CHAPTER 4

Grafting Glory

In Book 15 of the *Natural History*, on fruit and nut trees, Pliny the Elder deploys unusually strong language in a remarkable statement phrased as rhetorical apophasis (bold mine):

> *Reliqua cur pigeat nominatim indicare, cum conditoribus suis* ***aeternam*** *propagauerint* ***memoriam****, tamquam ob* ***egregium*** *aliquod in uita factum? Nisi fallor, apparebit ex eo ingenium inserendi nihilque tam paruum esse quod non* ***gloriam*** *parere possit.* (Plin. *HN* 15.49)
>
> Why should I hesitate to indicate by name the remaining varieties of fruit, seeing that they have prolonged the memory of those who established them for all time, as though on account of some outstanding achievement in life? Unless I am mistaken, the recital will reveal the ingenuity exercised in grafting, and will show that nothing is so trifling as to be incapable of producing glory. (trans. H. Rackham, Loeb edn, with my substitution of 'celebrity' with 'glory' to translate the Latin *gloria*)

These lines are poignant and use lexical choices – *egregius*, *gloria*, *aeterna memoria*, etc. – more normally found in the context of military achievements, the elite's traditional avenue to fame. Instead, Pliny emphasizes developing new fruit varieties and *naming* them as a pursuit that can confer glory and ensure posthumous commemoration. Grafting occupied a prominent place in some Latin literary production, notably in Virgil: its symbolism and allegorical values had multivalent effects.[1] Ancient myth emphasizes the absolute importance of grafting in agriculture: according to Macrobius, grafting and the cultivation of fruit trees, along with sowing and other forms of propagation, featured among the teachings that the god Saturn would have given to the early inhabitants of Italy.[2]

[1] On grafting in Latin texts and its symbolism, see Pease 1933; Pigeaud 1988; and Lowe 2010.
[2] Macrob. *Sat.* 1.7.25.

Is Pliny being sarcastic with these words, attributing immortal celebrity to the creator of a new apple or a new type of fig?[3] I do not think so. The idea that successful agricultural hard work could bestow fame occurs more than once in the *Natural History*.[4] When such glory is sought in the right measure, it is a positive thing, whereas excesses, as in other cases in Pliny's discourse, are utterly negative.[5] In Pliny's work, the interest in grafting by prominent Romans for both ideological and practical reasons (i.e., to ameliorate production of one's estate and gain commercial advantage) is stated most explicitly.

It has been said that Pliny's discussion of grafted cultivars 'is also a discussion of aristocratic agriculture and fame in an empire that left few avenues for social recognition to the Roman elite'.[6] However, even if certain traditional avenues of recognition for the Roman elite had been curtailed in the imperial period, most notably the possibility of obtaining a military triumph or of sponsoring building projects in the city of Rome, how to explain why grafting and naming new fruit could be charged with such high value?

First, the actual biology behind grafting is absolutely central to the domestication and cultivation of fruit trees and the maintenance of a cultivar with consistent traits and characteristics. Grafting may have been a source of fascination and a curiosity for some Latin writers, but it was a fundamental and normal practice on any farm from antiquity to the present; arboriculture cannot exist without grafting.

Second, the ideological valence given to grafting and the creation of new varieties represents the culmination of those processes discussed in the first three chapters of this book: the *historical emergence* of gardens and plants as embodiment of the public persona of the owner and the use of garden

[3] Lowe 2010, 479 sees a pun in the lines. Cf. Plin. *HN* 25.22, although in the general context of discussing medicinal plants: *Fuit quidem et hic quondam ambitus nominibus suis eas adoptandi, ut docebimus fecisse reges* ('It was one of the ambitions of the past to give one's name to a plant, as we shall point out was done by kings', trans. W.H.S. Jones, Loeb edn).

[4] On the whole, Pliny offers a unified vision of the physical world of Rome and of the moral price of her vast empire; in the *Natural History*'s discourse, art is linked to nature, austerity to luxury, Greek to Roman: Beagon 1992; Carey 2003; Murphy 2004. An important aim of the work is, however, *iuvare mortalem*: Naas 2002, 84.

[5] See, e.g., the positive case of Acilius Sthenelus (discussed later in this chapter), whose work in bringing back to high levels of production a neglected vineyard generates *summa gloria* for the owner of the land, the grammarian Remnius Palaemon; or the negative case of Lucius Tarius Rufus, consul in 17 BC, who spent *c.*100 million sesterces in buying up farms in Picenum, *colendo in gloriam* ('farming it in search of glory', *HN* 17.37): in this case, he had overdone it, hence Pliny's negative view.

[6] Squatriti 2013, 93.

spaces to political ends, as seen in the case of Pompey; the *social prestige* among elites in plant transplanting and in the acclimatization of new plants, which could be seen as a symbolic representation of Rome's imperialism and participation in it; and, finally, the considerable *interest and advancement in horticulture* in general that occurred during the end of the Republic and the Julio-Claudian period. Such interest in horticulture largely occurred in response to two phenomena: the general demographic growth of Roman Italy, with an increase in the percentage of urban population, in particular in Rome, which increased the demand for fresh produce destined for the capital;[7] and the extensive programmes of veteran settlements in the provinces, which stimulated the search for, and selection of, the best cultivars of grape, but also other plants, to be grown on the newly established farms.[8] These very practical and economically based issues, feeding Rome with vegetables and fruit and establishing successful provincial cultivations, coexisted with the development of the Augustan ideology celebrating a new Golden Age after the long period of civil wars and turmoil. As we have seen, many intellectuals took interest in all matters agricultural, including arboriculture, in response to, and in coordination with, this ideology.

Grafting and Arboriculture

With the domestication of fruit trees, cultivators changed 'the reproductive biology of the plants involved by shifting from sexual reproduction (in the wild) to vegetative propagation (under cultivation)'.[9] In other words, domesticated varieties of fruit trees are reproduced as clones, by the farmer's intervention, by using three possible vegetative techniques:

- rooting of twigs/cuttings;
- planting of suckers;
- scion grafting.

Very rarely are domesticated fruit trees raised from seeds,[10] since seedlings tend to revert to the wild form of the plant and the fruit produced does not have the same qualities of the parent plant, but tends to deteriorate in quality.[11] The ancient Greeks were well aware of this problem,

[7] For the impact of Rome's growth on its hinterland, see Morley 1996.
[8] As discussed in Chapters 2, 7, and 8.
[9] Zohary, Hopf, and Weiss 2012, 114.
[10] Only some kinds of nut tree, such as the almond, the walnut, and the carob, were traditionally reproduced by seed planting: Zohary, Hopf, and Weiss 2012, 115.
[11] White 1970a, 248.

and Theophrastus commented on it.[12] This is the result of the fact that fruit trees are 'normally cross-pollinated and widely heterozygous.[13] Therefore even if employing seeds from a superior cultivar, the progeny will not have the desired characteristics and will be economically worthless'.[14] On the contrary, vegetative propagation, in particular grafting, gives a yield true to type.[15] Thus, the farmer is able to select individual plants that display desirable characteristics, such as hardiness, size, and flavour of fruits and time of ripening. These can be maintained by cloning the plant to obtain saplings that are genetically identical to the parent plant. Vegetative propagation rather than seed planting has thus been the manner in which farmers could assure a dependable supply of desired genotypes and select superior cultivars. Once humans discovered grafting and fully mastered it, the domestication of a whole new range of fruit trees became possible, as in the case of the citrus group, which seem to have been first domesticated in the East, probably in China, before spreading to the Mediterranean.[16]

Of the three vegetative reproductive techniques listed above, grafting offers a clear advantage from the point of view of the cultivator: it allows one to 'domesticate' wild varieties of the same plant by grafting a domesticated variety that has desirable characteristics onto it, thus changing adult, and productively/commercially worthless plants, into productive

[12] Theophr. *Hist. pl.* 2.4–6; cf. also *Caus. pl.* 5.3.1.

[13] This means that the pairs of genes located in a specific position on a chromosome are different from each other; if such a plant reproduces sexually, recombination of the genetic material will occur, each time in a slightly different combination, because of the gene pairs being different.

[14] Zohary, Hopf, and Weiss 2012, 114. [15] White 1970a, 248.

[16] A range of fruit trees seem to have been introduced into the Mediterranean basin from the Far East, as inferred on the basis of archaeological and also DNA evidence, and perhaps it is for this reason that Zohary, Hopf, and Weiss (2012, 115) suggest that 'grafting was probably invented outside of the region of Mediterranean horticulture and introduced into this region from the east'. It is, however, surprising that they then go on to state that the earliest, indirect, credible information on the use of grafting comes from China in the context of citrus fruit domestication and that one of the texts reporting this is dated to *c.*139 BC, when a few sentences earlier they had recognized that Theophrastus gives an accurate description of grafting in the fourth century BC (which implies the technique had been around and in use in Greece for some time). Is a spread of grafting *from* the Mediterranean basin *to* the east not a possibility worthy of consideration? The Chinese text in question is the Masters of Huainan, *Huainanzi*, which seems to allude to the grafting of sweet orange on thorny lime bush, while the third-century BC Chinese encyclopaedia *Er ya*, by referring to seedless varieties of fruit, implies either propagation by cuttings or by grafting; however, the first *detailed* description of the grafting process in Chinese sources dates to the sixth century AD, the agricultural treatise *Qi Min Yao Shu* (Métailié 2007, 149). On Chinese sources, see also Mudge *et al.* 2009, 548–9. At p. 450 they observe that although grafting is not specifically mentioned in the Hebrew Bible, there are possible allusions to grafting of vines; by the Talmudic period grafting was clearly referred to in Jewish writings (e.g., Mishna, Kilayim 1:7: 'It is unlawful to graft tree on tree, vegetable on vegetable, tree on vegetable or vegetable on tree' if they belong to a different species).

ones. This solution is very advantageous if, for instance, one is looking to bring to fruit an already relatively developed (wild) plant which does not bear commercially viable fruits, because these are very small or too sour, for instance. The most common occurrence of this practice in antiquity is probably the grafting of the olive onto the oleaster, the wild olive spontaneously present in a number of Mediterranean regions,[17] or onto the olivaster,[18] which is attested in a number of epigraphic documents from Roman North Africa (see discussion below).[19]

The other situation when recourse to grafting is very useful is when a stronger rootstock is sought in order to develop more resistant plants, better able to withstand disease, frost, or droughty soils. Even in the case of cultivated plants that have been reproduced from suckers or root cuttings, grafting can be economically advantageous because it offers the means to reduce the wait for young plants to reach maturity and start bearing fruits; by grafting the scion of an adult plant onto a young rootstock, this hiatus is circumvented, since the scion will be ready to flower and produce fruits.

Not all three vegetative propagation techniques are equally suitable for every kind of fruit tree. When looking at the history of domestication of fruit trees and nuts, available evidence indicates that the first fruit trees introduced into domestication in Southeast Asia and Europe were the olive, the vine, the date palm, the pomegranate, the fig, and the sycamore fig. These are all plants that can be reproduced by simply taking cuttings and letting them root (vine, fig, sycamore) or by digging out suckers (the pomegranate), by taking offshoots (the palm) or by planting basal knobs (the olive).[20] The fact that these trees did not need a more sophisticated technique such as grafting for vegetative propagation probably explains why they were the first fruit trees to be domesticated. On the contrary, other very common fruit trees in classical antiquity – the apple, the pear, the plum, sweet cherry, and the pistachio – do not lend themselves well to simple vegetative propagation and their maintenance is almost entirely

[17] The scientific name of the cultivated olive is *Olea europea* L.; the wild olive-oleaster is *Olea europea* L. subsp. *oleaster* Hoffm. et Link.

[18] Olivaster normally indicates feral forms of the olive resulting from seedlings of cultivated olive trees or seedlings of crossings between cultivars and the wild olive-oleasters. On the classification and origin of *Olea europea*, see Bartolini and Petruccelli 2002, 21–6; for the relationship between olive and oleaster, Zohary, Hopf, and Weiss 2012, 116–21. The oleaster is fully interfertile with the cultivated olive and spontaneous hybridization can occur. In Mediterranean regions oleasters grow spontaneously in the presence of carob trees (*Ceratonia siliqua*), juniper, and mastic (*Pistacea lentiscus*): Bartolini and Petruccelli 2002, 21.

[19] Cf. New Testament, Romans 11:24, which uses a reference to the grafting of wild olive and cultivated olive as an allegory.

[20] Zohary, Hopf, and Weiss 2012, 115.

reliant on grafting.[21] Although the earliest evidence for the domestication of these fruit trees appears in the third millennium BP,[22] their extensive incorporation into horticulture seems to have been a phenomenon of the Greek and Roman periods.[23] Grafting has applications in viticulture too, since the grape vine (*Vitis vinifera* L.) is normally propagated vegetatively, by either rooting winter dormant twigs or by grafting.

Horticulture, and particularly fruit-tree cultivation, differs fundamentally from cereal agriculture. While the latter, being annual crops that can be harvested some months after sowing, theoretically allow the cultivator to move production from one spot to another (known as 'shifting farming'), fruit trees start to bear fruit after three to eight years, depending on the species, but reach full productive potential only several years later.[24] For that reason, arboriculture is a long-term investment requiring a well-developed, settled society, secure property rights and/or long-term land leases, as well as the protection of the plants from intruders and animals for the whole year.

This overview helps set the right context for understanding the emphasis given to grafting in certain Latin literary sources. The goal was to *maintain* the same characteristics of the parent plant in common fruit trees by propagating the plants by grafting. In addition, grafting is an essential technique in developing fruits with new characteristics or in domesticating new plants. It is also essential to commercial agriculture, when maintenance of the same fruit genotypes and reproduction of a given cultivar on a large scale are needed. Therefore, grafting, which finds its earlier classical descriptions in the Greek author Theophrastus and in the Hippocratic author of the treatise *On the Nature of the Child*,[25] was a basic and common technique for the ancient Mediterranean farmers of the Greek, Roman, and – we should also add – Punic worlds.

Grafting for Dummies

Grafting consists in joining the tissues of two different plants,[26] allowing them to bind and continue their growth together as a single plant with a

[21] Zohary, Hopf, and Weiss 2012, 115.

[22] Normally scientific studies, particularly those using radiocarbon dating, use the 'Before Present' (BP) dating convention; 'Present' refers to AD 1950, the rounded date for Willard Libby's proposal of 1946 to date organic materials by measuring their carbon-14 content.

[23] Zohary, Hopf, and Weiss 2012, 115.

[24] Zohary, Hopf, and Weiss 2012, 115.

