CHAPTER 7

Plant Dispersal and Provincial Agriculture
The Iberian Peninsula and Gaul

The Romans have been credited with the introduction of new plants in many western provinces, particularly those north of the Alps. Indeed, the cultivation of apple, cherry, grape, peach, pear, plum, and walnut is commonly assumed to have started in the northern alpine regions with the Romans; remains of these fruits are found abundantly and more frequently at all types of Roman sites than in those of the pre-Roman period. While at times the actual contribution made by the Romans to European biodiversity has been exaggerated,[1] it cannot be doubted that certain fruits and condiments in several regions north of the Alps are unmistakably associated with the Roman presence, just as the consumption of distinctly Mediterranean products like *garum* and olive oil are. This chapter discusses the changes in provincial agricultural practices and the dispersal of plants that occurred in the Roman era, and the possible impact on these of Roman colonization and military presence. It should be borne in mind that the discussion that follows is based on the currently available archaeological evidence. There is much that is still in need of clarification – for example what role indigenous populations may have had in the dispersal and cultivation of plants that we know were *introduced* in a region, since they had no wild, autochthonous progenitors. For some areas, the archaeological datasets available for the pre-Roman, Iron Age period are not as rich as the Roman ones, and this may result in skewed interpretations when data for the two periods are compared. It is therefore inevitable that future research and discoveries will add information that will either supplement the picture here presented or change it considerably. However, based on the evidence available to us now, it can be posited that the incorporation of provincial territories into the Roman state and the geographic mobility of colonial settlers and military personnel stationed in the provinces and along the frontiers contributed to the botanical

[1] See discussion in Witcher 2013.

dispersal of a range of plants, either used as food, or for medicinal preparations and other practical uses, such as dyeing.[2]

Gaul and the Iberian Peninsula experienced an earlier integration into the Roman empire than other European regions and were also the object of extensive colonization programmes. Incorporation into the Roman empire brought notable changes in local dietary habits, at least in urban centres, and while the appearance of new food plants in the archaeobotanical record does not always mean *local* cultivation, as many could have been imported in preserved status, there are cases when local cultivation can be postulated with some confidence.

In previous chapters I have suggested that the last years of the Republic and the Augustan era were marked by an increased interest in the properties of various cultivars of major commercial crops. This increased interest in developing and selecting plant cultivars was, I posit, one of the outcomes of the large programme of colonial foundations in the provinces carried out by Caesar and by Octavian/Augustus. Caesar planned a number of overseas colonies (in Spain, Gaul, North Africa, Corinth, Lampsacus, and Sinope), perhaps as many as 20; according to Suetonius, he settled as many as 80,000 citizens abroad.[3] Octavian/Augustus had to grapple with the huge problem of settling scores of military veterans; after creating twenty-eight colonies in Italy, with the well-known sociopolitical problems this entailed (e.g., the 'Perusinian War'), he firmly focused on provincial territories until the establishment of the *aerarium militare* and the replacement of the grant of land with a cash bounty solved the delicate problem of finding land for the veterans. These colonial foundations and ensuing distribution of land could lead to major hydrogeological works affecting the landscape, as in the case of the Tricastin plain, with the important Roman colony at Orange and a Latin colony at St-Paul-Trois-Châteaux.[4]

The colonists who had received a parcel of land in the provinces and who wanted to embark on commercial agriculture had to decide not only what type of crops to grow, but also which cultivars were the best suited to the local environment. The major agricultural change that colonization and the incorporation into the large and relatively stable Roman state caused in these provincial territories was the spread of large-scale

[2] Dickson 1994 for some examples of medicinal plant remains found at Roman military sites.

[3] Suet. *Div. Iul.* 42. Caesar's colonization programme has been considered to have had the establishment of commercial ties as its primary aim, with the settling of primarily citizens (Yeo 1959, 107), but he also established some veteran foundations.

[4] Van der Leeuw and The ARCHAEOMEDES team 2005.

viticulture and oleoculture, and this is well attested by archaeological evidence. But arboriculture, and horticulture more generally, were also affected, resulting in an increased variety of plant foods grown and consumed locally.

