of author’s criticism to that edition, the same title in [64]. See also [65], in English and closer to the appearance of the *Vocabulario*, in which Bluteau’s dictionary is extensively described and singled out among the 76 dictionaries said to have been published in Portugal until 1759.

However, exceptions occurred and in a few works tree or trees are in the masculine, dictionaries being the main source of those works. Three of the cases where ‘tree’ or ‘trees’ appear as a masculine entity (*Chronicle of the Kings of Bisnaga*, *Crisfal*, and *Colloquies on the Simples and Drugs*) were presented and discussed before in a shorter version [13,14] and are now extended, while the remaining are presented and discussed for the first time.

#### 4.1. Book of Lineages

In the entry “Arvol” (stated to be an ancient form of *árvore*) in the sole volume of the *Dictionary of Portuguese Language* published by Academia Real das Sciencias de Lisboa in 1793 [103], it is stated that ‘tree’ was mentioned in the masculine in the *Book of Lineages* written by, or more likely written under the patronage of Pedro Count of Barcelos (born ca. 1289, dead in 1354), a bastard son of King Dinis. Later, the *Book of Lineages* was reorganized twice, first between 1360 and 1365, second between 1380 and 1383 [129] (p. 43) and the lexicographer provides no unequivocal indication of the exact source he used. However, it is very likely that he was citing the first printed edition of the *Book of Lineages* which was done under the responsibility of João Baptista Lavanha, chief chronicler of Portugal [130], and was published in Rome in 1640 after the death of Lavanha. In fact, in the printed *Book of Lineages* it can be read *a fazer mal sà fazenda sò hũ aruol* (*a fazer mal à sua fazenda sob um árvore*; ‘making him wrong-doings under a tree’), i.e., ‘tree’ is in the masculine [130] (p. 90). This sentence is, with small spelling differences, the same that appears in the dictionary. The same mention of ‘tree’ in the masculine can be found, for example, in an incomplete manuscript dated from the 17th century but with tree written *arbol* instead of *aruol* [131] (f. 19 front line 22). In one of the two additional times that ‘tree’ is mentioned in the *Book of Lineages* the gender is not attributable, in the other is in the feminine, either in Lavanha’s edition [130] (p. 112) or in the manuscript just referred to [131] (f. 30 front lines 18, 21).

Conversely, in the three other manuscripts (among the sixty known to exist) dated from the end of 15th century to 17th century that were used for a relatively recent transcription of the above-mentioned part in which tree was used in the masculine, ‘tree’ is never mentioned in the masculine but twice in the feminine and in one the gender is not attributable [129] (pp. 106, 206).

Some light can be shed on the use of the masculine in Lavanha’s edition by the manuscript located at the Biblioteca Nacional de España, prepared to be used by the compositor [129] (p. 28). In it, contrary to what happened after being printed, ‘tree’ is always either in the feminine or its gender is not attributable [132] (pp. 106 last line, 143 lines 3, 6). Clearly the compositor in Rome (Italy), presumably Italian, changed tree from the feminine in the manuscript to the masculine in the print, certainly against Lavanha’s wishes.

#### 4.2. Death of King Arthur

The entry “Árvore” in Nascentes’ etymological dictionary published in Rio de Janeiro (Brazil) in 1955, ends by stating that ‘tree’ appears in *Morte do rei Artur* (*Death of King Arthur*) in the masculine, exemplifying with *Quando Giflet chegou ao outeiro, esteve so u arvor*, which can be translated as ‘When Giflet arrived to the hill, he stayed under a tree’ [133]. Despite the fact that no reference is provided, it is almost certain that the quote comes from a 15th century manuscript that can be found at the Österreichische Nationalbibliothek, probably copied by three different copyists from an earlier manuscript that might be dated from the beginning of 14th century [134]. Looking at the manuscript [135] (f. 195 back), the correct quote would be *Quando Giflet chegou ao outeiro esteve so hũa arvor* (‘When Giflet arrived to the hill he stayed under a tree’), and ‘tree’ is undoubtedly in the feminine, not in the masculine as erroneously stated by Antenor Nascentes. In its other mention in the *Death of King Arthur*, *e liou seu cavalo a hũa arvor* (*e atou o seu cavalo a uma árvore*; ‘and tied his horse to a tree’), ‘tree’ is again in the feminine [135] (f. 196 front).

### 4.3. Chronicle of King João I

Again, in the sole volume of the *Dictionary of Portuguese Language* published by Academia Real das Ciências de Lisboa [103], in the entry “Arvor” (also stated to be an ancient form of *árvore*) we find a reference to the use of ‘tree’ in the masculine in the *Chronicle of King João I* written by Fernão Lopes during the first half of the 15th century. Again, the source used in the *Dictionary* is not clearly stated, but assuming it was a printed edition of the *Chronicle*, it had to be the 1644 edition printed in Lisbon by António Alvarez at his own expense. In the first part of the first printed edition of the *Chronicle of King João I* it can be read *como a raposa, que estaua ao pè do aruor* (‘like the fox who was near the tree’), i.e., ‘tree’ is in the masculine [136] (p. 74), the same sentence that appears in the dictionary. In the first part of the *Chronicle*, ‘tree’ or ‘trees’ are mentioned three more times always with gender not attributable, while in the second and last part written by Fernão Lopes ‘tree’ or ‘trees’ are mentioned five times, three in the feminine and in two the gender is not attributable.<sup>15</sup> It is worth noting that the only time that ‘tree’ is mentioned in the masculine is also the only time that it is written *aruor* without the final *e* (*aruore* or *aruores*). In fact, *aruor* or *aruores* are found in all uses not only in the first and second part but also in the third part of the *Chronicle of King João I* written by a different author (Supplementary Materials, Supplementary S1) but issued in the same year from the same printing house [77].

However, in a much earlier but incomplete manuscript copy of the first part of the *Chronicle of King João I* dated from the 16th century, ‘tree’ was in the feminine, not in the masculine like in the printed edition or in the dictionary [73] (ff. 383–454). The same occurred in a richly decorated manuscript (with only the first part of the *Chronicle*) made during the 16th century [137]<sup>16</sup> or in manuscripts contemporary to or subsequent to the printed edition of 1644 [138,139].<sup>17</sup>

### 4.4. Vita Christi

Between 14 May and 20 November 1495 the four Books (some 580 folios, 259 × 388 mm each) of the Portuguese translation of *Vita Christi*, completed by Ludolph the Cartusian in 1374 and printed for the first time in 1472, were published in Lisbon [140] (p. XI); [141]. The Portuguese translation, which was used for the composition of the 1495’s incunable, might have been the first complete vernacular translation of *Vita Christi* [141], and, according to the hand-written copies emanating from monastery of Alcobaça (Portugal), might have been finished by 1445–1446 [142–144]. Alternatively, the Portuguese translation might have been earlier because a part of *Vita Christi* in Portuguese can be found in *Leal Conselheiro* [75], written or compiled by King Duarte no later than 1438, the translation probably being earlier.<sup>18</sup> Whenever and whoever did the translation, the result is considered to correspond to a lexically modern stage of Portuguese [37] (p. x). As for the gender of ‘tree’, in the four volumes of *Vita Christi* we found three mentions in the masculine.

Mentions in the masculine occur in Book 1 [145] (f. cxxvj back a line 10), in Book 2 [146] (f. lxxxvij back b line 8)<sup>19</sup> and in Book 3 [147] (f. cvij front a line 27), and are absent from Book 4 which was the first to be finished, in 14 May 1495 [148].

However, in the manuscripts, which are supposed to have been used by the compositors [140] (p. XI), the above-mentioned mentions of ‘tree’ in the masculine are clearly in the feminine in Book

<sup>15</sup> ‘Tree’ or ‘trees’ in the feminine appear in pages 46, 149, and 168.

<sup>16</sup> ‘Tree’ or ‘trees’ in the feminine in f. xxviii front b line 35, and f. cxviii back b line 15, the latter appearing in the printed edition of 1644 [136] with gender not attributable.

<sup>17</sup> In the first part of the *Chronicle* [138] ‘tree’ or ‘trees’ in the feminine appear in f. 10 back line 25, and f. 167 back line 4, the latter appearing in the printed edition of 1644 [136] with gender not attributable. In the second part of the *Chronicle* [139] ‘tree’ or ‘trees’ in the feminine appear in ff. 63 back line 18, f. 164 front line 10, and 184 front line 8.

<sup>18</sup> The fragment of *Vita Christi* constitutes the chapter LXXXVII of *Leal Conselheiro* [75] (ff. 81 front–82 front); [76] (pp. 410–417), and corresponds to the second half of chapter 8 of Book 1 of *Vita Christi* [142] (ff. xxvij front b line 27—xxviii back); [139] (ff. xxvi back a line 31—xxviii back).

<sup>19</sup> This mention in the masculine occurs in the title of chapter 18 in the list of contents. However in the title of that chapter in the text, ‘tree’ is correctly mentioned in the feminine [146] (f. liiij front a line 27).

1 [142] (f. cxlix back b line 14) and in Book 2 [143] (p. 5 line 25). No comparison can be made in relation to the mention in the printed Book 3 because the corresponding manuscript has been lost at least since 1775 [140] (p. XII), but in all likelihood the mention in the masculine is also a typographic error and like the others an easily understandable one.

In fact, *Vita Christi* clearly represents a typographic *tour de force*. Unless the composition of Books was done simultaneously, the 185 folios of Book 1 took three months to finish, the 88 folios of Book 2 took three weeks and the 123 folios of Book 3 took less than two and half months.<sup>20</sup> On average, two folios were printed per day for Book 1, four for Book 2 and more than three folios every other day for Book 3. In addition the compositors were not Portuguese. Their names were Nicholas of Saxony and Valentin of Moravia and their command of Portuguese was certainly very poor. Considering all of this, it is almost surprising that no more errors exist.