[25] *Hist. pl.* 2.5.3. *On the Nature of the Child* 15, Loeb 10.76–8, a work dated to *c.*424 BC. For a survey of grafting among different civilizations and epochs, see Mudge *et al.* 2009.

[26] The vascular cambium.

compound genetic system in which the distinct genetic identity of the stock and scion are maintained.[27] A plant, chosen for its roots only and called the rootstock, is connected to a cutting (the scion), chosen for its proper vegetative parts, i.e., the leaves, flowers, and fruits.[28] It is also common, both in ancient and modern times, to graft two varieties of the same fruit onto a plant, so that, for instance, one half of a tree will bear white mulberries and the other black ones. For a graft to take hold and the point where the two plants have been joined to 'heal', several weeks are needed; the exact time depends on the type of plants being grafted and what grafting methods are used. Plant compatibility is crucial for a successful graft because only 'interclonal/intraspecific grafts are nearly always compatible'.[29] Very rarely are intragenetic and intrafamilial grafts compatible, whereas grafts between plants of different families are always incompatible.[30]

Grafting is mentioned in the work of all four Latin agronomists (Cato, Varro, Columella, and Palladius); however, the degree of detail given in their works notably varies. Whereas Cato refers to grafted fruit at various points of his manual, largely by the use of the verb *inserere*,[31] and Varro discusses the compatibility of stock/scion,[32] for a detailed (and largely accurate) description of various grafting techniques we need to turn to Columella. As he himself clearly states in the preface to his agricultural treatise, the knowledge required to truly master all agricultural things is considerable, and not many people had achieved this. In this opening, Columella uses the example of the knowledge of the various grafting techniques and of horticulture to emphasize that few would have applied themselves to systematically acquire this knowledge:

> *quis tanti studii fuit, ut super ista, quae enumeravimus, tot nosset species insitionum, tot putationum, tot pomorum holerumque cultus exerceret, tot generibus ficorum sicut rosariis impenderet curam, cum a plerisque etiam*

[27] Mudge *et al.* 2009, 440.
[28] When the lower portion of the grafted plant includes not only the roots but also some portion of the shoot system on which the scion is grafted, one talks of 'under stock' rather than rootstock.
[29] Mudge *et al.* 2009, 440.
[30] Mudge *et al.* 2009, 440, note that these are broad generalizations that are 'complicated by the observation that the degree of taxonomic affinity necessary for compatibility varies widely across different taxa'. As example, they cite the case of the interspecific/intrageneric combination of almond (*Prunus amygdalus*) and peach (*P. persica*), which is compatible, while almond/apricot (*Prunus armeniaca*) is not (441).
[31] E.g., Cato, *Rust.* 7.3–4, in reference to suburban estates: *Poma, mala strutea, cotonea Scantiana . . . item alia genera quam plurima serito aut inserito*; 40–2 on grafting of figs, olives, apples, pears, and vines. At *Rust.* 41, he refers to a technique that combines grafting and layering of vines.
[32] Varro, *Rust.* 1.40.5.

> *maiora neglegantur, quamquam et ista iam non minima vectigalia multis esse coeperint?* (Columella, *Rust.* 1, *Praef.* 27)
>
> Who has extended his studies so far as to be acquainted, in addition to the points which I have enumerated, with the many methods of grafting and pruning? To put in practice the cultivation of the many fruits and vegetables? To devote his attention to the many varieties of figs as well as to rose-gardens, when even greater things are neglected by most people even though they have now begun to be, for many farmers, not the least part of their revenue?' (trans. E.S. Forster and E.H. Heffner, Loeb edn)

Columella, on the contrary, presents himself as someone who has knowledge of all these topics, and therefore his work devotes ample space to discussion of grafting and horticultural matters. He is very clear about the benefits of grafting: an engrafted tree is more fruitful than one that is not, as for instance, a young plant reproduced by slippage.[33]As summarized by White,[34] Columella describes four kinds of grafting techniques:

(1) cleft-grafting and (2) bark-grafting, indicated by the Latin term *insitio*, from the verb *inserere*;
(3) patch-budding, referred to by either the term *inoculatio* or by the Greek-derived *emplastratio*, which means patch;
(4) bore-grafting, called *terebratio*.

The scion, i.e., the cutting that is being grafted onto the rootstock, was called *surculus*.

Cleft-grafting envisages the cutting and clefting (wedge shape) of the stock, so that it can receive the scion, which has been shaped accordingly. In the bark grafting case, the scion is instead placed between the bark and the hard wood. These first two methods are referred to in Cato's manual on agriculture.[35] The third method, patch-budding, requires a small portion of the bark to be removed from the stock to form an 'eye', while the graft consists of a bud with the same size of bark attached as the one removed from the 'eye'. Columella seems to claim that this technique was a Roman invention, and goes on to give a detailed description of how to proceed with successful patch-budding.[36] The good fit of stock and scion was very important in this technique, and Pliny notes that to achieve

[33] Columella, *Rust.* 5.10.6. [34] White 1970a, 248–58; see also Hardy and Totelin 2016, 135–41.
[35] Cato, *Rust.* 40–1; see also Verg. *G.* 2.73–7.
[36] Columella, *Rust.* 5.11.8: *Nos tertium genus insitionis invenimus.* See Plin. *HN* 18.330 for an in-passing distinction between the 'grafter' (*insitor*) and the patch-budder (*inoculator*).

same-sized cuts, the same hollow punch was used.[37] The fourth method, bore-grafting, was used only for vines and required the stock to be carefully bored with a special instrument, the Gallic auger.[38]

Columella also claims to have developed a grafting technique which allows circumventing the problem that only trees that are similar to each other can be grafted together, as he states at the opening of section 11 of Book 5.[39] In concluding his description of grafting methods, Columella gives the reader a flavour of his hands-on approach and direct experience of agriculture by stating:

> *Sed cum antiqui negaverint posse omne genus surculorum in omnem arborem inseri, et ex illa quasi finitione, qua nos ante paulo usi sumus, veluti quandam legem sanxerint, eos tantum surculos posse coalescere, qui sint cortice ac libro et fructu consimiles iis arboribus, quibus inseruntur, existimavimus errorem huius opinionis discutiendum, tradendamque posteris, rationem, qua possit omne genus surculi omni generi arboris inseri.* (Columella, *Rust.* 5.11.12)
>
> But since the ancients denied that *any* kind of scion could be grafted on *any* kind of tree and, according to the limitation which we made use of just now, established as a hard and fast rule that only those scions can unite which resemble the trees in which they are inserted in bark and rind and fruit, we have thought it advisable to destroy this erroneous opinion and to hand down to posterity a method by which any kind of scion can be grafted upon any kind of tree. (trans. E.S. Forster and E.H. Heffner, Loeb edn)

Columella's account continues with the description of this new, time-consuming method, which is now referred to as 'inarching',[40] using as example the binding of an olive with a fig.[41] Whether indeed Columella

[37] *HN* 17.100, this was like the punch used by shoemakers, the *suatoria fistula.*

[38] Columella, *Rust.* 4.29, *Arb.* 8; see also Plin. *HN* 17.115–17.

[39] See *Rust.* 5.11.1: *Quarum insitionum rationem cum tradiderimus, a nobis repertam quoque docebimus*; description of the new grafting technique at 5.11.12–15.

[40] The practice increases plant compatibility, but still does not allow to graft a scion on any kind of tree as Columella boldly claims. See also *De arboribus* 9.1–2 where he describes how to create a single bunch of grapes of different colours by following a similar method.

[41] *Rust.* 5.11.13–15: 'Dig a trench measuring four feet each way at such a distance from an olive-tree that the ends of the branches can reach it. Then plant a small fig-tree in the trench ... After two years, when it has made enough growth, bend down the branch of the olive-tree which seems to be the healthiest and bind it to the stock of the fig-tree. Then lop off the rest of the branches and leave only the tops which you wish to engraft; then cut through the trunk of the fig-tree and smooth off the wound and split it in the middle with a wedge. Then pare the tops of the olive-tree, still adhering to the mother-tree, on both sides, and then insert them in the cleft in the fig-tree, and take away the wedge and carefully tie the little branches so that no force may tear them away. Then after an interval of three years the fig-tree will coalesce with the olive-tree, and finally, in the fourth year, when they have become properly united, you will cut off the little olive branches from the mother-tree, just as if they were layers. This is the way in which you will graft any kind of scion on any kind of tree' (trans. E.S. Forster and E.H. Heffner, Loeb edn).

himself experimented with grafting and discovered the method described or whether it was developed by some farmer/specialized gardener on Columella's estate made no difference: the discovery was made under Columella's patronage and was his to claim.[42] Just as in Varro there is a clear difference in the way in which slave personnel engaged in animal farming and in the cultivation of plants were recognised or not as individuals with distinct agency, so does Columella here ignore the contribution of the specialized slave horticulturists that he must have had on his estates.[43] I shall return to this point later, for its implications about elite attitudes towards the betterment of cultivars and the creation of new ones.

Finally, among the agricultural writers, we find Palladius (Rutilius Taurus Aemilianus Palladius), an author writing much later than the others, in the late fourth/early fifth century AD, and who was much reliant on the earlier treatises as his sources. Palladius included an elegiac poem on grafting, the *de Insitione*, in his fourteen-book *Opus agriculturae*. While the rest of Palladius' treatise is in prose, the choice of poetry for the book on grafting shows, on the one hand, the continuation of a literary tradition that can be traced back to at least Virgil's *Georgics*. On the other hand, Palladius' choice suggests that he wanted to distinguish the treatment of grafting from the rest of the treatise. The shaping and control of nature, which grafting embodies, was perceived as a topic suitable for the grand rhythms of poetic metre.[44]

The continuous selection of fruit plants with desired traits and their propagation by grafting allowed, with the passing of time, the development of a range of varieties of the same fruit featuring different characteristics (Figure 4.1). In ancient Rome, these developments are reflected in the mention of various fruit varieties found, above all, but not exclusively, in the texts of the agronomists and in Pliny the Elder's books dealing with arboriculture.[45] If we take as example the cases of the pear, apple, and fig, among the most common fruit trees of the Roman world, we can see a steady increase over time in the number of varieties. Cato, the earliest of the agricultural writers, refers in his manual written around 160 BC to five

[42] As observed by Hardy and Totelin 2016, 40.

[43] Nelsestuen 2015, 71: in Varro, slaves who maintain herds are constructed as *pastores*, but those engaged in field cultivation are never recognized as *agricolae*, but are *servi*, *mancipia*, or *instrumenta vocalia*; '*agricola* denotes the free owner of both the means . . . and the ends of production (i.e. its *fructus*)'.

[44] The importance of grafting in ameliorating the quality of trees and flowers was also well recognized in medieval China and made the object of poetry, such as Chen Guan's (1059–124) poem 'Grafting flowers': Métailié 2007, 153.

[45] The following data are based on White 1970a, Appendix A to Chapter 9.

Figure 4.1 Saint-Germain-en-Laye, France: the grafting of a tree, detail of one of the vignettes making a large mosaic floor depicting an agricultural calendar, first half of the third century AD.
Photo © RMN-Grand Palais-Musée d'Archéologie Nationale / Michel Urtado.

varieties of pear, four of apple, and six of fig. Varro, one century later, ignores the pear altogether, but mentions five varieties of apple and four of fig.[46] However, in the early first century AD Columella, who, as mentioned above, is also the author who gives a very detailed account of the grafting techniques and refers to his personal experience in experimental grafting, lists eighteen kinds of pear, which, he specifies, represent only a selection,

[46] Varro lists only the foreign varieties of apples: White 1970a, 262, Appendix A. Varro is by no means systematic in covering fruit varieties, which were not central to the aims of his dialogue.

Table 4.1. *Fruit varieties mentioned in the agronomists (after White 1970a, Appendix A)*

Author	Pear	Apple	Fig	Grape vine	Olive
Cato	5	4	6	7	10
Varro	(no mention)	5	4	5	9
Columella	18 (only a selection, according to C.)	8	17	63	12
Pliny	39	23	29	71	15

eight of apple, and seventeen of fig. When we arrive at Pliny the Elder just a few years later than Columella, we find thirty-nine varieties of pear, twenty-three of apple, and twenty-nine of fig, and the impression is that he has not given an exhaustive list. The great increase in varieties available and cultivated is not limited to fruit trees, but includes the grape vine and, to a lesser extent, the olive too, two of the major crops of the Roman world: whereas in Cato one finds seven kinds of grape vine and ten of olive mentioned, by the time of Pliny's account these have risen to seventy-one and fifteen, respectively (Table 4.1).

As far as the surviving literary sources are concerned, then, the late first century BC to the mid first century AD appears to be the time when a boom in the development of new fruit varieties occurred. However, regardless of Varro's limited interest in fruit varieties and grafting in his *de Re Rustica* (rather he gives great prominence in his dialogue to *pastio villatica*, which had become very fashionable on estates in his time),[47] the start of systematic grafting as a practice of horticulture is firmly rooted in the late Republican period. It even came to the notice of those whom we would not expect to be interested: Cicero mentions grafting as a very ingenious practice when he adds horticulture, flower cultivation, and *pastio villatica* (honey production in this case) to the activity of the farmer:[48]

> *Nec vero segetibus solum et pratis et vineis et arbustis res rusticae olaetae sunt, sed hortis etiam et pomariis, tum pecudum pastu, apium examinibus, florum omnium varietate. Nec consitiones modo delectant, sed etiam insitiones, quibus nihil invenit agri cultura sollertius.* (Cic. *De Senect.* 54)

[47] It is worth noting, however, that the opening of the dialogue emphasizes the agricultural productivity of Italy, by presenting the entire peninsula as an orchard. For a political and philosophical reading of Varro's dialogue, see Kronenberg 2009; Green 2011; and Brown 2019.

[48] Cicero also uses grafting figuratively, and with a positive meaning, at Cic. *Brut.* 213 (passage referenced in Gowers 2011, 90 note 12).