The Iberian Peninsula

The Roman presence in the Iberian Peninsula had started early in the third century BC, when Rome was facing the other big Mediterranean power: Carthage.[5] With Carthage's defeat in 206 BC and its withdrawal from the Iberian Peninsula, Rome acquired the former Carthaginian territories. The Iberian Peninsula had significant natural resources that had drawn the early attention of Rome, the mines being the most important, but the agricultural fertility of some parts of the Peninsula was also an attraction for settlers.[6] Strabo famously commented that the lands along the Baetis were 'exceedingly well cultivated' and that 'large quantities of grain and wine, and also olive oil, not only in large quantities, but also of best quality'[7] were exported from Turdetania, roughly the area corresponding to the valley of the lower Guadalquivir. A good share of this trade was directed to Italy and Rome in particular.

As early as 171 BC, a Latin colony had been founded at Carteia; this foundation was, it is true, an exception in this period, since formal colonization started much later, but, nonetheless, by the 130s BC there were already Roman landowners in the Iberian Peninsula.[8] It is accepted that the prolonged Roman military presence first, and the proper arrival of numerous settlers and colonists later, considerably changed the agricultural economy of the region. The intensive cultivation of the grape vine in Tarraconensis and of the olive tree in Baetica, which by the first century AD had developed into large-scale exports of wine and oil, are phenomena linked with the Roman presence, the establishment of colonies, the

[5] The province of Hispania Ulterior was created in 197 BC. Military camps manned by Italian soldiers were possibly installed at settlements of the Turdetani, Baestani, Oretani, and other Iberian populations between the late third and mid second century BC (Keay 1992, 287).

[6] E.g., see Strabo's comment about the reasons for Corduba's growth (3.2.1): the excellence of its soil and the extent of its territory, in addition to the fact that the Baetis (and its navigable tributaries) offered good means for the distribution of goods. The basin of the Baetis covers an area of 56,632 km^2: Campbell 2012, 250.

[7] Strabo 3.2.3 and 3.2.6: Ἐξάγεται δ' ἐκ τῆς Τουρδητανίας σιτός τε καὶ οἶνος πολὺς καὶ ἔλαιον οὐ πολὺ μόνον, ἀλλὰ καὶ κάλλιστον.

[8] Harris 1989, 128–9; Harris 2016, 48–9.

centuriation of the land, and the emergence of an agricultural system centred on farms and villas engaged in cash-crop agriculture.

While the almost continuous presence of Roman legions in Hispania during a good part of the second century BC, and later during the Sertorian war, had generated the trade in imported goods such as Italic wine and fineware, it was only between the second half of the first century BC and the early first century AD that major changes in local patterns of rural exploitation occurred, with the introduction, on a massive scale, of farm-based agricultural production.[9] As noted by Keay, 'The foundation of colonies from the mid 1st century BC onwards and a subsequent increase in commercial activity . . . were catalysts for rapid change. A new hierarchy of dominant and dependent centres arises at the expense of the old networks and, by the early 1st century AD, the agricultural wealth of the region is being more directly exploited for Rome's benefit'.[10]

Baetica, the new province created under Augustus' administrative reorganization to encompass a good part of what had been Hispania Ulterior, started production of both wine and oil as cash crop for export in the late first century BC, but by the middle of the first century AD wine production in this region had been supplanted by large-scale olive cultivation.[11] It has been noted that the early presence of screw presses in Baetica is possibly an indicator of 'the impact on technical innovation of the presence of the Roman military and state infrastructure in a micro-region'.[12] Large numbers of craftsmen, including carpenters and masons, accompanied Roman army units and this, in combination with the demand for army food supplies, may have impacted on technological innovation within agriculture in military areas.[13] The massive quantities of Baetican oil amphorae found in Rome and at military sites around the empire show that the Roman state was deeply concerned with oil production in Baetica, even though the extent and type of its intervention are not completely clear.[14]

In Hispania Citerior, wine production is attested at least as early as the second century BC, but here important changes also occurred only in the later part of the first century BC, when numerous medium-sized farms producing wine for export appeared in the countryside. It is in this period that dedicated spaces for the installations of presses and the adoption of

[9] Keay 1992, 303–4. [10] Keay 1992, 308.