#### 4.5. Chronicle of the Kings of Bisnaga

In the end of the entry “Árvore” in Machado’s etymological dictionary [56], it is remarked the use of this noun in the masculine exemplified with a quote of *Crónica dos Reis de Bisnaga* (*Chronicle of the King of Bisnaga*). The *Crónica* was published in 1897 by the Portuguese Arabic scholar David Lopes [149], who transcribed a set of manuscripts located at Bibliothèque nationale de France [150], partly authored by a certain Domingos Paes around 1525, partly by a certain Fernão Nunes around 1535 [149] (p. LXXXVI). Paes and Nunes were travelers or merchants, or both (Nunes definitively was a horse merchant) that lived for large periods in the kingdom of Bisnaga (Vijayanagar in modern-day Karnataka, southern India) and wrote extensively on the history of the kingdom. It is known that their manuscripts were copied by a third party in Goa (India) and sent from there to Lisbon with a cover letter presumably addressed to the Portuguese grammarian and historian João de Barros or, alternatively the manuscripts were sent to Lisbon and copied there [151] (p. v).<sup>21</sup> Wherever the copy was done, the copyist is unknown. Finally, in Lisbon the copied manuscripts were used by João de Barros as a source for at least part of the *Década Terceira* (*Third Decade*) first published in Lisbon in 1563 [152],<sup>22</sup> implying that the manuscripts deposited at Bibliothèque nationale de France [150] had to be written before 1563.

Following Lopes’ transcription of the copy of Paes and Nunes manuscripts [150], in the part written by Nunes, ‘tree’ or ‘trees’ are mentioned three times, two in the feminine, one in the masculine while in the part written by Paes ‘tree’ or ‘trees’ are mentioned five times, two in the feminine in two successive periods, two in the masculine in the same period and one, in the same page of the two preceding masculine forms, with gender determinants making the word first masculine and then feminine [149] (p. 81), the sentence being *hũ arvore que debaixo d ela agasalhavamos trezentos e vinte cavallos*, ‘a tree under which we lodged three hundred and twenty horses’ using Sewell’s translation [151] (p. 237).

However, checking Lopes’ transcription against the original manuscript, the uses in the feminine he considers in the part originally written by Domingos Paes are almost certainly in the masculine [150] (f. 79 front). All the others, either from Paes or from Nunes, correspond to the gender attributed by Lopes in the transcription.

<sup>20</sup> Book 4 was in fact the first to be finished and there is no information on a possible date for its beginning.

<sup>21</sup> The copy of Sewell’s book available online lacks the facsimile of the end of Fernão Nunes summary, the covering letter and the beginning of the summary of Domingos Paes. Sewell’s book includes a translation of the Chronicle of the Kings of Bisnaga, changing the order of presentation previously adopted by David Lopes and attributing an earlier date of composition to the part written by Domingos Paes, which is set at 1520–1522.

<sup>22</sup> A great part of chapter IV, Book IV, especially the part related with the conquest of Rachól by the King Crisnaráo including the episode involving the Moor Cyde Mercar (f. 98 front to f. 99 front) and part of chapter V, Book IV, namely the description of Rachól, starting f. 99 front, is an almost exact copy of parts of Fernão Nunes narrative (pp. 24–31 of David Lopes’ transcription [149]).

#### 4.6. Eclogue Crisfal

In the tenth edition of Morais' dictionary published in Lisbon in 1950, it is remarked in the end of the entry "Árvore" that 'tree' can also be used in the masculine, exemplifying with a quote from the eclogue *Crisfal* attributed to Cristóvão Falcão [153].

Doubts on the authorship of *Crisfal* were raised in the beginning of the 20th century, and since then no agreement has been reached and probably never will.<sup>23</sup> Regardless of who the author really was, Cristóvão Falcão or Bernardim Ribeiro, the eclogue was first published in Lisbon [156] between 1543 and 1547, and was written probably between 1536 and 1541 [157] (p. XVIII).

In the first edition, generally known as *folha volante* (a sort of pamphlet), in stanza thirty three, it reads *ao pe de hũa aruore estaua* ('near a tree he was') and 'tree' is in the feminine [156]. The second edition of the eclogue was bound together with the *princeps* edition of Bernardim Ribeiro's *Menina e Moça* (*Child and Maid*) known as Ferrara's edition. The third edition of the eclogue was bound together with the third edition of *Menina e Moça*, known as Cologne's edition, which in the whole was a copy of Ferrara's edition as faithful as one can be [157] (p. LXXXI). In the two editions, the verse reads exactly the same, *ao pee de hum aruore estava* ('near a tree he was'), 'tree' being in the masculine [158] (f. cxxxix front); [159] (f. cxxxvii back). In two different copies of the fourth edition of *Crisfal* [160,161]<sup>24</sup> tree appears again in the feminine. The same happens in the much later edition of 1721 [157] (pp. XCVII, 21).

It is worth noting that the "masculine" edition of Ferrara (Italy) published in 1554 was done in the printing house of Abraham Usque, the same master printer of Samuel Usque's (undetermined relation, if any) *Consolação às Tribulações de Israel* [162] in which 'tree' is always mentioned in the masculine or gender is not attributable (see Section 4.8 below).

The question that can be raised is which is the most reliable edition? Once again there is no agreement and a number of authors prefer the *folha volante*, certainly not because of the gender of 'tree', the *folha volante* seemingly being the source for most part of the editions except for Ferrara's and Cologne's [157] (p. LXXX; [163] (p. 7); [164]. Alternatively, and again not because of the gender of 'tree', others prefer the edition of Ferrara dated from 1554 [165] (p. 17), coincidentally meaning that some prefer the edition in which *aruore* is in the feminine, others the edition in which *aruore* is in the masculine.

A solution for this apparent conflict of gender raised by Ferrara's edition might be found in the constraint imposed by the heptasyllabic structure of the eclogue [164]. Thus, the elision of the letter *a* in the end of the article in the feminine singular *huma* or *hũa*<sup>25</sup> before *a* in the beginning of the noun *aruore* would make the reading of the heptasyllabic verse easier [165] (p. 41); [167] (p. 83). Thus, the gender masculine of *aruore* would result from the apostrophe being omitted in *hum'aruore*. Curiously, some 120 years later, the practice of not using apostrophes to signal elision of letters in the end of words was still criticized and considered a frequent source of confusions and mistakes [98] (pp. 212–214).

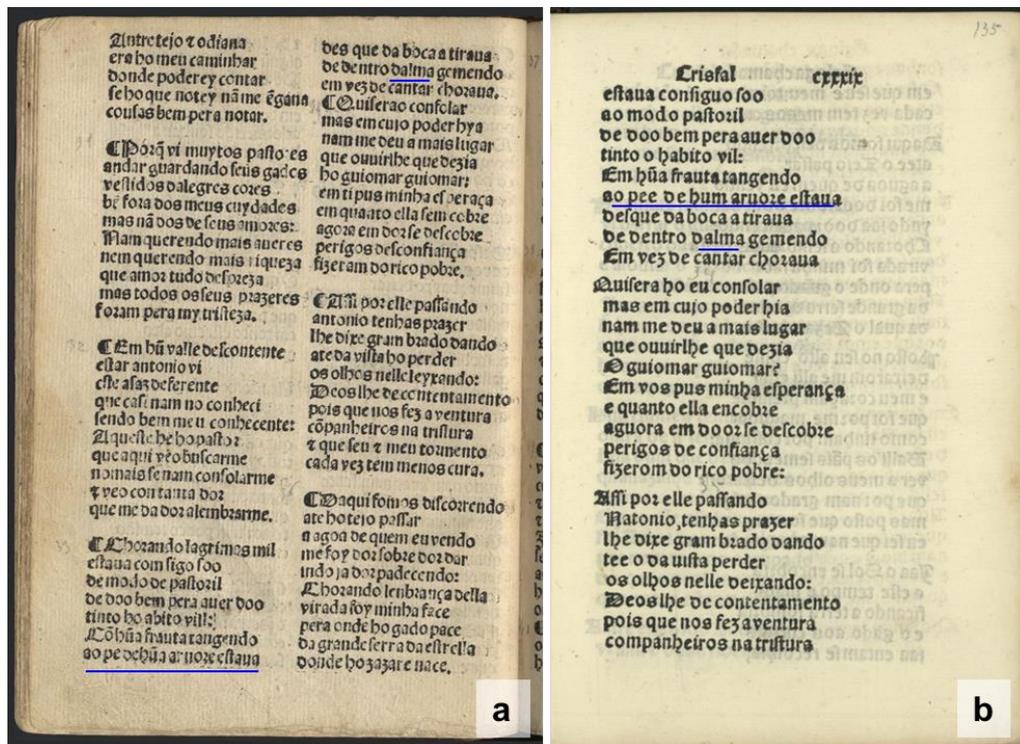
As appealing as the solution of elision plus omission of apostrophe might be, a look at the printed pages renews the doubts. Two verses after the contentious *aruore* verse in the 33rd stanza, either in *folha volante* or in Ferrara's edition, there is the elision of a vowel resulting in *dalma* instead of *da alma* ('of the soul') in both cases without apostrophe and without an obvious space between *d* and *alma*.

<sup>23</sup> A good summary of the sometimes harsh debate that raged during the first half of 20th century on whether Cristóvão Falcão or Bernardim Ribeiro was the author of *Crisfal* can be found in [154]. See also [155].

<sup>24</sup> A number of differences exist between the two copies, namely in the title, in the spelling of printer's name, and in the engravings.

<sup>25</sup> The tilde over vowels, like in *amarã, bês, lôge, hũa* ('loved', 'goods', 'far' and 'a' respectively) was used since long to nasalize the vowel or vowels and in manuscripts they were frequently placed over two adjacent vowels [166] (pp. 44, 45, 365). In printed texts and less frequently in manuscripts, e.g., [69] (p. 7), it was widely used mostly for economy and meant that the letters *m* or *n* were being omitted but should be read as if they were actually printed or handwritten (*amaram, bens, longe, huma*, for the example above). It was also frequently used over consonants to indicate the omission of one or more letters.