> Nor does the farmer find joy only in his cornfields, meadows, vineyards, and woodlands, but also in his garden and orchard, in the rearing of his cattle, in his swarms of bees, and in the infinite variety of flowers. And not only does planting delight him, but grafting also, than which there is nothing in husbandry that is more ingenious. (trans. A.W. Falconer, Loeb edn)

The 'boom of grafting' ought to be contextualized on two very different levels: on the one hand, there is the practical side of grafting in the context of commercial agriculture, increased urbanization rates, and population size of Rome and other major towns, which in turn meant increased demand for different varieties of plant food and novelties on the part of a greater range of demanding consumers engaged in different degrees of competitive display. In this discourse, the elite landowners occupy centre stage, not simply because of the nature of the surviving written evidence – works of upper-class authors for elite readers – but also because substantial innovation in agriculture, such as the cultivation of new species, was 'designed to produce great profits for the proprietors rather than to add to the poor man's repertoire of stratagems for avoiding risks'.[49] On the other hand, though, there was also a clear ideological dimension that is exploited and elaborated on, particularly on the part of the upper classes. Grafting meant domestication of, and control over, wild nature, a conceptual point of reference which finds parallel echoes in other civilizations too, for instance ancient China.[50] It is these aspects that find their way in literary texts such as Virgil's *Georgics* and to which we now turn.

Subduing Nature

> *et saepe alterius ramos impune videmus*
> *vertere in alterius, mutatamque insita mala*
> *ferre pirum et prunis lapidosa rubescere corna*
> (Verg. *G.* 2.32–4)

> Often, too, we see one tree's branches turn harmless into another's, the pear transformed bearing engrafted apples, and stony cornels blushing on the plum. (trans. H. Rushton Fairclough, Loeb edn)[51]

It has been stated that 'the Romans were fascinated (obsessed even) by the process [i.e., grafting]',[52] and grafting is a theme that finds its way also in

[49] Horden and Purcell 2000, 260. [50] Métailié 2007.
[51] Unless otherwise noted, all subsequent translated quotes from the *Georgics* are from this translation.
[52] Hardy and Totelin 2016, 136.

other literary genres besides the agricultural manuals proper, as the quotation from Virgil's *Georgics* exemplifies.[53] Indeed the verses from Virgil's second *Georgics* extolling grafting and other forms of vegetative propagation (see lines 22–31) as central in the taming of spontaneous vegetation are possibly the best-known passages of Latin literature dealing with this subject. In this poem, Virgil presents grafting as the essential technique which allows the farmer not simply to tame nature's *silvestrem animum*, particularly in the case of unfruitful trees (*infecunda*, line 48), but also to propagate fruit trees with selected characteristics, something generation from seed could not ensure:

> *iam quae seminibus iactis se sustulit arbos,*
> *tarda venit, seris factura nepotibus umbram,*
> *pomaque degenerant sucos oblita priores.* (57–9)
>
> Again, the tree which rears itself from chance-dropped seeds rises slowly and will yield its shade to our children of later days; its fruits, too, degenerate, forgetting their olden flavour.

As the verses progress, grafting becomes wondrous, a complete transformation of nature which skirts the realm of outright hubris. From line 69 onwards the reader encounters the mention of several impossible grafts because they are crossings between plants of completely different genera, such as arbutus and walnut or ash and pear. In this poem, even the sterile tree par excellence, according to the view of several moralistic writers, the plane tree,[54] is made to produce apples thanks to the art of grafting. The poem's recurrent theme is clearly the taming of nature at various levels, not simply in the actions of the rustic farmer. In praising the fertility of Italy, where 'cows calve two times a year and the trees fruit twice in a year' (2.150), the poet also adds his praise for major engineering feats, such as the creation of Portus Iulius in the Bay of Naples, by which human intervention and ingenuity profoundly modified the natural landscape. As has been pointed out, the act of grafting similar species/compatible plants (e.g., the apple and the pear) 'was never more interesting for the Romans than planting or sowing; only farfetched combinations connoted anything more'.[55] Lowe stresses that writers of the late Republic and early

[53] On grafting having positive or negative tones in works of Latin literature, see Lowe 2010.

[54] E.g., see Pliny's remark at *HN* 12.6 that the plane had been imported merely for the sake of its shade. The 'single' plane tree (*platanus caelebs*) is at times juxtaposed to the elm, the plant normally used to trail grape vines in the practice commonly referred to as the 'marriage' of the elm and the vine (*vite maritata* in Italian) to stress even further its unproductivity: e.g., Hor. *Carm.* 2.15.4.

[55] Lowe 2010, 465.

first century AD period such as Virgil had an overall positive view of grafting and artificial 'polycarpophoria'. For the first generation of readers of the *Georgics*, the immediate association to come to mind was of a Saturnian golden age and not the idea of violence perpetrated against the natural world.[56]

Virgil is not the only poet to insert grafting among his verses; Propertius, for instance, refers to the grafting of unwilling pears.[57] In the *Eclogues*, a poem attributed to Calpurnius Siculus, the grafting *ars* of a certain Astacus was described in this way: 'the tree puts on a dress of alien leaves and fruits of a diverse species', pears are combined in due proportion with the apple, and he 'constrains engrafted peaches to supplant the early plums'.[58]

In several writers one can detect a fascination with extraordinary grafting combinations, perhaps culminating in Pliny the Elder's claim that in Tibur there was a tree which had been grafted with an amazing variety of fruits: 'nuts on one branch, berries on another, while in other places hung grapes, pears, figs, pomegranates and various sorts of apples'.[59] Plutarch was not immune to such fancies and inserts a discussion on grafting in his *Table Talk*, to answer the question of why evergreen plants such as cypress, fir, and pine are not grafted.[60] The literary setting Plutarch gives to this little disquisition is a stroll by the interlocutor in Soclarus' garden, where he showed 'trees which had been fancified in all sorts of ways by what is called grafting'.[61] Unusual or plainly impossible grafts are mentioned here too:

> καὶ γὰρ ἐκ σχίνων ἐλαίας ἀναβλαστανούσας ἑωρῶμεν καὶ ῥοιὰς ἐκ μυρρίνης· ἦσαν δὲ καὶ δρύες ἀπίους ἀγαθὰς ἐκφέρουσαι καὶ πλάτανοι μηλεῶν δεδεγμέναι καὶ συκαῖ μορεῶν ἐμβολάδας, ἄλλαι τε μίξεις φυτῶν κεκρατημένων ἄχρι καρπογονίας. (Plut., *Mor.* 2.640b.1)
>
> olives growing upon mastic trees and pomegranates upon the myrtle; and there were oaks which bore good pears, plane trees which had received grafts of apples, and figs grafts of mulberries, and other mixtures of trees mastered to the point of producing fruit. (trans. Clement and Hoffleit, Loeb edn)

In this passage we find the combination of the unproductive plane tree with the apple which we have seen in Virgil's *Georgics*, but also the pairing

[56] Lowe 2010. [57] 4.2.18.
[58] Trans. J.W. Duff and A.M. Duff, Loeb edn. *Ecl*g. 2.40–3: *non minus arte mea mutabilis induit arbos / ignotas frondes et non gentilia poma: / ars mea nunc malo pira temperat et modo cogit / insita praecoquibus subrepere persica prunis.*
[59] Plin. *HN* 17.120; the tree, however, did not live long. [60] Plut. *Mor.* 2.640b.
[61] Trans. Clement and Hoffleit, Loeb edn.

of oak, whose acorns were good primarily for pig rearing and not for human consumption, transformed into a pear-producing plant suitable to humans. As remarked by Squatriti,[62] 'surprising hybridity' continued to be a concern and source of fascination all the way down to Palladius: in his treatise he also claimed that it was possible to graft incompatible plants, such as chestnut on pear, and apple on mulberry or willow, suggesting that late antique writers and landowners shared the same fascination with strange grafts expressed by authors of the early empire centuries earlier.[63]

Multiple grafts among compatible plants were a challenge, and cultivators liked to undertake them. The emperor Marcus Aurelius, in a letter to his former tutor M. Cornelius Fronto, mentions a single-trunk tree displaying shoots of many kinds of different plants (so a tree that had been grafted by inoculation, or the *emplastron* grafting technique):

> *Anno abhinc tertio me commemini cum patre meo a vindemia redeuntem in agrum Pompei Falconis devertere; ibi me videre arborem multorum ramorum, quam ille suum nomen catachannam nominabat. Sed illa arbor mira et nova visa est mihi in uno trunco omnium ferme germina <arborum ferens>. . .*[64]
>
> Three years ago I remember turning aside with my father to the estate of Pompeius Falco when on our way home from the vintage; and that I saw there a tree with many branches, which he called by its proper name of *catachanna*. But it seemed to me a new and extraordinary tree, bearing as it did upon its single stem off-shoots of almost every kind of tree. (trans. C.R. Haines, Loeb edn)

The epistle is lacunose and what the tree was and what kinds of shoot had been grafted onto it is not specified, but Marcus' astonishment and admiration for the plant he had seen, together with his father M. Annius Verus, on the estate of the distinguished senator Q. Pompeius Falco is clear.[65] As this is a letter to his former tutor, its contents may well be accurate; although the etymological origins and precise meaning of the word *catachanna* are obscure,[66] the fact that Marcus Aurelius reports it as the 'proper name' for this kind of engrafted plant, suggests that it was a term used with a technical meaning in the context of horticulture.[67] It has

[62] Squatriti 2013, 93.
[63] Squatriti 2013, 93. For a list of the plant graft compatibilities claimed by Palladius, several of which are fallacious, see Mudge *et al.* 2009, 457–8.
[64] M. Aurelius to Fronto, dated to AD 143, Loeb p. 140 (Naber p. 35).
[65] This Q. Pompeius Falco is the consul of AD 108 and correspondent of Pliny the Younger.
[66] This word is later used by Fronto in a letter (p. 149 vdH) in which he criticizes the hybrid mixing of very different writing styles, see Henderson 1955.
[67] Van den Hout 1999, 76–7.

been suggested that the term is a Punic word:[68] if so, its currency in Latin might indicate the influence Punic arboriculture had (Mago and his treatise come to mind) on developing advanced grafting techniques.

It was not only grafting that fascinated Latin writers and poets and that had an important role in the routine operations carried out in the cultivation of orchards; pruning can be added too. At least in the case of gardens as depicted in wall paintings such as the famous painted 'garden of Livia' from the Primaporta villa, the fruit trees depicted do not display a large crown and only a few branches have fruits on them. Small crown and few branches as depicted are the result of repeated expert pruning. Kathryn Gleason's careful examination of the wall paintings has drawn attention to the fact that the painter has indeed depicted the marks left by the pruning cuts and that gardens so densely planted as those depicted in art and archaeologically attested at Villa Arianna in Stabiae must have required considerable care and expense to keep.[69] The thick planting, which at first gives the impression of 'natural' growing, needed very expert regular pruning to achieve and maintain certain effects. This expert pruning is indeed recorded in the wall paintings. References to individuals who were expert in pruning trees, the *arboratores*, appear in Columella and Pliny. In the former, while enumerating experts in various required agricultural tasks who could pass their knowledge to the bailiff, the *arborator* is paired with the *vinitor*, the vinedresser; in the latter, it is just a quick mention, while giving the recommendation that one should not cut foliage at midday.[70]

Names – Agricultural and Aristocratic

As we have seen, Pliny saw grafting as a way to secure future remembrance. The list of various grafted fruit varieties he offers, with names largely derived from the name of their 'creator', is a positive acknowledgment of human ingenuity, of the relationship between man and nature, whereby nature's variety and productivity are increased and ameliorated by controlled human activity.[71] Prominent Romans and distinguished *gentes* who have given their names to cultivars of apple, pear, fig, and cherry include a Dolabella, Pompey the Great, the gens Claudia, the Lutatia, the Pomponia, and even Livia. Pliny does not explicitly say that these people *grafted* the new cultivars – he does not use the verb *inserere* – but the

[68] Van den Hout 1999, 76. [69] Gleason 2019.
[70] Columella, *Rust.* 11.1.12; Plin. *HN* 18.330.
[71] On this, see Beagon 1992, 80–1; and Laehn 2013, 53–4.

connection between prominent individuals and the creation of new fruit, which could have only happened by traits selection and vegetative propagation, is unmistakably stated by the noun *auctor*, which here means both the creator of the new cultivar and the producer, as can be appreciated in the passage about pears:

> *sed confessis urbis vocabulis auctores suos nobilitavere Decimiana et ex eo tractum quod Pseudodecimianum vocant, Dolabelliana longissimi pediculi, Pomponiana cognomine mammosa, Liceriana, Seviana etet quae ex his nata sunt Turraniana longitudine pediculi distantia, Favoniana rubra paulo superbis maiora, Lateriana, Aniciana postautumnalia acidulo sapore iucunda. Tiberiana appellantur quae maxime Tiberio principi placuere . . .* (Plin. *HN* 15.54)

> but pears that have advertised their producers by the accepted designations of Rome are the Decimian, and the offshoot from it called the Sham Decimian, the very long-stalked one called the Dolabellian, the kind of Pomponian called breast-shaped, the Licerian, the Sevian, and the Turranian, a variety sprung from the Sevian but differing in length of stalk, the Favonian, a red pear a little larger than the 'proud' pear, the Laterian and the Anician, which comes when autumn is over and has an agreeably acid flavour. One pear is called the Tiberian, which was a special favourite of the Emperor Tiberius . . .[72] (trans. H. Rackham, Loeb edn)

The relationship between man and nature adds to Pliny's vision of the world as, to use Bispham's words, 'inextricably linked with the progress of Roman conquest'.[73] The positive idea of, and the pursuit of, novel fruit became a topos which travelled from the scrolls of literary works written in Rome for elite readers to the stone of metric funerary inscriptions far away from the capital a good century later: a long Severan inscription from

[72] Apples named after their 'creator' are mentioned at *HN* 15.49–50: *ergo habent originem a Matio Cestioque et Mallio, item Scaudio – quibus cotoneo insito ab Appio e Claudia gente Appiana sunt cognominata; odor est his cotoneorum, magnitudo quae Scaudianis, color* ('Well then, there are kinds of fruit that have their origin from Matius and Cestius, from Mallius, and likewise from Scaudius; and on the last a member of the Claudian family named Appius grafted the quince, producing the fruit called Appian; this has the smell of a quince, the size of a Scaudian apple, and a ruddy colour'). Figs are mentioned some sections later, at 15.70: *sunt et auctorum nomina iis* [i.e., *praecocibus*] *Liviae, Pompei . . .* ('Early figs also have the names of the persons who introduced them – Livia, Pompey . . .'). For cherries, see *HN* 15.103*: cerasorum Aproniana maxime rubent, nigerrima sunt Lutatia, Caeciliana vero et rotunda. Iunianis gratus sapor, sed paene tantum sub arbore sua, adeo teneris ut gestatum non tolerent. principatus duracinis quae Pliniana Campania appellat* ('Of cherries the Apronian are the reddest, and the Lutatian the blackest, while the Caecilian kind are perfectly round. The Junian cherry has an agreeable flavour but practically only if eaten under the tree on which it grows, as it is so delicate that it does not stand carriage. The highest rank, however, belongs to the bigaroon cherry called by the Campanians the Plinian cherry').