[11] The Haltern 70 amphorae from Baetica, transported, as we learn from the *tituli picti*, *defrutum*, and olives preserved in *defrutum*; the Haltern 71 was an oil container; Tchernia 1980; García Vargas, de Almeida, and González Cesteros 2011.

[12] Lewitt 2020, 329. [13] Lewitt 2020, 329; Stoll 2016.

[14] Lo Cascio 2007, 638; Lewitt 2020, 329.

wine fermentation techniques typical of Italy (the *dolia defossa*) appeared. The Laietanian wine, produced in what is now modern Catalonia, was already heavily exported to Aquitania and Narbonensis in the Augustan period.[15] At this time, an intensification and reorganization of production in the region, with the construction of several new wine-producing sites, took place. However, the first intensification in grape cultivation in the area was linked not to villas but to indigenous farms and proto-industrial centres connected to the Roman army presence during the period of conquest.[16] In other words, the demand for specific goods for the Roman army affected the farmers' choices and local agricultural strategies. Later, when Barcino (mod. Barcelona) became a *colonia* in AD 14 and its territory was centuriated, the number of villas and farms engaged in wine production greatly increased.[17] A recent study of the area encompassing the ancient towns of Barcino, Baetulo, Iluro, the *oppidum* of Burriac, and their extended territories has shown that the considerable spread of viticulture and the boom in rural settlements followed the new colonial foundations and territorial reorganization of the Augustan period.[18]

While the exact number of colonies and centres receiving municipal status established by Augustus is not known,[19] the scale of the endeavour can be appreciated from the list of towns given by Pliny the Elder, which reflects information derived from an Augustan source dating to before 12 BC (so the list excludes the various centres which received urban charters during the last years of Augustus' rule). Focusing only on the towns with privileged status, Pliny lists, for Baetica, nine *coloniae*, ten *municipia civium Romanorum* and twenty-seven towns with Latin rights granted before Vespasian's extension of the *ius Latii*; for Hispania Citerior twelve *coloniae*, fifteen *municipia*, and twenty communities which had, apparently, old Latin rights, while for Lusitania he gives five *coloniae*, one *municipium* and three communities with the old Latin status.[20] Macmullen reckons that circa seventy urban centres saw their form of government reshaped on an Italian model; in more than half of the cases, the change had been initiated by Caesar.[21]

[15] Étienne and Mayet 2000, 236. [16] Álvarez Tortosa 2017.
[17] Revilla Calvo 1995; Busquets, Moreno, and Revilla 2013; Álvarez Tortosa 2017.
[18] The study considered a corpus of 1,380 rural sites dating from the late second century BC until the end of the second century AD: Álvarez Tortosa 2017; Álvarez Tortosa 2020, 41.
[19] Augustan foundations include Augusta Emerita, Asturica Augusta, Caesaraugusta, Lucus Augusti, Bracaraugusta, Iulia Gemina Acci; see MacMullen 2000, 52–3. For some towns, it is unclear whether they were founded or chartered by Caesar or by Augustus.
[20] Plin. *HN* 3.7, 3.18, 3.77–8, 4.117; Alföldi 1996, 456–7. [21] MacMullen 2000, 51.

The relationship between colonial foundations – which, it is worth remembering, entailed a reorganization of the land – and rural production centres can be seen most clearly in the case of the new towns, where there was a strict correlation between the main families attested in the urban centres, particularly in the *colonia* of Barcino, and the rural estates comprising the best agricultural land, on which wine production for export took place. Leading urban families across Hispania had wide-ranging economic interests also branching into trade, manufacturing, and mining.[22]