Conversely, there is an obvious space between the article *hũa* or *hum* and *aruore*, suggesting that in both cases the compositor deliberately separated the two words without elisions (Figure 5).



**Figure 5.** Eclogue *Crisfal* showing the verse in which *aruore* ‘tree’ appears (a) in the feminine and (b) in the masculine with a hypothetical elision of the letter *a* of the preceding article in the latter (larger underline), and the verse in which an elision of the article occurred in the two cases, resulting in *dalma* instead of *da alma* (‘of the soul’; smaller underline). (a) Is from the so called *folha volante* [156]; (b) is from Ferrara’s edition [158] (f. cxxxix front).

#### 4.7. Palmeirim of England

In the first edition of Moraes’ dictionary published in Lisbon in 1789 [102] and in all subsequent editions until the publication of the ninth edition, completed in 1891 also in Lisbon [168], it is remarked in the entry “Árvore” that in *Palmeirim* part 1 and 2 ‘tree’ appears frequently in the masculine. Despite the fact that the identification of *Palmeirim* was not provided, it certainly refers to the chivalry novel *Palmeirim de Inglaterra* (*Palmeirim of England*) authored by Francisco de Moraes, the *princeps* probably published about 1544 in an unknown place by an unknown printer [169] (pp. 102–104). The second edition was published in 1567 in Évora (Portugal) by André de Burgos, the third in 1592 in Lisbon by António Álvares [169] (pp. 89–97).

Incidentally this novel was awarded the distinction of being one of the two or three novels that the rector of the parish and the barber agreed were worthy of being spared from the fire or to be permanently hidden out of sight when they investigated the library of Don Quixote de la Mancha after his return from the first journey.<sup>26</sup>

Following the transcription of the *princeps* edition and its comparison with the second and third editions [169] (pp. 129–1156), ‘tree’ or ‘trees’ are mentioned 77 times in the first edition, seven in the masculine, 66 (86%) in the feminine, and in four the gender is not attributable. In the second edition,

<sup>26</sup> This episode is narrated in chapter VI of the first part of Cervantes’ *Don Quixote* [170] (f. 20 front).

'tree' or 'trees' are mentioned 79 times, 17 in the masculine, 59 (75%) in the feminine and in three the gender is not attributable. In the third edition, 'tree' or 'trees' are again mentioned 77 times, 31 in the masculine, 43 (56%) in the feminine and in three the gender is not attributable.

Clearly there is a decrease of the frequency of 'tree' as a feminine entity with the complementary increase of the masculine as time passed and new editions appeared.

In addition, in the third edition, not only is the frequency of the use of the masculine slightly lower than the frequency of the use of the feminine but it is very common that the two genders are used at very close distance, meaning they were set up by the same compositor. For example, *hum aruore*, 'a tree' (masculine) and *mesma aruore*, 'same tree' (feminine) appear in the same column of the same page, only seven lines and 53 words apart [171] (f. 13 front), about two thirds of the number of words of this paragraph.

Interestingly, the same printing house (Antonio Alvarez) is also involved in other conflicting mentions of 'tree' in the masculine, namely in the first part of the *Chronicle of King João I* [136] (Section 4.3 above) and in Cardoso's dictionary [177] (Section 4.10 below).

#### 4.8. The Consolation for the Tribulations of Israel

In Sousa da Silveira's book on 16th century Portuguese writers [167] (p. 83), the author exemplifies the past use of tree in the masculine quoting an excerpt of Samuel Usque's *Consolação às Tribulações de Israel* (*The Consolation for the Tribulations of Israel*), published in Ferrara in 1553 and transcribed by Mendes dos Remédios in his history of Portuguese literature published in Coimbra in 1914 [173] (p. 320). In fact, the quote did not include *aruore* but *novo arvoresinho* ('young little tree'), clearly in the masculine.

A search in Usque's *Consolação* reveals that in addition to *arvoresinho*, 'tree' or 'trees' is mentioned 40 times throughout the three dialogues. In nine of them the gender is not attributable while in the remaining 31 *aruor* or *arvores* is always in the masculine [162],<sup>27</sup> including in the only case that it appears as if it was in the feminine in the complete transcription of *Consolação* done by Mendes dos Remédios [162] (f. 213 back), [174] (f. xxxvi back). Exactly the same number of references to *aruor* or *arvores* and gender attribution is found in the second edition of *Consolação* [175] presumably published in Amsterdam (The Netherlands) in 1599 [176] (pp. XLI–XLIII).

#### 4.9. Child and Maid

In 1554, Abraham Usque published in Ferrara, almost certainly posthumously, the *princeps* edition of Bernardim Ribeiro's *Menina e Moça* (*Child and Maid*), comprising the novel *Menina e Moça* itself plus six eclogues including *Crisfal* discussed in Section 4.6 above, one letter in verse and several other poetic compositions. On the whole, 'tree' or 'trees' is mentioned eight times. The first one is in the masculine, all the remaining seven are in the feminine except one additional time in the eclogue *Crisfal*, as described above in Section 4.6, and another time in another eclogue in which gender is not attributable [158].

The printing of the second edition was finished in 1557 in Évora by André de Burgos with substantial differences in relation to the *princeps*, namely the absence of the eclogue *Crisfal*, of the letter, of some other poems and the increase of the text of *Menina e Moça* itself, almost certainly spurious and apocryphal [177] (pp. 14–15), whose name also changed in the cover page. In the parts common to the first edition, 'tree' or 'trees' are always mentioned in the feminine like in Ferrara's edition and on the sole occasion that tree was in the masculine in Ferrara's, the word used in Évora's edition is changed from *aruore* to *arvoredo* ('grove of trees'), in the masculine as it should be [178] (f. x front). In the additions to the novel, 'tree' is again mentioned only once and somehow surprisingly in the masculine [178] (f. clxxxii front).

<sup>27</sup> *Arvoresinho* appears in f. 6 front line 14.

#### 4.10. Latin-Portuguese Dictionaries of Jerónimo Cardoso

The oldest existing Portuguese dictionary is bilingual, was authored by Jerónimo Cardoso and was published in Lisbon in 1562 [63,179,180]. In that year, two other works authored by Cardoso were published. A Portuguese-Latin dictionary was printed in Lisbon in the printing house of João Álvaro, and a Latin-Portuguese dictionary printed in a subsidiary that João Álvaro had in Coimbra by that time. In the two dictionaries, the only one published during Cardoso's life, 'tree' is in the feminine [181] (f. 20 front), [182] (f. 80 front). After the death of Cardoso in 1569, the Latin-Portuguese dictionary was reprinted repeatedly, a clear sign of its success, and expanded and corrected by the German Sebastianum Stokhamerum, in Latinized form. The gender of 'tree' in the meaning of the entry *Arbor, oris* changed to masculine in various editions [183] (f. 18 back), [184] (f. 18 front), [172] (f. 18 front), [185] (f. 18 front) issued from a variety of printing houses between 1570 and 1613, and back to the feminine after 1619 [186] (f. 18 front), [187] (f. 18 front), [188] (f. 18 front), [189] (p. 35), [190] (f. 21 front) also from a variety of printing houses, including one (Petri Crasbeeck's) who had also printed *aruore* in the masculine.

However, in all editions issued after Cardoso's death, in the same page of the entry, thus set up by the same compositor in every edition, *aruore* appears repeatedly as part of sentences and whenever the gender is attributable *aruore* is always in the feminine, regardless of having been previously considered of masculine or feminine gender (to a complete list of the entries and sentences see Supplementary Materials, Table S1).

#### 4.11. Colloquies on the Simples and Drugs

On 10 April 1563, the printing of the treatise titled in abbreviated form *Colóquios dos Simples e Drogas* (*Colloquies on the Simples and Drugs*) authored by Garcia da Orta was finished in Goa. With it appears the first printed poem by Luís de Camões, dedicated to the viceroy of India that granted the privilege to the edition of *Colóquios* [191]. Contrary to what was stated elsewhere [192], *Colóquios* was not printed in the first printing press that arrived in Asia,<sup>28</sup> but was the first book written by a European on Indian plants, medicinal or not, as well as on fruits, stones and gems found in India, with the earliest descriptions of Indian plants and drugs made in a non-Indian language [192,195].

Throughout the *Colóquios*, 'tree' is used either in the masculine or in the feminine. For example, in the Colloquy six, *Do arvore triste* ('On the sad tree') in the title 'tree' is in the masculine, in the first speech of Ruano is in the feminine twice [191] (f. 17 back), and not in the masculine as transcribed by Conde de Ficalho in 1891 [196] (p. 70).<sup>29</sup> In the sixth line of Orta's speech, when he somehow dismissively describes the legend of Pārijāta tree referred in the end of Section 2 above, 'tree' is again in the feminine but after five lines is again in the masculine [191] (f. 18 front). Another example is found in the opening speech of Ruano in Colloquy thirty two, in which 'tree' is used in the feminine and in the masculine separated by no more than 11 words [191] (f. 129 front).

#### 4.12. More Palmeirim of England

In the entry "Arvore" of the Dictionary of Portuguese Language published in 1793, there are three references to the use of 'tree' in the masculine [103]. Two of them were presented above (the eclogue *Crisfal* by Cristóvão Falcão and *Palmeirim de Inglaterra* by Francisco de Moraes, Sections 4.6 and 4.7 respectively). The third is the fifth and sixth parts of *Palmeirim de Inglaterra* [198] the second sequel of Moraes' original *Palmeirim* and a book that certainly and we risk saying deservedly, would not be spared by the rector of the parish and the barber as were the first and second parts found in Don

<sup>28</sup> Jesuits started operating their own press in Goa in the summer of 1556, incidentally their first printing press worldwide. Jesuits' printing press was the second to arrive in Asia. Before that press another one arrived in 1515 en route to Ethiopia. However, it rotted away in some warehouse never reaching its intended destiny. See [193,194].