[73] Bispham 2007, 43.

Nikopolis in Moesia Inferior (modern Bulgaria) ends with an appeal to decorate the tomb with flowers and 'with *many novel fruits of various kinds*' (emphasis mine).[74]

However, there is a contrast between the way in which Pliny writes about grafting and developing new varieties of fruit and how, for instance, he laments that simple vegetables such as cabbages have become so huge and so expensive that they are beyond the means of the poor people on whose tables they used to feature prominently.[75] The very large cabbages or the asparagus, plants that Pliny states were made by nature to grow wild and were now cultivated producing large specimens, are also the result of human ingenuity. We have here that sharp juxtaposition of *ars* vs. *natura*, a theme explored in Chapter 1 when discussing Pliny the Younger and his description of the garden of his villa *in Tuscis*.

The agricultural means that led to these horticultural results are not explicitly stated but can be easily inferred: irrigation, well-manured soil,[76] and seed selection. Because of the historically humble role cabbages had, Pliny uses the example to overemphasize the immoderate luxury of the table of his own times.[77] On the contrary, fruit and fruit consumption are rarely presented as a symbol of excess and gluttony in our literary sources; when they are, it is normally in the case of out-of-season fruit, such as in the anecdote about Gallienus serving melons in winter and out-of-season green figs and apples always fresh from the trees.[78] In late antiquity, abstaining from eating fruit may have been seen by some as a sign of imperial self-control and restraint, as in the case of Constantius II who, according to Ammianus Marcellinus,[79] never wiped his mouth or nose in

[74] *CIL* 3.754 = *Carmina Latina Epigraphica* 492 = *ILBulg* 145: vv. 20–5, *carmini, possessor, faveas precor, ac precor ut tu / hanc tituli sedem velles decorare quodannis / et foveas aevi monumentum tempore grato, / roscida si rosula seu grato flore amaranthi / et multi{s}generum pomis variisque novisque, / ut possit toto refoveri temporis anno.* See Krummrey 1981; Cugusi 2007, 105–6, who reports that possibly the provenance of the inscription is Oescus.

[75] Plin. *HN* 19.54, passage quoted in Chapter 3, p. 111.

[76] On the importance of manure and manuring practices, see discussion in Chapter 3, 00–00. The importance and value of manure and garbage heaps as fertilizers are recognized in the *Digest* and legal codes, where manure is discussed as a vendible asset, a source of litigation, and part of the equipment that must go to the buyer of a farm (*instrumentum fundi*); see brief overview in Buck 1983, 29–30.

[77] The so-called imperial sumptuary laws regulating food that could be sold in *popinae*, including types of vegetables, may be related to moralizing concerns on the part of emperors; see Le Guennec 2016; and Marzano 2019 for a different interpretation.

[78] *SHA*, *Gall.* 16.2: *hieme summa melones exhibuit . . . ficos virides et poma ex arboribus recentia semper alienis mensibus praebuit* ('and served melons in the depth of winter . . . He always served out-of-season green figs and apples fresh from the trees', trans. D. Magie).

[79] Amm. 21.16.7.

public, or spat, or tasted fruit, but the emperor's abstention from fruit may rest on religious grounds rooted in his Manichaeism rather than in fruit having assumed the connotation of luxury.[80]

Overall, grafting is not as prominent in Pliny's discourse on luxury and excess as other aspect of horticulture. It is true that at the start of Book 17 he frames grafting morally, characterizing the ingenious technique as introducing adultery even to trees, so that 'not even fruit should grow for the poor'.[81] In this passage, Pliny also openly states the financial returns that effective fruit cultivation could bring to estates in proximity of Rome, a point to which I shall return later. Pliny seems to be more cautious than Virgil about the claim at *Georgics* 2.69 that nuts could be grafted 'on an arbutus, apples on a plane and cherries on an elm tree';[82] there are religious implications that make the pursuits of certain types of surprising grafts unadvisable, but this does not deny a fascination with the wondrous and exceptional, as in the story Pliny reports of the tree from Tibur mentioned earlier in the chapter, the one bearing nuts, berries, grapes, pears, figs, pomegranates, and apples. However, the developing of new fruit varieties and transplantation of (useful) plants are largely seen in a positive light in the *Natural History*, even though the topic is not devoid of the contradictions and complexities that so often characterize Roman discourse in general. Through a narrative shaped by politics and morality, the essential nature of grafting for Pliny emerges as something allowing fruit to be improved and differentiated. This stance can be appreciated in the opposite situation, when grafting could not create varieties of a fruit or enhance any of its traits, as in the case of the mulberry, which significantly does not acquire an association with any personal names, only to the geographic area where it was grown:

> *minimum in hac arbore ingenia profecerunt: nec nominibus nec insitione nec alio modo quam pomi magnitudine differunt mora Ostiensia et Tusculana Romanae*. (Plin. *HN* 15.97)
>
> In the case of this tree the devices of the growers have made the least improvement of any, and the mulberry of Ostia and that of Tivoli do not differ from that of Rome by named varieties or by grafting or in any other way except in the size of the fruit. (trans. H. Rackham, Loeb edn)

It is only when dealing with *unproductive* plants that Pliny seems to perceive vegetative propagation as a subversion of *natural* order, as in the case of the plane tree that did not shed its leaves in winter that we will

[80] Rohrbacher 2005. [81] Plin. *HN* 17.8. [82] Plin. *HN* 15.57.

encounter later in this chapter.[83] If we are to take Pliny's words literally, not only did a long list of very prominent Romans have an interest in creating new varieties of common fruits, but they actually also personally engaged in grafting experiments. Perhaps some did so, taking a keen interest in the productivity of their estates and enjoying gardening for relaxation, as many centuries later some of the aristocrats of Europe did. But it remains hard to believe that Pompey or Livia, wife of Augustus, developed the new types of early-ripening figs attributed to them with their own hands. Rather, it is much more likely that achievements made in one's household, by one's slaves, were claimed by the master as his or her own. As remarked earlier about Columella's claim to have invented a new grafting technique, it did not matter in terms of the credit whether the author was indeed Columella or someone in his household. What is revealing, however, is that a Pompey or a Dolabella should bother at all in taking the credit for the successful grafting and for the naming of the new fruit; the strong symbolic value this action had in Roman mentality cannot be denied, and the best example of the complex cultural layers surrounding grafting techniques and the creation of new cultivars is the case of Livia Augusta.

Livia Augusta

> *sunt et auctorum nomina iis, Liviae, Pompei: siccandis haec sole in annuos usus aptissima* . . . (Plin. *HN* 15.70)
>
> [Early figs] also have the names of the persons who created them: Livia, Pompey; these figs are the best to be sundried for use throughout the year . . . (trans. A. Marzano)

Livia Drusilla, Augustus' wife, was a remarkable lady in many respects. Married to Augustus for about fifty years, she must have been as politically shrewd as her husband. She helped him transform the Roman state, promote, in the celebration of established peace and return of a golden age, ideals about the importance of the family, simplicity and marital harmony, linked her name to euergetic building projects that were transforming the city of Rome (e.g., the Macellum Liviae, the Porticus Liviae, but also restorations of temples such as the one consecrated to Fortuna Muliebris),[84] and participated in political life probably more than any

[83] Plin. *HN* 12.11–12.

[84] On Livia's building activity and her direct financial involvement in these projects, see Purcell 1986, 88–9.

other woman in Rome had ever done before. As she had responsibility for the welfare of her family and husband, which due to their prominence was under continual public scrutiny, Livia had an important role in encouraging marital harmony and peace in general, as exemplified by the promotion of the cult of Concordia. Her public role and unique standing were well captured in the expression *Romana princeps* of the *Consolatio ad Liviam*, written by a Roman *eques* after the death of Drusus, Livia's son, in 9 BC.[85] Even more explicitly, during the reign of her son Tiberius she had, in Cassius Dio's words:

> πάνυ γὰρ μέγα καὶ ὑπὲρ πάσας τὰς πρόσθεν γυναῖκας ὤγκωτο, ὥστε καὶ τὴν βουλὴν καὶ τοῦ δήμου τοὺς ἐθέλοντας οἴκαδε ἀσπασομένους ἀεί ποτε ἐσδέχεσθαι, καὶ τοῦτο καὶ ἐς τὰ δημόσια ὑπομνήματα ἐσγράφεσθαι. (Cass. Dio 57.12.2)
>
> a very exalted station, far above all women of former days, so that she could at any time receive the senate and such of the people as wished to greet her in her house; and this fact was entered in the public records. (trans. E. Cary, Loeb edn)

As a powerful woman, she attracted plenty of criticism too, being presented in some sources as scheming, ruthless, and, inter alia, the mastermind behind the murder of her grandson Germanicus. She was even suspected of causing the death of her husband when he was ill: rumours that she had killed him by poison circulated.[86]

In the context of this study, I am primarily concerned with another instance of Livia's exceptionality: the attribution to her of the development of a particular kind of fig by grafting. As we have seen, Pliny explicitly names her as the *auctor* of the fruit to which she gave her name.[87] Whether she actually grafted the plants herself (unlikely in my view) or practised any form of gardening is not the point. As discussed earlier, it was perfectly normal to attribute to the owner of a given estate, or of a given slave, the horticultural achievements developed on his property. So whether the *ficus liviana* or the *ficus pompeiana* mentioned by Pliny were directly cultivated by these illustrious individuals or were more likely developed on their estates by someone else and given fame by the association of their names, the end result was the same: it is Livia or Pompey who are remembered as their 'inventors'.

[85] *Consolatio ad Liviam* 356. [86] Cass. Dio 56.30.1–2; Tac. *Ann.* 1.5.

[87] I take *auctor* in Pliny's text to mean 'creator'; it is equally possible to understand the word as meaning 'promoter' and thus take the passage to mean that the fig was named after her because she had a preference for the variety and gave it popularity.

What is also remarkable is that Livia appears to be the only woman to whom the creation of a new fruit variety by grafting is attributed. In the list of names of prominent (male) Romans and illustrious families grafting apples, pears, and other fruits provided by Pliny, Livia's name stands out. In Latin literature the only other example of female active involvement in grafting concerns Pomona in Ovid's *Metamorphoses*, but she is not a woman, she is a nymph.[88] I propose that Livia's unique status as *auctor* of the *ficus liviana* had as much to do with her transit into the male – and public – sphere in other areas of action as it did with her social prominence at a time when great interest in arboriculture, grafting, and horticulture arose, as exemplified, for instance, by the number of literary works on these topics (unfortunately many lost) composed in the Augustan age and the various innovations in the field of horticulture that occurred in the period, as examined in Chapter 3.

Grafting, as an action, was perceived as being male by definition; *insero*, to in-graft, can also mean to insert, to thrust, and the term could take sexual overtones, as remarked by Hardy and Totelin in the case of the verses *Priapea* where there is a word play with *inserta*.[89] Theophrastus, in his categorization of male and female trees, normally places fruit-bearing trees in the female category.[90] As these 'female' trees, to remain true to type, were largely propagated by grafting, it is natural that the act of grafting was perceived as male. It seems a fair generalization to say that, for Romans of the early and mid Republican periods, the *hortus*, here intended as the domestic vegetable garden, was typically a female space entrusted to the charge of the women of the house.[91] As stressed by Pliny, who refers to Cato's authority, in old times the status of the kitchen garden gave the measure of the *mater familias*' ability since *haec cura feminae dicebatur*, that is, the care of the *hortus* was considered the woman's responsibility.[92] By contrast, the cultivation of crops, and in particular of vines and fruit trees, was in the male domain.

[88] Ov. *Meth.* 14.623–771.

[89] Hardy and Totelin 2016, 154; obscene grafting pun also at, e.g., Mart. 6.49.11.

[90] Theophr. *HistPl.* 3.8.1; Negbi 1995; Hardy and Totelin 2016, 131.

[91] On the *hortus* as a female space but also on the blurring of gender distinctions in Roman gardens, see von Stackelberg 2009, 70–2.

[92] Plin. *HN* 19.57. In Columella's prescriptions on running an agricultural estate, it is the *vilica* who has the task of safeguarding and preserving the yield of the vegetable garden (*Rust.* 12.1–3). A wall painting, known through a nineteenth-century drawing, from the so-called House of Emperor Joseph in Pompeii (VIII.2.39; see MAN, inv. no. 9406 [DAI Rome 53.504]; Carratelli 1990–2003, 323) offers a representation of this idea of old and depicts two women tending to the plants. Next to them is a statue of Priapus, with his robe pulled up and filled with what seems to be fruit and vegetables: the produce of the cultivated plot and of their garden care.

With time, however, and with the emergence of commercial vegetable gardens, the *hortus* was no longer seen as an exclusively female sphere, although, as observed by von Stackelberg, the perception of a possible loss of masculinity if the male presence in the garden was not balanced by an appropriate activity, such as digging, planting, and exercising (either the body or the mind) continued.[93] Arboriculture and viticulture, however, were not subject to this gender ambiguity: they remained a male preserve throughout.