It was not simply the foundation of colonies and the settlement of military veterans that caused these important changes, but also the development, largely done by the military units, of a capillary road network connecting *coloniae* and earlier urban centres receiving the status of *municipium*.[23] A major project was launched by Augustus between 8 and 2 BC: the reconstruction and extension, from the Pyrenees to Gades, of the Via Herculea now running for *c.*1,500 km with the name Via Augusta. The quality of the transport infrastructure was fundamental in determining the ease with which people and goods could travel, and this in turn had direct bearing on decision-making by the farmers in respect to which crops to grow, on the balance between pursuing commercial agriculture and self-sufficiency, and on the balance between producing agricultural goods with long shelf life (e.g., wine and oil) and those with short shelf life like fresh vegetables and fruit (see Chapter 8 for further discussion).[24]

Although the successful abundant production of the Mediterranean triad of wine, oil, and grain was what defined, agriculturally, the Roman Iberian Peninsula, the written sources give glimpses of flourishing horticulture too. When talking of the River Baetis, whose shores were well populated, Strabo noted that:

> καὶ δὴ καὶ ἐξείργασται περιττῶς ἥ τε παραποταμία καὶ τὰ ἐν τῷ ποταμῷ νησίδια. πρόσεστι δὲ καὶ τὸ τῆς ὄψεως τερπνόν, ἄλσεσι καὶ ταῖς ἄλλαις φυτουργίαις ἐκπεπονημένων τῶν χωρίων. (Strabo 3.2.3)

[22] Olesti and Carreras 2013; Olesti 2020.

[23] At least six legions were present in the Iberian Peninsula in the last quarter of the first century BC, when Augustus was busy with the conquest of the northwestern region; it is known that he settled veterans from these legions at Emerita in 25 BC (*legiones* V and X); at Caesaraugusta, between 16 and 13 BC (*legiones* IV, VI and X); and at Acci (Guadix), sometime at the beginning of the Principate (*legions* I and II). Immediately after the conquest of the northwest, three legions were left in H. Citerior: see Alföldi 1996, 453–5.

[24] On the degree of connectivity of Roman Spain, de Soto and Carreras 2009; Carreras and de Soto 2010; Hispania also had several navigable rivers and important river estuaries which allowed partial navigation upstream: Campbell 2012, 246–53.

> the land along the river, and the little islands in the river, are exceedingly well cultivated. And besides that, there is the charm of the scenery, for the farms are fully improved with groves and all other kinds of plant cultivations. (after H.L. Jones trans., Loeb edn)

This is a reference to horticulture, which, as we have seen earlier in this book, both logic and historical comparanda indicate would find adequate stimulus to develop into sizeable commercial production only when aggregate consumer demand is sufficiently high. Despite the fragmentary picture offered by the available archaeobotanical data, an increase in the number and variety of plants grown in the Iberian Peninsula seems to have occurred in the period immediately *following* the establishment of new colonial settlements and the appearance of farms and villas in the countryside. Whether this higher variety was the result of increased urbanization and demographic rates, so of market forces affecting the balance between offer and demand, stimulating a more varied production of vegetables and fruits for the urban market, or of newcomers wishing to grow certain plants with which they were familiar, is very difficult to determine. Recent work on the demography of northeastern Spain (in essence the area of modern Catalonia) has argued, in relation to the Roman era, that 'a concentration of people in the cities is unlikely to have happened'.[25] On the other hand, the authors of the study observe that the occupation of the rural areas seems to have been more intensive and organized under Roman rule. For example, surveys of the *ager Tarraconensis* have identified only 10 late Iberian rural sites, but 128 for the Republican period.[26] It is, therefore, hard to escape the impression that settlers from Italy did actively contribute to the development of more varied commercial horticulture and arboriculture in key parts of the Iberian Peninsula. At the very least, the dietary habits of these individuals changed the nature of the local demand for plant foods.

Current available archaeobotanical data indicate that another colonial encounter had introduced to the south of Spain the cultivation of fruit such as the pomegranate and the almond (plants that have no wild ancestor in the Western Mediterranean) in the ninth century BC: the Phoenician/Punic settlements in Andalusia and the southern Valencian region.[27] A recent study on the emergence of arboriculture in the western Mediterranean concluded that the introduction and expansion of arboriculture during the first millennium BC can be traced from the south of the

[25] Sinner and Carreras 2019, 321.
[26] Sinner and Carreras 2019, 320–1.
[27] Pérez-Jordà *et al.* 2021, 4.3.1.