<sup>29</sup> For a translation to English see [197].

Quixote's library. In this sequel, authored by Baltazar Lobato and published in Lisbon in 1602, 'tree' or 'trees' are mentioned 27 times. In one of them, gender is not attributable, while in the remaining, 'tree' is in the feminine 24 times and in the masculine two times, one of them only ten words apart from the use of tree in the feminine [198] (f. 54 front).

#### 4.13. Origins of Portuguese Language

In 1606 Duarte Nunes de Leão published in Lisbon a study on the origins of the Portuguese language [199]. In chapter VII, dealing with the changes of words from Latin to the language then spoken in Hispania, which throughout the book meant Portuguese language almost without exception, Leão lists several nouns that changed from the feminine in Latin to the masculine in Portuguese and *aruore* is one of them [199] (p. 38). However, in the same book Leão mentions *aruore* three more times. In two the gender is not attributable [199] (pp. 55, 58) while in the other, *folhas das aruores* ('leaves of trees') it is in the feminine [199] (p. 3) the opposite of the statement made thirty-five pages later on what should be the correct gender for tree. Obviously, the use of the feminine could result from a typographic error. Alternatively, we can wonder if the merciless, almost savage critiques done by João Barreto to Leão's *Orthography* [128]<sup>30</sup> should not apply also here. Namely when Barreto explains that he presents Leão's rules not for being followed but to be avoided, or that the reader should be aware of the suggestions of Leão to know how to do the right thing by doing exactly the opposite [98] (pp. 240, 242).

#### 4.14. Voyage of King Filipe III of Spain to Portugal

In 1622 the same João Baptista Lavanha that compiled and edited the first printed edition of the *Book of Lineages of Pedro, Count of Barcelos* (see Section 4.1 above) published in Madrid (Spain) the Portuguese version of an account of the voyage that King Filipe III of Spain made to Portugal in 1619, including his entry in Lisbon. The printing of the account was finished in 1621, the year the king died. 'Tree' or 'trees' are mentioned 21 times, eight in the feminine, ten in the masculine and in three the gender is not attributable [200]. The almost equal frequency of the gender adopted is perfectly evident in folio 13, front, where the masculine form appears in line 24, the feminine in line 25, the masculine in line 28, and the feminine again in line 31, all certainly set up by the same compositor.

#### 4.15. Adolfo Coelho's Etymological Dictionary

In 1890 Adolfo Coelho published in Lisbon his pioneer two-volume etymological dictionary of Portuguese and in the entry *aruore* it is declared a masculine noun [201]. However, a comprehensive search in the two volumes of the dictionary reveals that *aruore* appears an additional 441 times. Of these, gender is not attributable in 282 cases while in the remaining 159 cases *aruore* is always in the feminine, never in the masculine [201,202] rendering incomprehensible the unique attribution of masculine done in the entry *Aruore*.

### 5. Tree in the Feminine and in the Masculine in Portuguese: Errors and Misfortunes?

In Portuguese the noun used for 'tree' had the feminine gender from very early times, even before Portuguese as such existed, examples being found throughout the centuries in texts first written in Latin-Portuguese and Galician-Portuguese, and then in Portuguese.<sup>31</sup>

<sup>30</sup> João Barreto was not alone in his harsh criticism to Duarte Nunes de Leão. The same was repeatedly done by Father Baião in his Supplement to the *Chronicle of King Pedro I* [121] (pp. 505, 533, 545–547).

<sup>31</sup> Contrary to what happened for example in Castilian in which tree was written mostly in the feminine as in *Fuero Juzgo*, in *Fuero de Navarra*, both from the 13th century, and in Antonio de Lebrija's *Dictionarum ex Hispaniensi in Latinum Sermonem* (1493 or 1495) or indistinctly in the feminine and in the masculine as in Alfonso de Palencia's *Universal Vocabulario en Latín y en Romance* (1490). See [203] (pp. 313–314). Also [38].

However, a variety of sources, mainly dictionaries, state or suggest that *árvore* might have been considered a masculine entity, in general naming or pointing to the original source in which tree is written in the masculine, sometimes not. An example of the latter is Francisco Constancio's dictionary. In 1855, he considered *árvore* to be a feminine noun but stated that it might have derived from Greek instead of Latin, even tracing some surprising lineage from Egyptian. At the end of the entry he wrote that ancient writers frequently mentioned *árvore* in the masculine without naming a single one [204].

Some of the sources for the use of 'tree' in the masculine presented above are either erroneous as happens with the 15th century manuscript on the *Death of King Arthur* or contradictory as when the authors (or the compositors) clearly declare 'tree' to be a masculine word but always use it in the feminine, as in the case of some editions of Cardoso's bilingual dictionaries, Leão's *Origins of the Portuguese Language* or Coelho's etymological dictionary (see Section 4.10, Section 4.13, and Section 4.15 above respectively).<sup>32</sup>

Nevertheless, it is accepted that the disappearance of the neuter that existed in Latin led to the masculine in Latin-derived languages when nouns and adjectives ended in *-o* or in *-u*, and to the feminine when ending in *-a*, while nouns ending in other vowels or in consonants frequently oscillated in the attribution of gender. Such oscillation included words ending in *-or* where genders coexisted for long with the settling of the feminine, the elimination of the masculine occurring gradually over time. Noticeably *aruor* or *arvore* are not cited among the examples of such processes [206] (pp. 91–97).

However, the continuous and apparently exclusive use of 'tree' in the feminine for more than a millennium seems to be broken in the 16th century during about less than forty years, only to be resumed afterwards.

A possible explanation for the most part of uses of 'tree' in the masculine is spelling errors, of which manuscripts and printed books were full. This is either because of ignorance, lack of care, or deliberate changes made by copyists and compositors, the best illustration we found being the first printed edition of the *Book of Lineages* discussed above (Section 4.1). To illustrate how widespread errors certainly were, we present next a few examples on the generalized perception and complaint of errors by authors of the time.

In the manuscript written by several hands titled *Diálogo de la Lengua* (*Dialogue on Language*) authored by the Castilian Juan de Valdés [207] in 1535,<sup>33</sup> the author leads a conversation with several characters, named Martio, Coriolano, Pacheco and Torres. After critiques, sometimes devastating, of a number of his contemporary authors, including of the renowned Andalusian grammarian Antonio de Lebrija (or Nebrija), Valdés seems to soften and declares that in relation to the spelling of the latter he says nothing because the blame of those errors should be attributed to the printers and not to the author of the book [207] (f. 9 front).<sup>34</sup> Later he adds that printers are partly to blame because they are extremely careless not only in spelling but by polluting what they do not understand [207] (f. 86 front).

In 1671, near the end of his 'Orthography of Portuguese Language' and coming almost from nowhere, João Barreto complains bitterly about the infinity of errors that result from the inexistence of proof-readers to detect and correct compositors' mistakes [98] (p. 211).

In the first of successive errata done through his eight plus two-volume dictionary, Raphael Bluteau presents a list of possible contributors to errors in any book, starting with the author himself, plus the authors he trusts and cites, those that transcribe the text, those who compose it, and those who fail to find and purge the text from errors after composition and before printing, ending with the resigned conclusion that where many help to err, many errors will occur [210] (p. ix).

<sup>32</sup> The statement that the gender of 'tree' changed from being usually masculine to the feminine was still found in a Grammar approved for use in secondary schools and published in 1937. See [205] (p. 49).

<sup>33</sup> For a discussion on which of the brothers, Juan de Valdés or Alfonso de Valdés, was the author see [208], especially pages X–XVI.

<sup>34</sup> Deliberately or not, depending on how knowledgeable Juan de Valdés really was, exculpating Nebrija and putting the blame on the printer is highly ironic because it is almost certain that the printer was Nebrija himself or at least the composition and printing was done under his supervision, eventually in his own home. See [209] (pp. 25, 26).

Errors are highly frequent in a number of works examined in the previous section. It is common that the mention of ‘tree’ in the feminine is in close proximity to its mention in the masculine, sometimes only few words apart, as happens in *Crónica dos Reis de Bisnaga* [144], in the first and second parts of *Palmeirim de Inglaterra* [162], in *Colóquios dos Simples e Drogas* [191], or in the fifth and sixth parts of *Palmeirim de Inglaterra* [198], among others. For example, Dimas Bosque, a friend and colleague of Garcia de Orta and presumably the Chief-Physician of India at the time [211] (p. 277) wrote in his preamble to the Colloquies that the book had some errors, a very kind understatement given the overall poor quality of the printing work, because the master printer João de Emden was absent during the composition and the work was done by someone who was badly trained in the art of composition [191].

Conversely, there is some dispute about the technical quality of the *princeps* edition of *Menina e Moça* in which the “masculine” version of the eclogue *Crisfal* is found. Opinions ranged from considering that the original manuscript was scrupulously followed by the compositor, as if it was some sacred book [212] (pp. 74, 91, 92, 97) to the very opposite, the compositor being accused of deliberately changing the original, sometimes wrongly, frequently by his own sense of aesthetics alone [213].

Undoubtedly, there were printing questions in Ferrara’s edition, some of them already remarked by Carolina Michaëlis despite being the strongest champion of its high printing quality. For example in the title, printed in the cover page, *MOÇA* (‘Maid’) is written *MOCA* presumably because the capital Ç of the font used was missing [212] (p. 25) changing the meaning of the title in Portuguese from ‘Child and Maid’ (*Menina e Moça*) to ‘Child and Club’ (*Menina e Moca*), *club* in the sense of stick used as an weapon (Figure 6a).



**Figure 6.** (a) Cover page of the *princeps* edition of *Menina e Moça* dated from 1554 with printing errors resulting from replacement of Ç by C and of A by V upside down underlined [158]; (b) possible elision of *a* in the indefinite article underlined hypothetically to allow for a simpler right and left justification of lines plus a more balanced, or less unbalanced distribution of spaces between words, making masculine the adjacent *aruore* [178] (f. clxxxii front).