Starting from 35 BC, Livia received several exceptional honours – some were traditional male prerogatives, like the right to be preceded in public by a *lictor* granted to her after Augustus' death – that distinguished her among all the other *matronae* of Rome and clearly marked her public role.[94] It seems to me that attributing to her the creation of a new kind of fig, an attribution that must have circulated during her lifetime since a Livian fig was listed by the lexicographer Cloatius Verus,[95] was possible because she had acquired such a special and unique status in Roman public life, appropriating several much more important prerogatives from the exclusively male political and public sphere. We have seen the strong ideological value that grafting, naming, and transplanting new plants from faraway regions had for the Roman elite; Livia *cum tribunicia potestate*, Livia *suis iuris*, 'Livia the builder',[96] could then also become 'Livia the *auctor*' of a new fruit variety. The naming of the fig after Livia is not inconsequential; rather, it is yet another indicator of how ideologically charged even mundane activities were. It could also be a remnant of an intentional 'promotion' of Livia as engaging in an activity – agriculture – that was traditionally Roman and morally sound,[97] for Livia's connection with vegetation 'branched' in different directions.[98]

Grafting, Boasting, and Marketing

As in the case of landscape art and the appreciation of natural landscapes, the Romans did not admire or represent pure wilderness but rather a tame,

[93] Von Stackelberg 2009, 71.
[94] See Purcell 1986 for an insightful discussion of Livia's exceptionality.
[95] A fragment of Cloatius Verus' work preserved *apud* Macr. *Sat.* 3.20 lists the Livian fig, together with an Augustan fig. Cloatius was very likely active in the early Augustan period.
[96] Purcell 1986, 89.
[97] Contrast, some years later, the negative depiction that Agrippina (as described by Tacitus) gives of Domitia, daughter of L. Domitius Ahenobarbus and Nero's aunt, by depicting her as busy in beautifying the fishponds of her villa(s) at Baiae: marine fish farming gets a negative connotation as early as Cicero; on the reasons and its ideological relation to agriculture, see Marzano 2007, 15–22.
[98] E.g., her connection with the laurel grove planted in the villa *ad gallinas albas* after the famous portent and the large grape vine of the Porticus Liviae. Livia's link to vegetation and the male arboricultural sphere are further discussed in Marzano (forthcoming).

ordered landscape with visible human interventions. Grafting was also a means of bending nature to one's will. As time progressed and Rome witnessed the importation of new exotic plants, the emergence of topiary art and the creation of luxurious *horti*, green spaces open to the public, brought knowledge and experience of the expanding empire home to an urban public. At the same time, it appears that the higher the social standing of a person, the more extraordinary the achievements in the case of grafting were expected to be. Whereas the famous Pompey is credited with a new fig variety, by the time of Pliny (at least on the basis of the information given in his narrative), this was not quite impressive enough. So we read of a man of consular rank, who boasted – Pliny says he heard this himself – of having a new type of walnut tree that could bear fruit twice a year.[99] Even though Pliny had declared that 'there is no further room for ingenuity; no new fruit has been discovered for a long time now',[100] placing the acme at about the time of Virgil, clearly landlords did not cease to be interested in curiosities and in the amelioration of their trees' produce.

Grafted plants as indicators of skills that allowed the control of nature and as something to be proud of, show off to one's peers, and even boast about are the connecting link between elite gardens and horticulture, the element that allows us to close the circle connecting the symbolic and political valence of gardens I have discussed in Chapter 1 and the ideologically charged elite involvement in arboriculture. Garden spaces were the setting for the daily strolls of the upper classes, for the *ambulationes* or *gestationes* in which to exercise by walking, mounting a horse, or driving a light chariot. In the case of walking, arboricultural prowess, novel plants, or new cultivars became part of the display to be admired during these strolls. I have referred in Chapter 3 to the Latin inscription attesting a *gestatio* set in a *pomarium*, a fruit orchard. The choice was not purely practical, because that *pomarium* offered the required space for a *gestatio*, it was above all ideologically charged: the productivity and horticultural skills embodied by the fruit trees were a spectacle that the owner wanted to enjoy and share with his friends and peers. It ultimately had to do with the idea that morally acceptable *otium* had to be productive: exercising the body by walking the recommended one mile, while perhaps talking to a

[99] Plin. *HN* 15.91. Archaeobotanical finds attest to the cultivation of the walnut in Roman northern Italy, for instance, showing nuts with characteristics similar to the modern cultivated varieties: a size of the nut (with shell) ranging from 3 to 3.5 cm (wild walnuts typically measure 2–3 cm) and a shell thinner than the wild examples; see Mazzanti Bandini *et al.* 2000, 72–3.

[100] Plin. *HN* 15.57.

friend about philosophy and taking in the view of a productive orchard which displayed horticultural skills and the master of nature, ticked all the boxes.[101]

Archaeological data indicate that such use of garden spaces and aspirations were to be found at every level of the upper strata of society. Herod's gardens at Jericho, initially thought to have showcased balsam and palm, the main sources of revenue for his reign, in fact housed a miniaturized collection of trees and shrubs from the Mediterranean: growing these plants here required defying the environmental conditions of the desert and they were therefore something to show off.[102] Wide walkways in gardens (*c.*2 m), even in those that are not in a peristyle setting and may be taken as being *only* commercial gardens, suggest their use as *ambulationes* while admiring the plants. On the contrary, orchards and market gardens with purely utilitarian functions, like those excavated in Pompeii by Wilhelmina Jashemski, have *c.*1 m wide paths in between plantings. We have seen earlier in this chapter Plutarch's passage from the *Moralia*, in which the interlocutor strolls with friends in the garden and shows them trees displaying skilful grafting.[103] Beauty, and above all the unusual, in terms of rarity of a plant or of difficulty of the horticultural feat achieved, were elements that reflected well on the owner of a specific garden or orchard, regardless of whether the actual work had been carried out by his or her slave gardeners. Pliny recounts a personal memory of his: Caecina Largus used to point out and show off to his guests the lotus trees that were in the garden of the house that had once belonged to Licinius Crassus.[104] These trees were famous for the exchange that occurred between Domitius Ahenobarbus and Crassus, mentioned in Chapter 1, but also because skilful care made them last, strong and verdant (*cultu virides et iuvenesque*), until they were destroyed in the fire of Rome in AD 64. The longevity of the trees thanks to horticultural skills is as important an element as their

[101] This kind of display is no different from, e.g., having a dining room set in the *aporotheca* (fruit storeroom) as described by Varro for Scrofa's villa: *Rust.* 1.59.2. As observed by Wilson (2008, 745) intensive horticulture made a propagandistic statement about the owner's scale of investment and entailed an element of display. The famous ship built for Hieron of Syracuse, equipped with many luxuries and technologically advanced marvels, featured also 'garden-beds of all sorts, remarkably full of plants' (Ath. *Deip.* 5.207d).

[102] Plant identification rests on pollen analysis: Gleason, pers. comm., May 2020; Langgut and Gleason 2020.

[103] Plut. *Mor.* 2.640b.1

[104] Plin. *HN* 17.5. Pliny uses *ostentante* to refer to Largus' action, translated in the Loeb edition as 'used to point them out', but *ostento* can convey the meaning of showing off, boasting about, which I prefer in this context.

famous past history as motive for Caecina Largus regularly pointing them out to his guests while walking in the garden.

These literary gardens have 'real' counterparts in several examples of Roman gardens excavated in recent years. Horticultural display of grafted fruit trees and other plants reproduced by layering might have characterized the large garden of the so-called Casa della Regina Carolina near Pompeii's forum (VIII.3.14). Initial results from the ongoing excavation project suggest that walkways separated regular planting, and that some of these plants were reproduced by layering.[105] Another suggestive archaeological example of provisions for elite walking and display of agricultural productivity, this time having as the setting a vineyard rather than fruit trees and shrubs, comes from the recent investigations at the Villa of the Papyri in Herculaneum. A 4 m wide beaten earth path led from the villa's large peristyle to a round pavilion/belvedere some distance away, running through a vineyard.[106] Walking in one's garden and showing off to visitors the plants has many recorded historical examples beyond the world of ancient Rome.

At Villa Arianna in Stabiae the excavation of the great peristyle garden has revealed the garden design: a series of rectangular planting beds, some narrow, some wider, separated by broad, beaten earth walkways (Figure 4.2). As has been argued, the narrow planting beds, which, as shown by the root cavities, once hosted all different types of plants placed in a single file, may have hosted a vegetal display that alluded to the extent of Rome's geographic reach by having plants from different geographic areas (at the end of the planting beds there were palm trees).[107] Valued guests and close associates may have even left after their visits with cuttings of novel cultivars to graft onto trees in their own villa estates, as attested in twelfth-century China, where 'grafting offered a good possibility for the owner of a rare or particularly beautiful variety to partake this pleasure with a visiting friend who would leave with a cutting'.[108] The planting beds of elite gardens like the Villa Arianna's may also have displayed a new fruit cultivar, a novel fruit plant, trees dwarfed by pruning skills, or some impressive and successful graft, such as the tree that Marcus Aurelius saw in the property of the senator Pompeius Falco.

Garden views in Roman wall paintings capture the aesthetic importance given to fruit trees and other plants, whose growth was carefully controlled

[105] Marzano, Barrett, and Gleason 2019. [106] Camardo 2019, 106.
[107] Howe, Gleason, and Sutherland 2011; Gleason 2016, 78–9; Howe 2018, 107.
[108] Métailié 2007, 151.

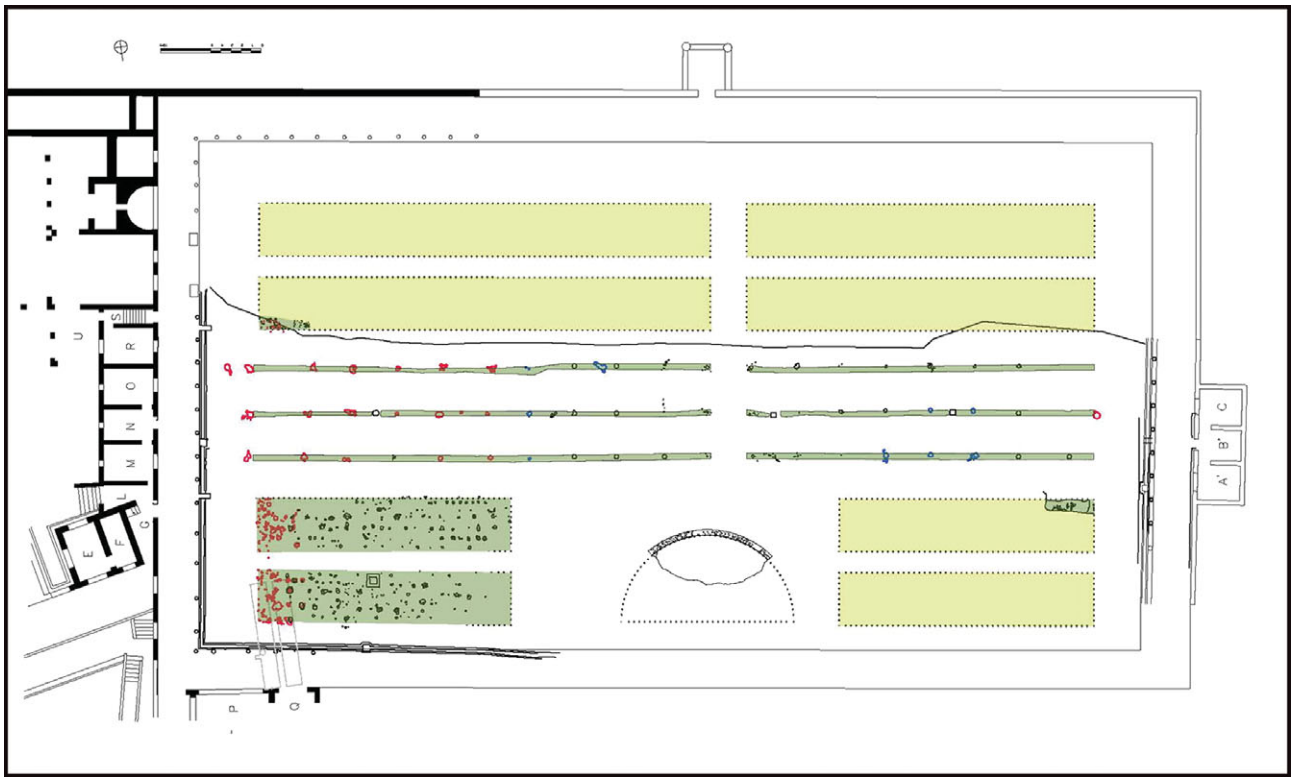

Figure 4.2 Castellammare di Stabia (Italy): Villa Arianna, plan of excavated garden in the Great Peristyle showing planting beds, walkways, and root cavities.
Courtesy of Thomas N. Howe and Kathryn Gleason.

by pruning; these painted gardens, the finest examples of which date to the Augustan era, show trees laden with fruit, as can be appreciated in the 'Casa del Frutteto' in Pompeii (1.9.5) or in the Prima Porta villa.[109] It is worth noting that the plants depicted in the wall paintings were pruned in such a way as to bring the plants to the eye level of the viewer.[110] This type of painted scene alluded to, and amplified, the horticultural 'spectacle' experience offered by the actual gardens. It might be significant that the quince was one of the preferred rootstock plants for the Romans. Besides its compatibility with the other popular fruit trees in the same family, the fact that when quince is used as rootstock it produces a dwarfing effect and smaller trees, may have been intentionally sought not only because of the practical advantages in cultivation (e.g., when harvesting fruit) but also because it produced plants that were closer to eye level, helping in creating fruit trees that were also meant for viewing.

The Villa Arianna garden, with its beaten earth walkways in between elongated rectangular planting beds featuring a variety of plants, was not exceptional but needs to be taken as indicative of an upper-class garden and the type of human–plant interaction that took place in these spaces. It is the type of garden we need to imagine as the setting for the anecdote told by Phaedrus in one of his fables involving the Emperor Tiberius.[111] Tiberius had stopped at the imperial villa at Misenum and went for a stroll in the garden, when the over-zealous and sycophantic *atriensis* tried to win some praise or reward from the emperor for hurrying to sprinkle with water the dusty and scorched beaten earth paths on which Tiberius was stepping. Even in Phaedrus' short text the fact that the luxuriant display of a well-tended garden was the essence of the pleasure one would take in while walking in the garden is clear: the emperor is strolling in *laeta viridia*, in a luxuriant garden, among luxuriant plants.[112]

The link between activities only the elite could afford (i.e., leisurely strolling in the private luxurious setting of a villa estate) and the importance accorded to the view, or, better, the spectacle of agricultural productivity is one of the cornerstones underpinning the elite interest in grafting I have discussed above. However, naming new fruit varieties after

[109] Gleason 2019. At the 'Casa del Frutteto', two *cubicula* have paintings with fruit trees. One depicts the cherry, the lemon, and the strawberry tree, together with laurel and various flowers, the other the plum, fig, lemon, pear, and cherry.

[110] Gleason *et al.* 2020, 163–5. [111] Phaed. 2.5.