Similarly, in the title of *Consolação às Tribulações de Israel* issued from the same printing house the year before [162], the capital Ç is twice replaced by C, without such serious consequences in the meaning of the sentence.<sup>35</sup> However, even in the title of *Menina e Moça* other problems exist reflecting the scarcity of capital A in the font used for the title, six times replaced by capital V upside down, tricking the reader with an optical illusion (Figure 6a).

Spelling errors born from replacement of letters that were either inexistent or were in short supply from the beginning, or were worn by overuse, was certainly frequent throughout the 16th century, with complaints about it extending deep into the 17th century [98] (p. 283). Insufficient number of low case *a* (probably the most frequent letter in Portuguese) might be a reason why tree or trees are preceded by articles or other gender determinants in the masculine.

An additional possibility might be that suppressing *a* in the articles, thus making *arvore* a masculine entity, was a way to speed the composition by preventing or swiftly solving difficulties arising from the need of right and left justification of lines and of a balanced distribution of spaces between words. A good illustration of this hypothesis is provided by the only case in which tree is in the masculine in the second edition of *Menina e Moça* [178] (f. clxxxii front) where *hûa* instead of *hũ* would certainly require afterwards a lot of additional work to balance spaces and justify lines (Figure 6b).

In some cases, errors might also have resulted from the haste with which books were sometimes done. This was very likely the case of the Portuguese translation of *Vita Christi*. Books 1 to 3 with almost 400 folios about A3 size took slightly more than six months from beginning to end, an average of two folios per day. In addition, the compositors were from Central Europe (see Section 4.4 above). Another case might have been Lavanha's account of the voyage of King Filipe III of Spain to Portugal (above, Section 4.14), dated in the cover page from 1622 but with an earlier date in the colophon (1621). Briefly, Filipe III left Madrid to Portugal on 22 April 1619, entered Madrid back from Portugal in 4 December 1619, fell seriously ill on 1 March 1621 and died on 31 March 1621 [214] (pp. 301–327). During this time Lavanha had to write the account in Castilian [215], the account had to be composed and printed (in Castilian) with all mentions of 'tree' or 'trees' either in the masculine (12 times) or with gender not attributable (6 times), except two in which the feminine was used [215] (f. 34 back lines 11 and 13). Lavanha had also to translate the account to Portuguese, and composition and printing in Portuguese had to be done in the same printing house [200]. All this had to be completed in a very short time because the two versions were printed or at least composed in 1621, presumably near the year's end. It is not surprising that the Portuguese version suffered most, also because the printing house was in Madrid.

All the above can variously explain, even if tentatively, almost all mentions of tree and trees in the masculine with the sole exception of *Consolação às Tribulações de Israel* [162,175] in which the masculine gender is consistently used, 'tree' or 'trees' never appearing in the feminine. Adding to this, *Consolação* has a number of other unusual characteristics not shared by the other works we examine in this article, namely having been written by a practicing Jew probably born in Portugal from parents fled from Spain, being unclear whether or not his native language was Portuguese.<sup>36</sup> In his early thirties he also fled from Portugal. He published in Italy in his late fifties after more than 20 years of wandering through Europe and the Near East, the publisher being another escapee from Spain and Portugal (who might or not have been his relative). Nevertheless, *Consolação* was most likely aimed at a Portuguese-speaking exiled Jewish audience rather than at a non-Jewish Portuguese one [216,217].<sup>37</sup>

<sup>35</sup> The same happens in the second edition of *Consolação* which in all likelihood was printed in Amsterdam in 1599 as if it were the original of Ferrara, written Ferrare in the cover of the second edition [175].

<sup>36</sup> Not if we give full credit to what is stated in the end of the prologue to *Consolação* [162], where it reads that it would be inconvenient not to use Portuguese, his mother language (*desconueniente era fugir da língua que mamey*).

<sup>37</sup> In relation to this latter aspect see also the end of the prologue where Usque declares that his first objective was to speak to a Portuguese audience [162].

It was argued that the systematic use of ‘tree’ in the masculine resulted from the influence of the masculine noun *albero* used in Italy where Usque had lived for several years, the same influence being argued in relation to the use of *ermolho* and derived verbal forms (hypothetically derived from the Italian *germoglio*, ‘sprout’) or the use of *guai* or *guay* [218] (pp. 295, 297). The influence of the masculine *albero* would easily explain the systematic use of the masculine in *aruor*. However, some caution must be exerted here because the use of *albore* in the feminine is attested in ancient Italian since between 1230 and 1250 [38]. Even more caution is required in relation to *guai* or *guay*, an interjection of sorrow still used today with that sense in Italian [219,220]. In fact its use was not limited to Italy of the time, and much earlier examples of its use can be found in *Cancioneiro Geral* compiled by Garcia de Resende and published in Lisbon in 1516 [83] (f. CLXVI front a line 6) where it was considered a specificity of Jewish women, or even earlier in *Comedia de Calisto y Melibea (La Celestina)* printed in Burgos (Spain) in 1499 [221] (ff. ii back line 27, xiv front line 25).<sup>38</sup> Clearly, the question why tree is systematically used in the masculine in *Consolação* lacks a clear and convincing answer.

In short, essentially due to errors (deliberate or not) or to an eventual grammatical undefinition still unresolved despite the almost complete settling of the Portuguese that had happened by 1500s [206] (p. 25), during fifty or so years in the second half of 16th century and in the beginning of 17th century, it is possible to find ‘tree’ or ‘trees’ written in Portuguese as if they were masculine entities, briefly breaking a continuous chain of use in the feminine. That is not to put aside the possibility that searching deeper, especially before the 1550s, would not reveal other cases where tree or trees were mentioned in the masculine. Also, we are fully aware that the only sources available to us are written ones, leaving in an unavoidable obscurity the much more frequent oral speech.

Such differences between written and oral forms are remarkably exemplified by the word *árvoe* itself. ‘Tree’ is and has been written in Portuguese for a long time with *v* (or with *u* in the past, which was equivalent) contrary to what happened in Latin and in all Latin-derived languages where it is written with *b* (Figure 4). However, in large areas of Northern Portugal even today it is still pronounced as if it was written with *b* (*árbore*). The difference in Portuguese between the sound *b* and *v*, or the lack of difference, is beyond the scope of this article. Nevertheless, pronouncing *v* as if it was a *b* is not only a break from the cultivated norm [222] (p. 23), but has been viewed for a long time as a barbarism and a sign of backwardness [74] (f. 4 front); [98] (p. 171); [158] (f. xxx front); [178] (f. xlvi back).

## 6. Gender of Fruit Trees and of Their Fruits

As seen in Supplementary Materials, Supplementary S2 *árvoe* (‘tree’) is conspicuously absent from the first Portuguese grammars and orthographies that were published during the 16th century and later [122–127]. Conversely, the use of *árvoe* to illustrate feminine nouns is not infrequent in more recent grammars [223] (p. 369). There it can also be found that the gender of nouns used to name fruit trees is generally feminine in Portuguese, as are the fruits they produce. However, when the fruit is in the masculine, the name of the tree that produces it usually is also written in the masculine [223] (p. 368).

Therefore, we set out to examine the gender in Portuguese of individual fruit trees and of the edible fruits they produce and how it compares with other Latin-derived languages. For this we prepared a list of 36 fruit trees for which we could identify gender of all or of most part of them in Latin as well as in Asturian, Barranquenho, Castilian, Catalan, French, Galician, Italian, Mirandese, Occitan, Romansh and Romanian.

To be included in the list, fruit trees had to have their name in Portuguese derived from the fruit they produce as is generally the rule in Portuguese and other languages [224,225]. Therefore, and despite its importance in the most part of the geography of Latin-derived languages in Europe, ‘olive

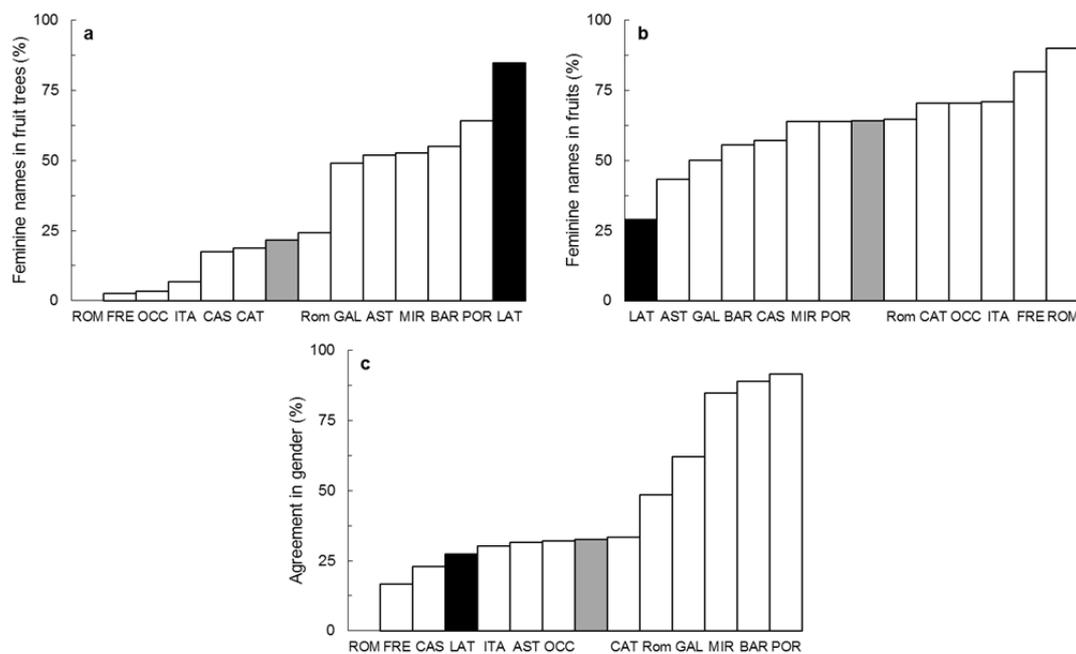
<sup>38</sup> Incidentally *guai* is still used colloquially in Spain today, but contrary to Italy where it kept the ancient meaning of sorrow, in Spain it completely changed and is used in a sense similar to the colloquial ‘Cool!’.

tree’ and ‘olives’ (*oliveira* and *azeitona* respectively, both nouns of the feminine gender in Portuguese) were not included in the list, which is fully presented in Supplementary Materials, Table S2. Binomial names were obtained from common names in Portuguese using [226] followed by a check of synonymy and authorship using [227]. Numerical characterizations and analyses were always performed in terms of feminine gender, as opposed to non-feminine (which in general means masculine) because in Latin and Romanian non-feminine has also to include the neuter. In addition, Latin, being the origin from where the other languages evolved, will never be considered in the analyses unless its inclusion is explicitly stated.