[112] *Viridarii*, that is (slave) gardeners in charge of the care of these *viridia*, are attested in an inscription, now apparently no longer extant, reported in the *Lexicon Totius Latinitatis* by Forcellini, s.v. '*viridarius*'.

illustrious people may have also had another goal beside the aggrandizement of the 'inventor', according to Roman traditional values – the practice of agriculture and the idealized projection of Rome's early Republican rustic simplicity when generals got their hands dirty tilling their field remains a positive value in elite mentality – and according to imperialistic ideas. Pliny seems also to suggest that fruit varieties bearing the names of notable Roman families, such as the *Appiana mala* (from the *Appii Claudii*) or the *Dolabelliana* pear, could be seen as some kind of 'advertising expedient' to give celebrity to a specific variety of fruit, either by connecting its creation to some famous person or by presenting it as the favoured fruit of a famous individual, as for instance in the case of the *Tiberiana* pear, so named because it was said to be the emperor's favoured variety. In the middle of his enumeration of various kinds of apples connected to famous *gentes* he states:

> *ac ne quis ita ambitu valuisse claritatis et familiae putet, sunt et Sceptiana ab inventore libertino, insignia rotunditate.* (Plin. *HN* 15.50)
>
> And in order that nobody may imagine that it has gained its position by influence due to distinction and family, there is also a Sceptian apple named from a freedman who discovered it, which is remarkable for its round shape. (trans. H. Rackham, Loeb edn)[113]

One wonders whether it was just Pliny's opinion that linking an object, in this case a fruit, to a famous family or individual may increase its market appeal or whether there was a more widespread realization of the marketing value attached to names. That there was clear awareness of product differentiation in antiquity and that the market required the identification of the various products, whether by their names or the shape of their containers, is beyond doubt.[114] Certainly this is not the only instance in the *Natural History* of various 'marketing' expedients, in many cases also including abuse of customers' trust via food adulteration or fraudulent labelling of products. Evidence from other contexts suggests that the basic rules and mechanisms one finds in retailing today were clearly understood. To give just some examples, we know that particular amphora shapes were copied when trying to enter a new market where a similar product was

[113] See also *HN* 15.54: *sed confessis urbis vocabulis auctores suos nobilitavere Decimiana et ex eo tractum quod Pseudodecimianum vocant, Dolabelliana longissimi pediculi* . . . ('but pears that have advertised their producers by the accepted designations of Rome are the Decimian, and the offshoot from it called the pseudo-Decimian, the very long-stalked one called the Dolabellian. . .', trans. H. Rackham, Loeb edn).

[114] Twede 2002 for a discussion of amphorae as successful commercial packaging.

already in circulation, in an attempt to gain consumers' confidence by proposing a familiar amphora shape, reinforced with *tituli picti* on containers proclaiming the quality of a product or giving the name of a specific 'brand', such as in the case of the famous *urcei* containing the *garum* of Umbricius Scaurus from Pompeii.[115]

Freedmen and Arboriculture

Latin literary sources emphasize the direct involvement of elite members of Roman society in the agricultural endeavours of their estates and in practising arboriculture, but in them and in a number of other references about skilful and highly productive cultivators we find the omnipresent, but sometimes invisible, figures of Roman society: freedmen (*liberti*). In the cases of trade, commerce, transport, and industry, freedmen have been recognized as the major actors, the real entrepreneurs. However, their role in commercial agriculture and in innovation in this field has not received the attention it deserves. Some freedmen had the specialized technical knowledge that was the basis of their contribution to agricultural advances; they must have been specialized horticulturist slaves on wealthy estates, who continued to apply, this time on their own properties, their expertise in agricultural matters after gaining freedom. The link between highly skilled gardeners and elite villa estates is well known in the case of the *topiarii*, a term usually understood as meaning landscape/ornamental gardener. The inscriptions attesting this slave specialization are geographically limited to areas where there was a high concentration of elite villas (Bay of Naples, surroundings of Rome, Lake Como) and to members of the *familia* of wealthy families and the imperial household.[116] Therefore, the connection between wealthy landowners – who could either acquire trained slave horticulturists or who were able and willing to invest in training them, in advancement of horticulture, and in the development

[115] E.g., *CIL* 4.2574a: *G(arum) f(los) sc[o]m[bri] / A(uli) Umbrici [Sc]aur(i) / ex officina [Scau]r(i)* ('the best *garum* of Aulus Umbricius Scaurus, made from mackerel; from the workshop of Scaurus'). See Curtis 1991, 92; on advertising and product identification on amphorae: Curtis 1984–6; Berdowski 2003.

[116] *CIL* 6.6369–70 (slaves of the Statilii Tauri); 6.7300 (Volusii Saturnini); 6.8639a, 11; 8738 (*familia Augusta*); 6.9949 (*Domus Tiberiana*); 6.9082 (Domitia Longina, wife of Domitian); other inscriptions attesting *topiarii*: from Rome, *CIL* 6.4360–1, 4423; 5353, 9943–8; 33745; Comum and Bay of Naples, *CIL* 5.5316; 10.1744, and Camodeca 2007, 152 (a *topiarius* of Faustina Augusta, prob. Faustina Minor from a necropolis of imperial slaves near the Lucrine lake). On *topiarii* as essential for the well-kept garden: Plin. *Ep*. 3.19.3. Von Stackelberg (2009, 17) observes that there is no reference in Greek to the occupation of a *topiarius*.

of commercially viable new cultivars – and the successful agricultural endeavours of these freed slaves is a significant aspect of Roman arboriculture.

Pliny's concession to include a freedman's name alongside famous individuals who had named fruit is a pointer towards those that probably were, more often than not, the real entrepreneurs in the field of arboriculture. The Sceptius of the *mala Sceptiana*, who must have laboured (or supervised his own slaves/cultivators) in selecting and grafting apples until he reached the desired results of a fruit with a remarkable rotundness, can be probably placed in the same category as the very successful grape cultivator Acilius Sthenelus, son of a *libertus*, and the freedman Gaius Furius Chresimus.[117] Sthenelus, who had intensively cultivated a 60 *iugera* (*c*.15.10 ha or 37.33 acres) vineyard he owned and which he sold for 400,000 sesterces, had developed new methods of trenching and planting vines on a neglected estate on the Via Nomentana near Rome purchased by Q. Remnius Palaemon, achieving, after eight years, record grape harvests.[118] The freedman Gaius Furius Chresimus, we are told, 'was extremely unpopular because he got much larger returns from a rather small farm than the neighbourhood obtained from very large estates', to the point of being accused of casting spells on his neighbours' crops.[119] This anecdote and the resolution of the matter when Chresimus was indicted by the curule aedile and called to appear in front of the tribes is often cited when discussing Roman agricultural productivity. In court, and before judge and jury, Chresimus produced all his good-quality and well-maintained agricultural tools, his well-fed slaves and oxen, in short all that was central to his farm's production and proclaimed 'These are my magic spells, citizens, and I am not able to exhibit to you or to produce in court my midnight labours and early risings and my sweat and toil.'[120] When recounting the story about Sthenelus, Pliny presents his agricultural successes, based on his accomplished agricultural skills (*exemplum*

[117] See also the freedmen Vetulenus Aegilius, very successful in the cultivation of olive trees on the estate in Liternum once belonging to Scipio Africanus (Sen. *Ep.* 86.14) and Antonius Castor, expert in plants and owner of a botanical garden often visited by Pliny the Elder (Plin. *HN* 25.9).

[118] Plin. *HN* 14.48–51; Suet. *Gramm.* 23.

[119] Plin. *HN* 18.41: *C. Furius Chresimus e servitute liberatus, cum in parvo admodum agello largiores multo fructus perciperet quam ex amplissimis vicinitas, in invidia erat magna.*

[120] Plin. *HN* 18.43: *postea dixit*: '*Veneficia mea, Quirites, haec sunt, nec possum vobis ostendere aut in forum adducere lucubrationes meas vigiliasque et sudores.*' A connection between certain agricultural practices and magic might also have been instigated by the fact that 'cutting roots' was an action associated with magic potions and spells, the root being considered the most potent part of a plant. In Greek *rhizotomos* = root cutter is a common synonym for sorcerer: Watson 2019, 100.

consummatae huius artis), in a very positive manner.[121] In the context of viticulture, oleiculture, and arboriculture, Pliny approves of deploying know-how and technical innovation to achieve agricultural success and improve productivity, so that 'taking an innovative approach to farming ... might not be at odds with the old-fashioned ideals'.[122] The criticism is levied against Palaemon, who had only 'played the part of a farmer' (*dum agricolam imitator*, that is to say, he did not have any agricultural knowledge and could not really claim the success that he enjoyed because of Sthenelus' *ars*), because he *haec adgressus excolere non virtute animi sed vanitate primo* ('undertook the cultivation of this property not from any high motive but at first-and-foremost out of vanity'). However, the story about the alleged use of magic on the part of Chresimus reminds us that innovation can be received with suspicion and that the advancement of agricultural techniques such as grafting was not always universally admired, particularly, one can assume, when 'unnatural' combinations were purposed for the sake of their novelty. Pliny's religious concerns about certain types of grafts that I have mentioned earlier, or the belief that certain techniques were in fact magic rather than the result of a cultivator's skills, are not irrational notions exclusive to a premodern society. As late as 1912, L.H. Bailey, who was an advocate for scientific horticulture, reported that agricultural writers commonly thought that 'graftage is somehow vitally pernicious and that its effect on the plant must be injurious ... akin to magic and entirely opposed to the laws of nature'.[123] Seeing grafting in a symbolic manner, and being fascinated by it, whether positively or negatively, is clearly a phenomenon that has been prevalent and long-lasting.

Another example of former slaves acquiring fame for their remarkable skills in the cultivation of trees concerns the freedman Aegilius, owner of the estate that had belonged to Scipio Africanus and was visited by Seneca to learn more about olive tree cultivation.[124] Aegilius is certainly presented by Seneca as having advanced technical knowledge in the matter of trees. He knew how to successfully transplant a tree, regardless of its age, and he knew how to 'revitalize' olive trees in particular. The technique to 'revitalize' an old plant by digging it out and cutting the excess roots, or to

[121] A point made by Bannon 2009, 186–9.
[122] Bannon 2009, 188; cf. also Beagon 1992, 21 who notes Pliny's interest in recent developments when discussing agriculture.
[123] Bailey, *The Nursery Book* (1912, originally delivered as a talk in 1893), quoted in Mudge et al. 2009, 445 and Lowe 2010, 464.
[124] This letter is further discussed in Chapter 6.

plant cuttings to create new olive trees, which Aegilius would probably have explained to Seneca at length, were valued by Seneca for both their practical and allegorical value.[125] Seneca, perhaps as witticism, tells Lucilius (the addressee of his letter) that he is not sharing any specifics of Aegilius' tips so Lucilius will not use the freedman's experience to compete with his (Seneca's) own application of the freedman's knowledge, thereby putting Lucilius in a position to compete with Seneca in olive production. Elite Romans liked to keep their sources of practical information to themselves.

As we have seen, when we are told that prominent Romans like Pompey or Columella developed new fruit varieties or new grafting techniques, they were probably claiming for themselves achievements obtained on their estates by their specialist horticulturist slaves. Some of these successful slaves may then have gained freedom and continued deploying their arboriculture skills on their own estates. A similar scenario is described by Pliny's brief mention of two new types of chestnut developed in Campania: a knight named Corellius had developed a variety, called after him the Corelliana, and then later his freedman Tereus grafted this variety again, obtaining chestnuts of better quality still, called the Tereiana. It is hard to avoid the inference that it was Tereus that had worked on developing these two varieties, first as slave of Corellius, and later, having gained freedom, on his own estate.

On agricultural estates, freedmen were often in the position of *vilici* or managers of the estate. Their position meant that they took decisions on the daily running of the estate, on what to grow and how much to experiment in ameliorating a fruit variety or in creating a new one. Freedmen achieved many different levels of wealth and social stations in Roman society, and as wealthy freedmen shared in the same luxuries and indicators of success as the rich freeborn, so do freedmen, in the depiction given by elite authors, share the same aspiration and achievements of the elite concerning the discovery of new plants and their transplantation. That slave-agriculturists and freedmen are somewhat invisible in the elite accounts of advances in experimentation on estates does not mean that they were not quite important in the history of Roman horticulture, either as *vilici*, as grafters, or as owners of estates themselves after their manumission.

[125] On agriculture and philosophy in this letter, see Zainaldin 2019.

A Freedman and an Arboricultural Monstrosity

Pliny – both recounting facts and making a moral point – tells us a story about the arrival and diffusion into Italy of a peculiar plane tree which exemplifies some complex attitudes about arboriculture. By identifying the plane tree as a monster and its importer as a *libertus* he elides the unnatural with the socially inferior and morally vicious, and also suggests that normally, in the context of tree novelties, one would have expected a freedman to have participated in the amelioration of *productive* trees. The story concerns a very wealthy Thessalian freedman and eunuch, a *libertus* of Marcellus Aeserninus, who during the reign of Claudius had imported a novelty plane tree from Crete to his estate near Rome, a tree which did not shed its leaves in winter. The passage in full is very revealing of both facts and attitudes:

> *est Gortynae in insula Creta iuxta fontem platanus una insignis utriusque linguae monimentis, numquam folia dimittens, . . . sed ex ea primum in ipsa Creta, ut est natura hominum novitatis avida, platani satae regeneravere vitium, quandoquidem commendatio arboris eius non alia maior est quam soles aestate arcere, hieme admittere. inde in Italiam quoque ac suburbana sua Claudio principe Marcelli Aesernini libertus sed qui se potentiae causa Caesaris libertis adoptasset, spado Thessalicus praedives, ut merito dici posset is quoque Dionysius, transtulit id genus. durantque et in Italia portenta terrarum praeter illa scilicet quae ipsa excogitavit Italia*. (Plin. *HN* 12.11–12)

> There is a single plane-tree at the side of a spring at Gortyn in the island of Crete which is celebrated in records written both in Greek and Latin, as never shedding its leaves . . . Slips from this tree, however, planted first in Crete itself – so eager is human nature for a novelty – reproduced the defect: for defect it was, because the plane has no greater recommendation than its property of warding off the sun in summer and admitting it in winter. During the principate of Claudius an extremely wealthy Thessalian eunuch, who was a freedman of Marcellus Aeserninus but had for the sake of obtaining power got himself enrolled among the freedmen of the emperor, imported this variety of plane-tree from Crete into Italy and introduced it at his country estate near Rome – so that he deserves to be called another Dionysius! And these monstrosities from abroad still last on in Italy also, in addition, that is, to those which Italy has devised for herself. (trans. H. Rackham, Loeb edn)

Pliny is all reproach about this deed and this plant; for him the plant is the embodiment of a *vitium*, a defect, something that deviates from the natural properties of the plane tree (that is, having thick foliage in summer that protects from the sun and shedding the leaves in winter so as not to

impede sunlight), which made it an appreciated ornamental plant for private and public gardens. The new plane tree from Crete is not only a bad tree; in previous sections, Pliny has already expressed his disapproval of all plane trees as a non-fruit-bearing species imported into Italy: it had been brought to the peninsula only for the sake of its shade. The new Cretan variety had an additional negative trait: the tree retained its leaves in winter, preventing the little light and warmth that the sun can provide. Pliny openly frowns at the human desire for novelties (*ut est natura hominum novitatis avida*) and clearly does not approve of the freedman's innovative import. I am not concerned here with the veracity of the story or with what varietal the Cretan plant might have been, but with how Pliny constructs it. The fact that the protagonist is a freedman and also a eunuch is a significant detail: someone with a social stigma as an ex-slave, but also someone whose body signifies a *vitium*, a change in the natural state of things, albeit one induced by the intervention of other human beings. This detail already signals to the reader that, unlike the positive story of the freedman Chresimus, what follows is not a positive example. Disapproval is further reinforced by the fact that Pliny does not tell us the name of this person, only of his patron; the freedman's personhood is thus negated, and his name is not recorded for posterity. Additional negative characteristics are attributed to him, stereotypical of the characterization of rich *liberti*: our *libertus* had reneged the link of dependence between ex-slave and *patronus*, and instead had himself adopted among the freedmen of the emperor '*potentiae causa*', only for the sake of obtaining power. So here we have a power-seeking freedman who imported a plant that Pliny disapproves of as counter to nature but that probably others would have admired as a novelty. This freedman behaves just like many members of the upper class did, and shows the same geographic mobility: he is from Thessaly, but, maybe because he was in Crete on business, maybe on some imperial administrative duties, finds out about the peculiar plane tree, obtains one or more plants, and plants them in his estate near Rome. As expected, he had invested his wealth in landed property. However, when referring to freedmen developing new fruit varieties (and, implicitly, keeping the dependency bond with their former master) like the above-mentioned Tereus, freedman of Corellius from Campania, and the new Tereiana chestnut variety, Pliny is not openly disapproving, but rather keeps his account factual and neutral. Useful acclimatizing was always welcome, an unproductive one was not.

The Economic Value of Grafting

If, ideologically, the art of grafting embodied the moulding of nature according to the human will, the civilizing power of mankind, and writers and poets could fantasize about the possibility of impossible grafts which went against any rule of nature, in the daily running of agricultural estates grafting had a much more practical value and was one of the routine operations any farmer would have been well familiar with.

Although it is not possible to distinguish different grafted types of the same fruit from micro- or macro-archaeobotanical remains, the archaeobotanical evidence for cultivated fruit from sites such as Pompeii or the so-called peach farm of S. Giovanni in Laterano in Rome clearly implies the regular practice of vegetative propagation either by planting cuttings or by grafting. As I discuss in Chapter 6, the relatively good archaeobotanical record from Roman sites in northern Italy shows an increase in the number of cultivated fruits in the imperial period, when compared to both the Republican and late imperial ages; this suggests the increased importance of commercial arboriculture and supports the idea that the emphasis placed on horticulture and arboriculture in early imperial literature was rooted in real developments in the field of agriculture.

As we have seen, impossible and strange grafts both fascinated and repelled authors such as Pliny. When he refers to the plum grafted onto nut trees (*nuces*) it is as *impudentia* (impudence, insolence) that he categorizes the action and the resulting fruit: it had the appearance of the nut but the juice of the 'adopted stock'.[126] But a few lines later, Pliny does suggest that some grafts were successful and enjoyed commercial distribution. In Baetica, he writes, two grafts involving the plum had started to be called with new names reflecting the nature of the 'adopting plant': *malina*, in the case of plums grafted onto apple trees (this is a straightforward graft, since both trees are part of the same family), and *amygdalina* for plum grafted onto almond trees. The latter, he writes, 'have the kernel of an almond inside their stone; and indeed no other fruit has been more ingeniously crossed'.[127] Pliny claims that in his own time some suburban estates engaged in commercial fruit cultivation derived an annual revenue of 2,000 sesterces per tree, more than farms used to return in the times of

[126] Plin. *HN* 15.12.41.

[127] Trans. H. Rackham, Loeb edn; Plin. *HN* 15.12.42: *nuper in Baetica malina appellari coeperunt malis insita et alia amygdalina amygdalis: his intus in ligno nucleus amygdalae est, nec aliud pomum ingeniosius geminatum est.*

old. He clearly links such returns to grafting, by saying that 'It was on this account that grafting . . . was devised'.[128] Two thousand sesterces per tree, in a period when a legionary soldier's pay was 900 sesterces a year, is a lot and it may well be an exaggeration. But Pliny's point in that passage is to emphasize that fruit cultivation had become a proper large-scale commercial activity, and that traditional and perfected farming techniques such as grafting were applied to it in order to develop fruit varieties that could command good prices on urban markets.

The important role grafting had in commercial agriculture and its economic value, in terms of shortening the time needed to have mature fruit-bearing trees, ensuring relative consistency in the fruit qualities, and propagating trees on a large scale, can be best appreciated in the case of oleiculture because of the abundant ancient evidence.

Olive trees can be propagated by suckers, layering, and graft; planting seeds will only give an olivaster, i.e., a plant derived from cultivated varieties but whose fruit will tend to revert to the wild characteristics and will not viably preserve the qualities of the mother plant. In modern oleiculture, olive pits are planted in order to obtain olivasters which will serve as rootstock for grafting with branches taken from the cultivated olive trees to be propagated.[129] The oleaster, the proper wild olive plant, is a bushy, thorny plant which produces few and small fruits. Cultivated kinds of olives can be readily grafted onto wild oleasters, and doing so has numerous advantages: since the oleaster grows spontaneously in all Mediterranean regions, it is possible to transform wild trees into desirable cultivated varieties either for oil production or for the table; unexploited tracts of land where oleasters are present can be brought under olive cultivation without uprooting the trees and replacing them with young olive trees which will reach full maturity and fruiting capacity about ten years after planting. Grafting onto mature oleasters means that the farmer will have the first harvest in a shorter time than if he were planting young trees.

Grafting of wild olive trees or of the offspring of domesticated olives, which had reverted to a wild state, was common practice in antiquity and its benefits were well understood. The application of these techniques was perhaps the reason for the relatively quick emergence of regions such as North Africa as great producers of olive oil, as attested by abundant archaeological evidence (e.g., the many olive presses known) and

[128] Plin. *HN* 17.8. [129] Bandino and Dettori 2003, 13–14.

numerous references in the literary sources.[130] It certainly had an important role recognized by the imperial authorities: in the second century AD, legislation was passed to encourage the cultivation of new tracts of land or of land that had fallen into neglect.[131] The Trajanic inscription from Henchir Mettich, which mentions the tenants' rights and obligation according to the first-century *Lex Manciana*, reports fiscal relief given to cultivators who would engage in arboriculture on unused land. Tenants who would either plant new olive trees or graft oleasters were exempt from rent payments for ten years in the former case, five in the latter, while planting vines and fig trees also prompted a grace period of five years.[132] The length of these tax-waivers is commensurate with the time it would take the different types of plants to reach maturity and produce substantial crops. The number of years covered by the exemptions is not always the same in the other North African inscriptions, perhaps reflecting different local conditions of soil, weather, and irrigation. The Severan inscription from Aïn Ouassel (or Aïn Wassel), which reports an earlier enactment issued by imperial procurators under Hadrian nearly a century before (part of the so-called *Lex Hadriana*), gives a ten-year exemption for both planted and grafted olives, and a seven-year exemption for other fruit trees (generically referred to in the text as *poma*).[133]

A late third-century AD funerary inscription from Africa Proconsularis found at Bou-Assid, 13 km northeast of the ancient town of Ureu (mod. Henchir Aouraou), is most remarkable in fully acknowledging the importance of grafting to bring a neglected estate back to full production. In this epitaph, set up by the wife of the deceased, the achievements of this *agricola* (the full name is lost as the first lines are missing) have to do with

[130] See also Plin. *HN* 17.129: *Africae peculiare, quod in oleastro eas inserit quadam aeternitate, cum senescant, proxima adoptione uirga emissa atque ita alia arbore ex eadem iuuenescente iterumque et quotiens opus sit, ut aeuis eadem oliueta constent. Inseritur autem oleaster calamo et inoculatione* ('It is peculiar to Africa that it grafts them on a wild olive, in a sort of everlasting sequence, as when they begin to get old the shoot next for engrafting is put in and so another young tree grows out of the same one and the process is repeated as often as is necessary, so that the same olive-yards go on for generations. The wild olive however is propagated both by grafting and by inoculation').

[131] On the significance and workings of this legislation, Kehoe 1988; Kehoe 1997.

[132] *CIL* 8.25902 = FIRA.100.III, 2–13, §8–9: *O]liuetum serere colere in / eo lo[co] qua quis incultum exco/luerit permittitur, ea condici<ci>one, u/t ex ea satione eius fructus oliueti q/uid ita satum est per oliuationes pro/ximas decem arbitrio suo permitte/re debeat, item pos[t]oliuationes [decem?] ole[i] / coacti partem t[e]rtia[m c]onductoribus uilicisue ei[us f(undi) d(are) d(ebebit). / [Qui] inserue/rit oleastra, post [annos qui]nque partem tertiam d. d.* See also *CIL* 8.25943 from Aïn el-Djemala, Hadrianic. Kehoe 2007, 58.

[133] *CIL* 8.26416 = *ILPBardo* 165 = *ILTun* 1373.

his great skills as a cultivator and the practical things he achieved on the *Fundus Aufidianus*. It is worth reporting the extant text in full:

> *. . .agricolae in spl(endidissima) ? \ rep(ublica) Bihensi Belt[a ?], \ conductori pari\atori, restitutori \ fundi Aufidiani et, \ praeter cetera bona q[uae] | in eodem f(undo) fecit steriles \ qu[o]que oleastri surculo[s] \ inserendo plurimas o [leas] | instituit, puteum iux[ta] \ uiam, pomarium cum tric[hilis], \post collectarium, uin[eas] \ nouellas sub silua aequ[e in]\stituit. \ Vxor mari[to] \ incomparabili fec[it].* (*AE* 1975.883)
>
> To . . . farmer in the most splendid community of Biha Belta, lessee and settler of accounts, restorer of the estate Aufidianus, and because of all the other good things which he did in that same estate, he created many olive trees by grafting unfruitful oleasters with scions, and he built a well next to the road, an orchard with arbors, and behind the treading vat (?) planted new vines under the trees. To her incomparable husband, his wife made this.

Bringing oleasters to bear commercially viable fruits via grafting is singled out here as one of the important things for which the deceased ought to be remembered.[134] It is not surprising that among the other *cetera bona* he did on this estate, we find planting an orchard with arbours and establishing a new vineyard:[135] fruit trees and wine production make for a well-rounded estate, estimated at having measured *c.*1,600 ha,[136] producing for the commercial market. In addition to the digging of a well, certainly needed for the irrigation of the orchard, possibly a treading vat/*cella vinaria* was also built, if that is the meaning of *collectarium*.[137] While there were legal and practical reasons for the widow to clearly list all the improvements carried out on the estate by her husband,[138] the list resonates into the ideological sphere: grafting, being able to transform *sterile* plants into oil-bearing olives, occupies central place. The deceased commemorated on the *Fundus Aufidianus* was, in other words, a *bonus agricola*, a Roman ideal with a particular valence in North Africa due to the legislation about

[134] Thus, also Vismara 2007b, 23.

[135] Since the text says '*vineas novellas sub silvua*', i.e. vines under the trees, it can be postulated that it was a case of vines grown trailing on trees, otherwise it is difficult to see how vines could actually grow and bear grapes under trees. However, Peyras (1975, 215) rules this out and instead interprets *sub silva* as meaning that trees surrounded the vines, protecting them from, e.g., the wind.

[136] Peyras 1975, 189.

[137] Aerial photos of the area of the *Fundus Aufidianus* have identified signs of the ancient olive trees, planted at a distance of *c.*9 m: Peyras 1975, 213. Nine metres or 30 Roman feet is the distance for irrigated olive plantations identified in the region of Sbeitla, whereas the dry cultivations of the Sahel had trees planted at a distance of 15/22 m which matches the precepts of Mago as reported by Pliny (*HN* 17.93): Vismara 2007a, 433–4.

[138] Peyras 1975; See also Kehoe 1988, 231–4.

imperial estates which conferred property rights to those who had brought abandoned lands back into good cultivation.[139]

Celebration of agricultural achievements can be found in several North African epitaphs, well into late antiquity. Not all commemorate the deceased's skill at grafting but rather record the number of trees he had planted. The fifth-century mosaic epitaph of a certain Pudion,[140] who died at 80 years old, declares that he planted 4,000 trees; his longevity and the number of trees, very likely olive trees considering that the text was found in Africa Proconsularis, are the only aspects of his life chosen for commemoration.[141] The number of trees reported in his inscription has seemed exaggerated to some scholars. Stone thought that the number was hyperbolic and that Pudion, a landlord, refers to trees that his *colonii* had planted on his estate; Brun instead considered the sum to refer to the trees he had planted during his whole life, which would make the number less impressive considering Pudion's longevity.[142] While numbers (especially the age at death) in Latin inscriptions tend to be rounded up, there is no reason to see the 4,000 trees as hyperbolic: from the Zenon archive (see below) we learn that no less than 3,000 olive shoots and 470 olive suckers were planted on one estate at one time.[143]

Besides propagating fruit trees from one's own existing trees on the estate, in all likelihood there were also plant nurseries providing the desired types of fruit tree. In addition to supplying commercial agricultural estates, plant nurseries must have also catered to clients wanting specific trees for the ornamental gardens of their urban houses and villas. Commercial nurseries must have been relatively common in the Roman world, especially in areas densely planted with orchards or having a concentration of elite houses/villas and public buildings with large gardens. The evidence is sparse, but suggestive. The kiln specializing in *ollae perforatae,* or planting pots, discovered along the Flaminia, churned out the kinds of product that plant nurseries needed;[144] and the city of Rome, with all its suburban villas, aristocratic houses, and gardens in public buildings certainly created a high demand for plants. Excavation of the fill of planting pits of an

[139] On the *bonus agricola* and rural investment in N. Africa, see Stone 1998. For *bonus agricola* in funerary commemorations paired with prowess in jurisprudence (*foro iuris peritus)*, another Roman 'value', see the inscription to Q. Vetidius Iuvenalis from Thubursicu Numidarum (Khamissa, Hr.): *ILS* 7742c.

[140] Or, Dion, if we take the initial letters as the abbreviation of *p(ius) v(ir)*: this is a Christian tomb found in an early church.

[141] *ILTun*, 243: *In pace bixsit annos octoginta et instituit arbores [q]uattuor milia.*

[142] Stone 1998, 107, 109–10; Brun 2004, 206, 311 note 64.

[143] *P.Cair.Zen.* 5.59839, 2.59184.