6.1. Distribution of Gender in Fruit Trees and in Their Fruits in Latin-Derived Languages

Percentages of fruit trees in the feminine in the Latin-derived languages examined, hereafter referred to as feminine trees, range from 0% in Romanian to 64% in Portuguese (median of 22%), while in Latin the value is higher, reaching 85% (Figure 7a).

Percentages of fruits in the feminine in the Latin-derived languages examined, hereafter referred to as feminine fruits, range from 43% in Asturian to 90% in Romanian (median of 64%), while in Latin the value is as low as 29%. However, names of fruits in Latin are almost never masculine (only in the case of dates) but instead almost always neuter (Figure 7b).



**Figure 7.** Percentage of (a) feminine in fruit trees; (b) feminine in fruits; (c) complete agreement in gender between fruit trees and their fruits. Latin, black bar; Latin-derived languages, white bars; median of percentages excluding Latin, grey bar.

As for the complete agreement in gender between the names of fruit trees and the names of their fruits in the Latin-derived languages examined, hereafter referred to as gender agreement, percentages range from 0% in Romanian to 92% in Portuguese (median of 33%), thereby supporting the statement that in Portuguese the gender of fruit trees and of their fruits generally agrees [223] (p. 368). Exceptions are ‘fig tree’ and ‘fig’ (feminine and masculine respectively), ‘quince tree’ (*gamboeiro* type), and ‘sweet chestnut tree’ both in the masculine, while the names of their fruits are in the feminine. In Latin, the value for gender agreement is 27% (Figure 7c).

The data shows a reduction of frequency of feminine names in fruit trees in relation to Latin in all Latin-derived languages examined, with percentages above the median and thus closer to Latin

occurring in more peripheral areas of Iberian Peninsula (in Romansh also, but very close to the median). More than 50% of feminine names in trees occur, by decreasing order, in Portuguese (64%) immediately followed by two languages strongly influenced by it, Barranquenho (55%) and Mirandese (53%) and finally in Asturian (52%), from which Mirandese derives [36]. However, in the 18 different fruit trees having feminine names in Mirandese and in the 14 different fruit trees in Asturian, only 9 were common to the two languages, namely ‘apple tree’, ‘European plum tree’, ‘fig tree’, ‘hazelnut tree’, ‘mulberry tree’, ‘pear tree’, ‘sour cherry tree’ and ‘sweet cherry tree’, and ‘walnut tree’.

The data also shows an increase of frequency of feminine names in edible fruits produced by trees in relation to Latin in all Latin-derived languages examined, with percentages below the median and thus closer to Latin occurring always in Iberian Peninsula (the exception being Catalan). Only Asturian and Galician have less than 50% of feminine names. This suggests a different and opposite general pattern of evolution from the predominant neuter in edible fruits in Latin to predominantly feminine forms in Latin-derived languages. The maximum belongs to Romanian where 90% of fruit names are in the feminine, the remaining being neuter and not a single one in the masculine.

Such generalized transformation of the neuter into feminine might relate with the general transformation of plural neuters in Latin into singular feminine in Latin-derived languages. An example might be the neuter word *folium* (‘leaf’) the plural being *folia* which, because of its ending in *a* might have been taken as a singular feminine by analogy with so many other singular feminine words ending in *a* like *rosa*, ‘rose’ [228] (p. 83). The same might have happened with edible fruits, a good example being *cerasum* (‘sweet cherry’), neuter in Latin and of feminine gender in all Latin-derived languages examined. However, in other cases the opposite occurred. *Persicum* (‘Persian fruit’, ‘peach’) which was also presented in [228] (p. 83) to exemplify the passage from the plural neuter to singular feminine, is of the feminine gender only in French, Italian and Romanian, and in the masculine in all other Latin-derived languages examined.

Conversely, instead of being unidirectional as in the variation of gender in trees and fruits, the evolution of the percentage of gender agreement from Latin to Latin-derived languages is clearly bidirectional. It decreases in relation to Latin in Castilian (23%), French (17%) and Romanian (0%) and increases in the other languages. The maximum of gender agreement is reached in Portuguese (92%) closely followed by Barranquenho (89%) and Mirandese (85%). However, gender agreement is a derived variable depending on the primary variables gender of fruit trees and gender of their fruits. Therefore, we set up to investigate the relationship, if any, between percentages of gender agreement and of feminine trees or fruits.

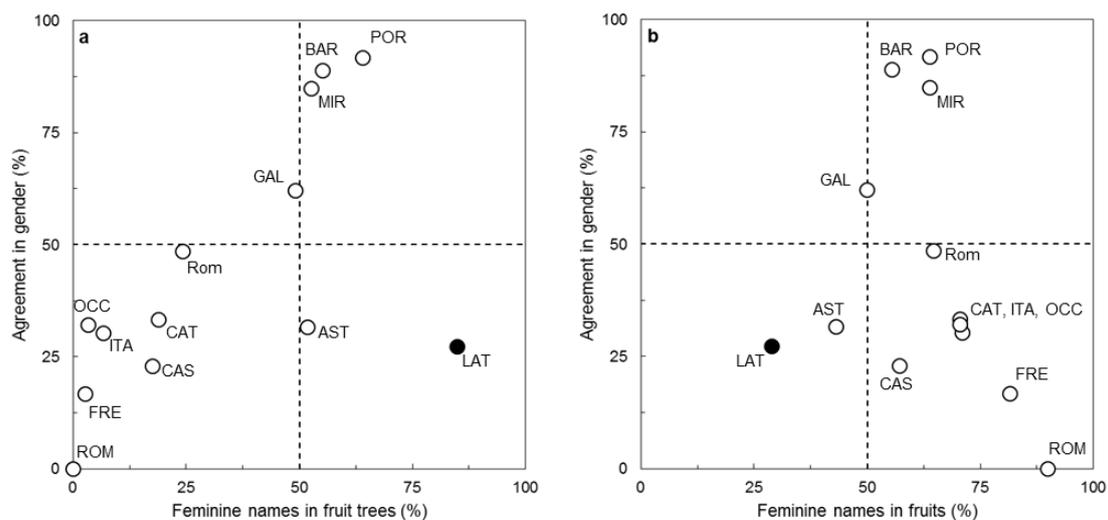
For this we used two separate but complementary approaches. The first is graphic and involves plotting the percentage of complete agreement in gender against the percentage of feminine names in fruit trees (Figure 8a) or, separately against the percentage of feminine names in their fruits (Figure 8b).

The second is probabilistic and involves determining Pearson’s product moment correlation coefficients between feminine trees or feminine fruits and gender agreement, hereafter referred to as correlation coefficient.<sup>39</sup> We always adopted a significance level of  $p = 0.001$  as reference for strong evidence against the null hypothesis of no correlation between variables [232]. All statistics were done with Statgraphics 4.2 (STSC, Inc., Rockville, MD, USA).

<sup>39</sup> Correlation, usually calculated as Pearson’s product-moment correlation coefficient represented by  $\rho$  in statistical populations and by  $r$  in samples as is the case here. It measures the amount of common linear variation (association) between two variables and varies between  $-1$  and  $+1$ , perfect negative and perfect positive association respectively, with  $\rho = 0$  denoting complete lack of linear association between variables. Because  $r$  underestimates  $\rho$  in small samples we will also present unbiased values of the coefficient of correlation,  $r^* = r\{1 + [(1 - r^2)/(2n - 8)]\}$  where  $n$  is sample size. Complementary to the coefficient of correlation, the lack of association between two variables can be expressed by the coefficient of alienation (determined as  $\sqrt{1 - r^2}$ ) which varies between 0 and 1. See [229] (pp. 556–566). Despite that correlation does not imply causation and despite that the usefulness of correlation has been so strongly questioned as to be almost denied, we will make use of it under the following assumption: whenever two variables are highly correlated either such high covariation is attributable to pure randomness or if not, something is the cause of it, even if we don’t have any hint of what that cause might actually be. See [230] (p. 3); [231].

Quadrant I in the biplot of feminine trees and gender agreement (Figure 8a, upper right), is occupied by Portuguese, Barranquenho and Mirandese and is characterized by high values of feminine names and especially by high values of gender agreement. Counter-clockwise from the upper right, quadrant II is essentially empty, only marginally occupied by Galician. Therefore, low values of feminine names and high values of gender agreement essentially do not come together in Latin-derived languages. Galician is almost equidistant (Euclidian distances) from Mirandese, Barranquenho and Romansh and nearer to Asturian than it is to Portuguese. Quadrant III is the quadrant with more languages, being characterized by low values of feminine trees and low values of gender agreement and thus complementary to the cluster Portuguese/Barranquenho/Mirandese. Finally, quadrant IV is characterized by high values of feminine trees and low values of gender agreement and is occupied by Latin and, marginally by Asturian which in this aspect is the Latin-derived language nearest to Latin, followed at some distance by Galician.