[144] At km 12.800 of the modern Flaminia: Messineo 1984, 66; 76.

orchard established sometime in the late second century AD at Champ Redon, to the east of Béziers, showed that the trees planted had a clod of earth around the root ball, an indication that they came from a nursery.[145] A sizeable commercial nursery is archaeologically known in Egypt, near Abu Hummus, dating from the second century BC to the second or third century AD.[146]

Details on the type of plants a commercial nursery could provide and the degree to which large agricultural estates depended on plant nurseries for their operations emerge clearly in the correspondence preserved in the papyrological archive known as the Zenon archive. Although dating to the third century BC and thus describing conditions in Ptolemaic Egypt, the letters of the archive encapsulate transactions about plants and trees that, in all likelihood, continued into Roman times. The letters between Zenon, a manager of an estate in Philadelphia, and Apollonius, the absentee owner of the estate and high-ranking official, reveal many details of the practicalities of acquiring plants and propagating them on an estate. One document dated to January 255 BC reports on the order of suckers of vines, olives, and fruit trees destined for the Philadelphia estate from the area of Memphis and Alexandria, or from Crocodilopolis. Plants and trees that figure in the correspondence include (but are not limited to) walnuts, figs of which six varieties are mentioned in one letter, apples, pears, plums, pomegranates, special kinds of apricots, peaches, olives, and grape vines (eleven varieties); these plants were acquired as either cuttings (*phyta*) or suckers (*motheumata*) to be planted on the estate.[147] Young trees were also transported when needed: one document mentions 200 pear trees sent from Apollonius' estate to the king (?); the young plants were replaced by planting 200 shoots.[148] If there were any doubts, the scale of the orders makes very clear the commercial nature of the agriculture practised on this estate. For instance, 500 pomegranate shoots, 12,400 vine shoots, and 3,470 olive shoots/suckers appear in the archive.[149]

Possible plant nurseries have also been excavated in Pompeii. The House of the Garden of Hercules (II.8.6) featured a large garden space

[145] Figueiral *et al.* 2010b, 416–18.
[146] Kenawi, Macaulay-Lewis, and McKenzie 2012. On the propagation of laurels, pomegranates, planes, cherries, and plums from shoots/suckers, see Plin. *HN* 17.65; trees suitable for this kind of propagation technique were likely common occurrences in commercial and private nurseries.
[147] Kenawi, Macaulay-Lewis, and McKenzie 2012, 195–6; *P.Cair.Zen.* 2.59459, 4.59736, 1.59033, 2.59156, 2.59184.
[148] Kenawi, Macaulay-Lewis, and McKenzie 2012, 197; *P. Mich.* 1.24.
[149] Kenawi, Macaulay-Lewis, and McKenzie 2012, 196.

which Jashemski suggested may have been used to grow commercial flowers for garlands.[150] In this garden she also discovered, against one of the walls of the garden, several planting pots in the root cavities identified in the lapilli, meaning that these pots housed young trees, not flowers. The root cavity in one of these pots seemed to have been from a citron/lemon tree, a plant propagated by layering, and it has been tentatively suggested that this garden was a tree nursery.[151] When plant pots are found undisturbed in situ it can be seen that they contain different soils from that of the garden in which they were recovered, as in the case of the planting pots from the House of the Greek Epigrams (V.1.18) in Pompeii.[152] This means that the plants, with their pots, came from somewhere else, i.e., a nursery. A more likely plant nursery was excavated at the back of the House of the Floral Lararium (II.9.3–4) along the Via Nocera: hazelnut, olive, grape vine, cherry, and other trees of the *Prunus* species seem to have been grown.[153] The trees appear to have been young and in a relatively confined area, suggesting the vegetative propagation of plants in the context of a nursery rather than cultivation for domestic consumption or decorative value.

A Special Case: Chestnut Trees and Their Fruit

The exploitation of grafting to enhance production and financial return can also, paradoxically, be detected in the case of a plant whose fruit did not actually have much economic importance in antiquity: the sweet chestnut (*Castanea sativa* Miller). Its relatively small presence in the Roman agricultural economy is in contrast to its greater valence in the European Middle Ages: its presence in woodlands increased, and its fruit – dried and processed into flour – became a staple in the diet of ordinary people.[154]

There were chestnut groves in Roman Italy, with variations among regions. While chestnut appears in the pollen record for Italy from the Bronze Age onwards, the archaeobotanical record for the Roman period does not seem to suggest a widespread use.[155] A larger presence in Roman Campania has been posited, and data indicate that the chestnut was used in the Vesuvian area for its fruit and wood from at least the first century

[150] Jashemski 1979–93, vol. I, 408–10. [151] Macaulay-Lewis 2006, 210.
[152] Macaulay-Lewis 2006, 217. [153] Ciarallo 2004, 123; see further discussion in Chapter 6.
[154] Squatriti 2013. [155] Moser, Nelle, and Di Pasquale 2018, 914.

BC.[156] Chestnut wood has been identified used as timber in construction or as fuel at various sites of the Vesuvian area.[157] It is likely that chestnut grew on the northern slopes of Vesuvius,[158] but commercial interest in chestnut was principally for its wood, especially posts to be used as props for vines: the posts used to trail the vines in the *vitis iugata* technique were of chestnut.[159] Columella mentions the chestnut in the context of viticulture and gives information on the production capacity of one *iugerum* of land planted with 2,880 chestnut trees: 12,000 posts every five years.[160] It was, in other words, in the context of coppicing (quick-growth coppiced chestnuts produced young tree stems that, cut every five to seven years, served as props for the vines) that we mostly find the chestnut in the Roman world.[161]

Different varieties did exist; Pliny, who wonders why nature should have bothered to defend the vilest of fruit (*vilissima*) so well with a spiny cupule,[162] mentions seven varieties. Of these, the one he reports to be the best for eating was a type grown in Tarentum, followed by the chestnuts of Neapolis. Although Pliny does mention that chestnut flour was used to make a kind of bread consumed by women who were fasting, it is clear that, in his view at least, the chestnut was not for human consumption: 'All the other kinds are grown to feed the pigs.'[163] Such an opinion does not seem to be confined to Pliny; mentions of chestnut as food are not common in Latin sources. But of course, this does not mean that ordinary people in certain rural areas or also in urban settlements did not regularly consume them. It seems that Ovid alludes to chestnuts being sold in Rome in Book 2 of the *Ars Amatoria*: in exhorting the reader to give rustic gifts to the lover rather than costly items, the poet mentions grapes and chestnuts. Literary evocations are strong here – the chestnut is defined as the one 'that Amaryllis loved but loves no more', a clear echo of Virgil's *Eclogue* 2.[164]

[156] Moser, Nelle, and Di Pasquale 2018, 914; Allevato *et al.* 2016.
[157] Di Pasquale *et al.* 2010; De Simone, Vairo, and Veal 2013.
[158] Moser, Nelle, and Di Pasquale 2018, 917.
[159] Plin. *HN* 17.147–50; Columella, *Rust.* 4.33.4 and discussion below. The analysis of carbonized timber from Herculaneum has identified a few elements made of chestnut wood, such as beams, squared joists, and planks: Moser, Nelle, and Di Pasquale 2018, 908, tab. 1.
[160] Columella, *Rust.* 4.33.4. See also, in Mart. 10.79, the contrast between the choices made on a luxurious suburban estate and on a farm: a certain Torquatus plants on his *praetorium* a laurel grove whereas Otacilius plants in his farmland 100 chestnut trees.
[161] Veal 2017, 391.
[162] *HN* 15.92: 'it is surprising that nature took such care in concealing the least valuable of things'.
[163] Plin. *HN* 15.92.
[164] At *Ecl.* 2.52 Virgil writes: *castaneasque nuces, mea quas Amaryllis amabat* ('chestnuts, which my Amaryllis used to love').

Due to the literary discourse Ovid establishes with Virgil, it is unclear to what extent these verses could be taken as an objective indication that: (a) chestnuts were, to a degree, commercialized in a metropolis like Rome and (b) they could be considered as gifts, albeit rustic and humble, appropriate for a lover.

Chestnuts seem to have been discovered in the Bourbon excavations of the Temple of Isis in Pompeii and in the *taberna* of Verecundus, at Herculaneum, and also in the so-called villa of Poppaea (villa A) at Oplontis.[165] A chestnut tree must have grown in the peristyle garden of the villa, since carbonized chestnuts were found during excavation in the upper lapilli layers, suggesting that these were fruits on tree branches.[166] In addition, a chestnut seems to figure in one of the many still lives painted on the walls of the villa.[167] In late antiquity, boiled or roasted chestnuts are described as one of the *tragemata* (nuts, fruits, but also cakes and some savoury dishes that were eaten as snacks or as dessert) of Greek dinners by the sixth-century author Anthimus.[168]

In an area such as Campania, where viticulture was fully developed, growing chestnut groves for coppicing must have been relatively common.[169] Results of the archaeobotanical analysis carried out in conjunction with the excavations of the ancient harbour of Neapolis have indeed revealed that, for the period from the second century BC to the fifth century AD, the chestnut was present among the local flora and the nut was consumed by humans.[170]

Due to its pollination type, chestnut also falls into the category of plants for which grafting is needed to replicate the characteristics of the mother plant in the fruit.[171] However, if the aim is to grow chestnuts for wood, especially for coppicing, and not to improve the nuts, then grafting is irrelevant, even counterproductive. Indeed, Squatriti points out that grafting may reduce the amount of wood on the tree and slow down the production of biomass.[172]

[165] Borgongino 2006, 152, record no. 527; 65, record no. 26. Herculaneum: 12 chestnuts in a dish from no. 13 on the Decumanus Maximus (inv. No. 2943-2): Jashemski, Meyer, and Ricciardi 2002, 97.
[166] Jashemski, Meyer, and Ricciardi 2002, 97–8.
[167] Oplontis, villa A, room 23, north wall: a glass bowl containing what seems to be dried fruit is depicted on this wall. Ricciardi 2014, 65 suggests that one of the fruits on the left side might be a chestnut.
[168] Anthimus, *OC* 88, referenced in Dalby 2003, 82.
[169] Pliny says that trailing the vines on a live support was also practised in Campania, mostly using white poplars: *HN* 14.10.
[170] Allevato *et al.* 2016. [171] Squatriti 2013, 45. [172] Squatriti 2013, 45.

The realization that different propagating methods were to be followed if one wanted to grow chestnut trees for coppicing or for their nuts is reflected in a surviving passage of a book on horticulture by Gargilius Martialis, an author who lived in the third century AD. He refers by name to various earlier writers, such as Pliny, Columella, and the Quintilii brothers, about planting nuts to propagate the plant for the purpose of obtaining wood. A few sections later he writes, without giving any specific name for his source(s), that there are some who separate the nuts from the suckers which grow spontaneously around the tree: whereas the former are considered better to propagate plants destined to coppicing/wood production, the latter are better to reproduce a tree to produce nuts.[173]

As mentioned earlier, in Pliny's account of the chestnut, two apparently new and newly named grafted varieties from Campania, the Corelliana and the Tereiana, are discussed. The former, called by the writer 'celebrated', was developed on his Campanian estate by a knight named Corellius, hailing from Ateste, and was characterized by a prolific production of nuts. Then his freedman Tereus grafted this new variety again, obtaining the kind named after him, which was less prolific but of better quality. In light of what we know was the utility of grafting in chestnut cultivation and of Pliny's comments on the minor commercial value of the fruit, it can be inferred that the landlord Corellianus and his *libertus* Tereus had been experimenting with the chestnut to improve its qualities and appeal for human consumption.[174] Considering that a chestnut tree reaches maturity by its fourth decade and that it usually does not flower in the first ten years of its life (but it can nevertheless grow fruit in youth), experiments such as those of Corellianus and Tereus required medium- to long-term planning, even when shortening its trajectory to maturity by grafting branches on an

[173] Garg. Mart. *De hort.* 4.4: *Inventi tamen qui de nucibus et hoc genere plantarum audeant aliquod facere discrimen, et nuces credant caeduis arboribus aptiores, plantas vero nucibus procreandis esse utiliores, sit amen fas est ut admittere in animum debeamus quod lignum in poma proficiat, fructus vero in ligna desistat* ('There are those who make a distinction between the nuts and this type of plant (suckers); they believe that the nuts are better to propagate trees meant for coppicing, whereas the plants are more useful in the propagation of trees meant to bear nuts, if however one can accept that the wood benefits the fruit and the fruit gives over to the wood'). Note that earlier in this paragraph the phrasing the writer uses reflects awareness in his sources that the propagation by layering/suckers preserved the characteristics of the mother plant, unlike reproducing by seed/nut: *quidam in planits iuxta arborem sponte nascentibus,* ***castaneas conservandas esse*** *dixerunt* ('Some authors have said that the chestnut must be preserved in the plants that spontaneously grow around the tree'; emphasis mine).

[174] Squatriti 2013, 93 is cautious about seeing the 'discussion of grafting chestnut trees ... as straightforward evidence of Roman castaneiculture' since in Pliny's case, his discussion is 'also a discussion of aristocratic agriculture and fame in an empire that left few avenues for social recognition to the Roman elite'.

already grown-up tree. If we assume that Pliny's story about these two cultivators is correct, why would they invest time, effort, and money in working on a nut that did not seem to have any great market value?

The answer may be twofold. On the one hand, the fascination of taking on an unusual botanical challenge rather than the ordinary routine of grafting apples, pears, and figs, may well have been attractive, not for practical reasons but more for glory and naming-rights over the new varieties. This seems to be what Pliny himself is interested in when telling us this story. As pointed out by Squatriti, 'to Pliny it was not the new grafted chestnut variety that mattered but the cultivator's success, a "rare" victory of the Roman landowner over oblivion by means of a tree that perpetuated his name'.[175]

On the other hand, a basic preoccupation with an estate's productivity, with what to cultivate, and what products to send to the market, must have been part of the picture for any farmer. Corellius and Tereus may not have grafted new kinds of chestnut merely to produce a botanical novelty and perhaps achieve future remembrance: they were interested in improving the chestnut so that a greater number of people would find it attractive and want to consume it. Such experimentation was ultimately concerned with increasing the market value of their produce and giving themselves, as cultivators of the variety, an advantage over competitors. After all, even if the main motivation behind such botanical experimentation was to overcome oblivion and be remembered by posterity, this is only possible if the new fruit achieves some level of popularity, if it becomes sought after, if, in other words, it is saleable. Otherwise the 'invention', as well as the name of the inventor, will be short-lived and soon forgotten. As is often the case in the Roman world, profit-seeking and financial decisions cannot be disentangled from ideological constructs.

[175] Squatriti 2013, 92.