A closer look at Figure 8a makes clear that the percentage of feminine trees and of gender agreement covary similarly, with Asturian slightly deviant from the linear trend of the two variables. The coefficient of correlation between feminine trees and gender agreement for all Latin-derived languages is highly significant ( $r = 0.857$ ,  $n = 12$ ,  $p = 0.0004$ ;  $r^* = 0.871$ ; coefficient of alienation 0.515). The presence of the apparently outlier Asturian clearly does not prevent the outcome of a very large  $r$  and thus of a very strong association between feminine trees and gender agreement. However, as could be expected such a trend is strengthened when Asturian is removed from the analysis ( $r = 0.954$ ,  $n = 11$ ,  $p < 0.00005$ ;  $r^* = 0.960$ ; coefficient of alienation 0.301).



**Figure 8.** Biplot of percentages of complete agreement in gender between fruit trees and their fruits, and percentages of (a) feminine names in fruit trees; (b) feminine names in fruits. Latin, black circle; Latin-derived languages, white circles.

As remarked above, Portuguese, Barranquenho and Mirandese are located at quadrant I in Figure 8a with a relatively high value of feminine trees together with a high value of gender agreement between trees and fruit trees. This necessarily implies a high value of feminine fruits and their location in quadrant I of the biplot of feminine fruits and gender agreement (Figure 8b, upper right). In Figure 8b, Galician occupies essentially the same place it occupied in Figure 8a. It is again almost equidistant (Euclidian distances) from Mirandese, Barranquenho and Romansh but almost at the same distance to Asturian or Portuguese. Quadrant II is basically empty while Latin and Asturian for one side and all the remaining Latin-derived languages necessarily change quadrants. Asturian is again the Latin-derived language nearest to Latin, now followed at some distance by Castilian.

However, a closer look at Figure 8b fails to reveal the clear trend observed in Figure 8a. Instead it appears that two independent patterns of association might exist. One including Galician, Romansh, Catalan, Occitan, Italian, French, and Romanian in which the percentage of feminine fruits and of gender agreement show an inverse association, the other including Galician again plus Barranquenho, Mirandese, and Portuguese showing a direct association. In addition, Asturian again and Castilian appear slightly deviant from the two linear trends of variation described.

Analyses of correlation essentially support this graphically-based reasoning. Considering all Latin-derived languages no significant association is found ( $r = -0.493$ ,  $n = 12$ ,  $p = 0.104$ ;  $r^* = -0.516$ ; coefficient of alienation 0.870). Removing Asturian and Castilian from the analysis the evidence of association between feminine fruits and gender agreement is highly enhanced ( $r = -0.811$ ,  $n = 10$ ,  $p = 0.004$ ;  $r^* = -0.834$ ; coefficient of alienation 0.584). However, when Barranquenho, Mirandese and Portuguese are also removed, leaving only Galician, Romansh, Catalan, Occitan, Italian, French, and Romanian in the analysis a highly significant association is found ( $r = -0.987$ ,  $n = 7$ ,  $p < 0.00005$ ;  $r^* = -0.992$ ; coefficient of alienation 0.158). By the contrary no significant association is found using only Galician, Barranquenho, Mirandese, and Portuguese ( $r = 0.786$ ,  $n = 4$ ,  $p = 0.214$ ; coefficient of alienation 0.618), the same when Asturian is added to the analysis ( $r = 0.907$ ,  $n = 5$ ,  $p = 0.033$ ;  $r^* = 0.988$ ; coefficient of alienation 0.420).

Being the language from where the others evolved, we have until now always kept Latin removed from analyses. However, Latin's position in the biplot of feminine fruits and gender agreement makes the reversal of such exclusion tempting. Adding Latin to Galician, Barranquenho, Mirandese, and Portuguese increases the clearly non-significant correlation coefficient  $r = 0.786$  to  $r = 0.962$  ( $n = 5$ ;  $p = 0.009$ ;  $r^* = 0.998$ ; coefficient of alienation 0.273), very close to the borderline for strong evidence that feminine fruits and gender agreement covary. Further inclusion of Asturian only weakens the association between variables ( $r = 0.925$ ,  $n = 6$ ,  $p = 0.008$ ;  $r^* = 0.958$ ; coefficient of alienation 0.380).

In short, feminine trees and gender agreement appear to be directly associated in all Latin-derived languages. An inverse association appears to be present for feminine fruits and gender agreement provided that Asturian and Castilian are discarded. However, this latter association seems to result from two separate processes, namely a strong inverse association involving all non-Iberian languages plus Galician and Catalan, and a presumably weaker association involving only western-most Iberian languages but, somehow surprisingly, only if Latin is also included.

Taking as good the existence of those separate processes, even if their underlying causes are not clear to us, it is conceivable that each process can be algebraically described by the straight-line if any exists, that best fits the distribution of languages involved in each process.<sup>40</sup>

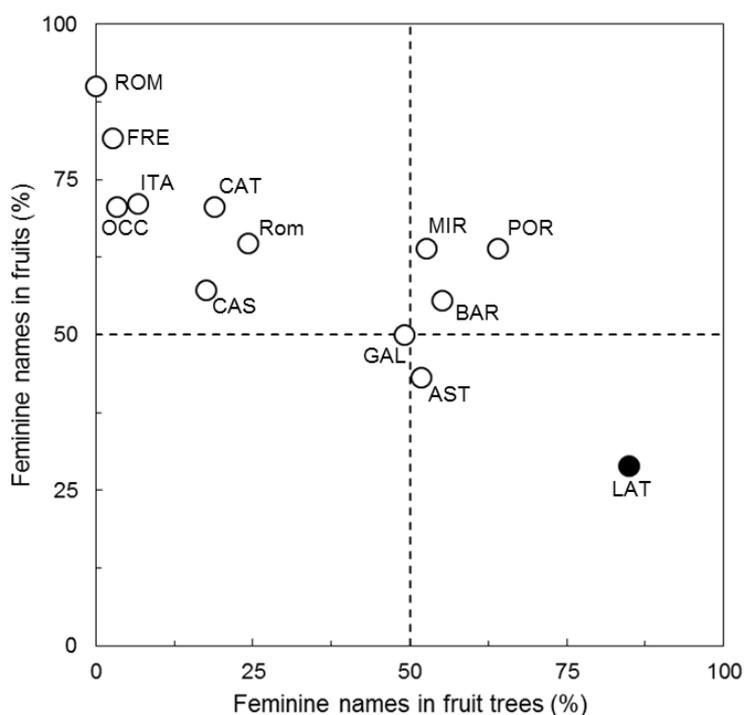
Looking at Figure 8b or having in mind that all languages are in the same geometric plane and that Galician belongs to the two data sets and thus participates in the two processes, then the two-straight lines cross somewhere in the vicinity of Galician, and the angle they form can be measured. Fitting highly significant straight-lines was possible for the two data sets, the angle they form being approximately 68°.

Two straight-lines in the same plane can form an angle from 0° to 90°, meaning that the relationship between raw, untransformed variables can range from complete linear dependency to complete linear independency [235]. For an angle of 68° the implication is that processes that governed or were responsible by the variation of feminine fruits and the agreement in gender in the two groups of Latin-derived languages were in the most part independent. Despite this, Asturian

<sup>40</sup> In fact, for each data set two straight-lines can be fitted, one considering fruits written in the feminine as the variable to be explained and gender agreement as the explanatory variable, the other the opposite, fruits in the feminine as the explanatory variable and gender agreement as the variable to be explained. In either case, the angle formed by the two-straight lines is the same and the subsequent reasoning is not affected. Equations were fitted by least squares linear regression adopting an experiment-wise type I error-rate of 0.001 determined by the Dunn-Sidak method and forced through the origin whenever necessary. See [233] (pp. 5–17); [234].

and Castilian had to be excluded and Latin had to be included in the weakest associated group. Nevertheless, the two processes essentially lead to the same outcome in Galician.

Finally, we will examine the variation of feminine trees and feminine fruits (Figure 9). As should be expected Portuguese, Mirandese and Barranquenho are located in quadrant I of high percentages of feminine names in both trees and fruits. The bulk of Latin-derived languages occupy quadrant II characterized by low percentages of feminine trees and high percentage of feminine fruits. Quadrant III is totally empty. Quadrant IV, high percentage of feminine trees and low percentage of feminine fruits is essentially occupied by Latin, and marginally by Asturian, again the Latin-derived language nearest to Latin in this aspect and closely followed by Barranquenho. Galician is even more central than before.



**Figure 9.** Biplot of percentages of feminine names in fruits and fruit trees. Latin, black circle; Latin-derived languages, white circles.

As happened with the variation of feminine trees and of gender agreement (Figure 8a), feminine trees and feminine fruits vary similarly but now inversely. Mirandese, Barranquenho and Portuguese are slightly deviant from the linear trend of variation of the two variables. The coefficient of correlation for all Latin-derived languages shows a relatively high association between feminine trees and feminine fruits ( $r = -0.734$ ,  $n = 12$ ,  $p = 0.007$ ;  $r^* = -0.755$ ; coefficient of alienation 0.679).

However, the presence in the analysis of the apparent outliers Mirandese, Barranquenho and Portuguese clearly prevent the outcome of a very large  $r$ , thus of a highly significant correlation and thus of a highly significant association between feminine trees and feminine fruits. This reasoning is evident when the analysis is done without those three Latin-derived languages ( $r = -0.901$ ,  $n = 9$ ,  $p < 0.00005$ ;  $r^* = -0.918$ ; coefficient of alienation 0.433).

In short, the evolution from Latin seems to consist of the reduction of frequency of the feminine in names of fruit trees simultaneously with an increase of the feminine in the names of fruits, a trend from which Portuguese and the intimately related Mirandese and Barranquenho are partly absent. Two clearly distinct groups of Latin-derived languages can be identified, one of Western and Northwestern Iberian languages including Portuguese, Mirandese, Barranquenho, Galician and Asturian, the other of non-Iberian languages plus Castilian and Catalan.

## 6.2. Derivation with *-arius* and Gender Inversion in Latin-Derived Languages

In terms of gender inversion, the data of complete agreement in gender between fruit trees and their fruits discussed in the preceding subsection mean that Romanian and French present the highest rates of gender inversion between base represented by fruit names and derivative represented by fruit tree names, 100% and 83% respectively. Conversely, Portuguese and the closely related Barranquenho and Mirandese present the lowest rates of gender inversion, 8%, 11% and 15% respectively (Figure 7c). These results basically agree with the data presented by Roché on rates of gender inversion [236], differences between our data and Roché's, resulting probably from the consideration by the latter of non-fruit trees and other plants.<sup>41</sup>

In addition, rates of gender inversion are frequently the highest in French when other categories of *-arius* derivatives by suffixation are examined. The same happens in "containers", "collectives" and, in a lesser degree in "collectives/places". Conversely, Portuguese always presents and frequently by far, the lowest rates of gender inversion. The only exception is the inversion from masculine to feminine, but not the combined rate, in "collectives" [236]. Clearly Portuguese seems to be "averse" to gender inversion.

In French, most fruit names are feminine, 82%. A higher value is only found in Romanian (Figure 7b) and gender inversion occurs in almost all the derived names of fruit trees. When there is no gender inversion, the names of the fruit and of the fruit tree are both masculine. As a consequence, almost all names of fruit trees we found are masculine in French (97%), which might have resulted, at least in French, in the change to masculine of the gender of *arbre* [236].

It was argued that in Portuguese the gender of *árvore* remained feminine and thereby names of trees were also in the feminine [229]. However, in Portuguese the occurrence of feminine names in fruit trees is not overwhelming as the occurrence of masculine names in French is. In Portuguese, 64% of names of fruit trees are feminine 36% are masculine (Figure 7a).

Comparing the gender of names of fruit trees in Portuguese and Latin (Supplementary Materials, Table S2) one finds a striking agreement between the two languages and in 74% of the cases the gender of names of fruit trees is the same in Portuguese and Latin. Keeping in mind the seeming "aversion" to gender inversion in Portuguese, then the gender of the name of fruit trees is conserved in the name of their fruits. Finally, the gender of *árvore* and of the names of fruit trees seems to be essentially independent which also implies that the gender of *árvore* is not the paradigm for the gender of names of fruit trees.

This led us to question whether the same occurs when non-fruit trees are considered. Therefore, we prepared a list of 128 names of non-fruit trees corresponding to at least 47 different species (see Supplementary Materials, Table S3). Sources for common names were essentially references [36,237,238]. Binomial names were obtained from common names in Portuguese using [36,226] followed by a check of synonymy and authorship using [227].

The data shows that in Portuguese the masculine prevails in the names of non-fruit trees, and only 37% are in the feminine. When only names of non-fruit trees formed by suffixation with *-arius* are considered, the percentage of feminine names is 36%, essentially the same and equal to the percentage of masculine names of fruit trees. As could be expected, the rate of gender inversion is low but much larger than in fruit trees (27% against 8%).

In short, in Portuguese, the gender of *árvore* clearly is not the paradigm for the gender of tree names. Names of non-fruit trees are essentially masculine, as should be expected if no cause for gender assignment is in place, the masculine being attributed by default. Names of fruit trees seem to have the gender taken from their names in Latin and also seem to serve as base to the gender of the name of their fruits.

<sup>41</sup> The values for gender inversion in 165 names of trees and other plants in French is 64% and in 181 names in Portuguese is 19% respectively lesser and higher than in our data involving only fruit trees [236].

*Árvore* in Portuguese has the gender *arbor* had in Latin. Interestingly, the same gender conservation happened with the intimately connected *fruto* ('fruit'), gender masculine in Latin and in Portuguese. However, contrary to 'tree', 'fruit' is also a masculine noun in all other Latin-derived languages examined, except in Romanian where it is neuter,<sup>42</sup> and no search for linguistic explanations is required to account for the fact that no change of gender occurred. Similarly, no search for linguistic explanations is required to account for the fact that no change of gender occurred when *arbor* in Latin evolved to *árvore* in Portuguese.

Conversely, linguistic explanations are worth looking for in those Latin-derived languages where the gender of tree changed, which as we have seen were almost all. A linguistic explanation for French was presented in [229] and is summarized above, but searching for explanations in relation to all other Latin-derived languages is undoubtedly beyond the scope of this article. Nevertheless, the conservation of the gender feminine in *árvore* in Portuguese when the masculine is the rule in Latin-derived languages is puzzling and merits some effort to explain it.

In [38] it is argued that the conservation of the feminine in 'tree' resulted from an animist vision of Nature and from the association of fruit production with biological reproduction assured by the feminine. This is clearly an extra-linguistic explanation and no further arguments were presented to substantiate why animism and association with reproduction were attributes of Portuguese, and how and why such attributes were absent or were lost in all other Latin-derived languages where the gender of tree changed to masculine. An alternative tentative explanation, also extra-linguistic, is presented in the next section accounting not only for the gender of 'tree' but also for gender agreement between fruit trees and their fruits.

## 7. Final Remarks

Portuguese is the Latin-derived language closest to Latin in what concerns the gender of fruit trees, which are predominantly feminine entities as they were in Latin. Together with Mirandese, the other official spoken language of Portugal, it is also the only Latin-derived language in which the word used for 'tree' is, and almost certainly always was feminine, like it was in Latin.<sup>43</sup>

Chance alone can hardly be responsible for these outcomes or for the positioning of Portuguese in biplots of the relationships between feminine trees and gender agreement and of feminine fruits and gender agreement (Figure 8) or between feminine trees and feminine fruits (Figure 9).

A number of factors might have been in place for such close proximity between Portuguese and Latin in this subject. Among others it is worth remarking that the Romance evolving in Portugal was strongly influenced by the Latin used in legal and religious contexts [166] (p. 26) and that as early as the reign of Portuguese King Sancho I (between 1185 and 1211) the Latin used in the royal chancellery was unusually perfect and correct for the time, with Latin classics being followed without syntactical or morphological errors or deviations [239] (p. 608). Even in the 16th and early 17th centuries, the greater resemblance of Portuguese to Latin in comparison with other Latin-derived languages in use in the Iberian Peninsula was recognized by Spanish grammarians. In a grammar aimed at non-native Castilian speakers wanting to learn the common language of Spain [240], published in Louvain (Belgium) in 1559, the unknown author candidly recognizes that Portuguese is closer to Latin than what he calls the common language of Spain [241] (p. 3). The same is stated in Cristóbal Villalón's *Gramatica Castellana: Arte Breve y Compendiosa Para Saber Hablar y Escribir en la Lengua Castellana Congrua*

<sup>42</sup> *Fructus* in Latin, *frutu* in Asturian, *fruto* in Barranquenho, Castilian and Portuguese, *fruit* in Catalan and French, *froitto* in Galician, *frutto* in Italian, *fruito* in Mirandese, *fruch* in Occitan, *frig* in Romansh, and *fruct* in Romanian.

<sup>43</sup> The same occurs and is even strengthened if we consider only the fruit trees and their fruits that were already present in either one of the two first monolingual Portuguese dictionaries (see Supplementary Materials, Table S2), both published few years apart in the 1780s [99,102]. Using such a shorter list the percentage of feminine names in fruit trees is 66% and of feminine names in their edible fruits is 65%, a slight increase but an increase nonetheless in relation to the percentages in the full list, 64% for trees in the feminine and for fruits in the feminine.

y *Deçentemente* published in 1558 or in Bernardo Aldrete's *Del Origen y Principio de la Lengua Castellana ò Romance que Oi Se Usa en España* published in 1606, almost half century later [33] (p. 160).

Also important was certainly the adoption of Portuguese in all official and legal documents that was imposed by the royal chancellery during the reign of King Dinis (ruled between 1279 and 1325), Latin being left for liturgical use of the church alone. This was a remarkably precocious adoption of a common language for secular and governmental use not only in the Iberian Peninsula but in Europe at large [70] (p. 25); [88] (p. 95), inevitably with consequences for the evolution of Portuguese.

Later on, when the task of settling Portuguese was carried out between 1536 and 1576 by grammarians like Fernão de Oliveira [122], João de Barros [32,125], Pero de Magalhães de Gândavo [127], Duarte Nunes de Leão [128] or by João Barreto [98] a century later, the study and knowledge of ecclesiastic and classic Latin were major bases for such settling [70] (p. 25). The close proximity between Portuguese and classic Latin could not but help the settling of the former as much as possible along the lines determined by the latter.

Whatever the relative importance of these or of other factors, the gender attributed to the entity 'tree' in Portuguese has not changed through time. "Language is the place from where the World is seen" [1] (pp. 83, 84), and Portuguese see 'tree' and trees that provide food in the feminine.

**Supplementary Materials:** The following are available online at [www.mdpi.com/2226-471X/2/3/15/s1](http://www.mdpi.com/2226-471X/2/3/15/s1), Supplementary S1: Tree as a feminine entity in Portuguese through time. A review; Supplementary S2: Paucity of reference to tree(s) in Portuguese through time. A review; Table S1: Variation of the gender of the word tree in successive editions of bilingual Portuguese-Latin and Latin-Portuguese dictionaries authored by Jerónimo Cardoso (deceased in 1569) and published between 1562 and 1694 in Lisbon or in Coimbra (Portugal); Table S2: Names and gender of tree, fruit, fruit trees and their fruits in Latin and in Latin-derived languages (Asturian, Brranquenho, Castilian, Catalan, French, Galician, Italian, Mirandese, Occitan, Portuguese, Romansh and Romanian); Table S3: Names and gender of non-fruit trees in Portuguese and, in the case of names derived with *-arius*, names and gender of the base when known.

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