Iberian Peninsula to the south of France. The different fruits (grape, olive, fig, almond, pomegranate, and apple/pear) arrived together in certain areas despite uneven distribution and acceptance by local communities.[28] The study relates these phenomena to a Phoenician-Punic sphere of influence between Andalusia and the Valencian region, and a Greek sphere in the south of France and the north of Catalonia, represented by the colonies of Massalia and Emporion. This study illustrates how the presence and degree of prevalence of fruit cultivation in comparison to cereals in southern Spain and France, are linked to colonial settlements and to important port towns with trade links with other parts of the Mediterranean. Via contacts with these colonial centres, indigenous settlements adopted not only the cultivation of the plants, but it appears also specific technical knowledge (for example, wine-pressing equipment). Similar mechanisms of diffusion seem to have been at work centuries later, with the Roman presence.

By the time of Pliny the Elder, the horticultural endeavours carried out at Corduba could be singled out for two reasons: the considerable amount even a small vegetable patch would fetch – 6,000 sesterces – and the fact that this involved the cultivation and progressive domestication of a vegetable, the cardoon, that only a few years earlier was not only not grown, but had not even been considered comestible for humans.[29] With due caution in consideration of the different geographic context, we can compare this figure with the 1,800 sesterces paid for the produce, probably wine, of the Cadianus estate of Herennia Tertia in mid-first-century AD Nola, in Campania (*fructum fundi Cadiani*).[30] Although we do not know the quantity and nature of this produce, the difference between the two amounts is striking, suggesting the profitability of horticulture when the right conditions existed.

The Archaeobotanical Data

Can we supplement the literary allusions to the diffusion and development of horticulture in Roman Spain found in texts such as Strabo's and Pliny's with archaeological data? A 2017 survey of published and unpublished archaeobotanical data for the whole Iberian Peninsula, covering the period from Roman to medieval times, offers a starting point for considering

[28] Pérez-Jordà *et al.* 2021. [29] Plin. *HN* 19.152; the passage is quoted in Chapter 3, p. 113.
[30] A sale transaction registered in one of the tablets found in Herculaneum: *Zeitschrift für Papyrologie und Epigraphik* 1999.449 = *TH* 12.

agricultural change beyond viticulture and oleoculture.[31] Overall, the trend shown by these data indicates considerable variety in type of cultivation for the Roman period when compared to late antiquity and the medieval period, with 'fruits' and 'pulses' well represented alongside cereals, particularly in the south, southeast, and east of the peninsula. While the data are fragmentary, subject to various biases, and compiled of datasets difficult to compare,[32] the taxa identified at both urban and rural sites show interesting differences, particularly between the north and the southeastern regions in the Roman period. In the north and northwestern regions, cereals are the prevalent crops attested; pulses, some fruit, and spices appear in higher quantities in the medieval period. Nonetheless, although in northern regions such as Galicia the pattern of consumption of plant foods, with its emphasis on cereals, was similar to that of the Iron Age period, there are also notable changes in the Roman period. The spread of vine cultivation in the region and the exploitation and management of the chestnut as a resource (as shown by the increase in pollen and also by the increase in chestnut charcoal, showing the use of this wood as fuel) are the most important changes.[33]

Few sites in Galicia have a good archaeobotanical record, but among these we may note the results from the investigations at O' Areal, near Vigo, where a major *salina* was in operation from the first century AD until its abandonment in the third century.[34] Waterlogged archaeobotanical remains, largely coming from dumps dating to the abandonment of the saltpans, included several cultivated fruits and nuts which were part of the diet of the local inhabitants and which, in most cases, may have been cultivated locally. These finds include chestnut, walnut, fig, cherry, the cultivated plum, peach, and grape, both cultivated and wild. With the exception of chestnut and walnut, these plants have not currently been documented in this region for the Iron Age period.[35] Their first appearance in the area, therefore, seems to have occurred during the Roman era. Similarly, a common fruit of the ancient Mediterranean world, the

[31] Peña-Chocarro *et al.* 2017. Most of the samples recovered are charred, and only 17 sites out of 83 had waterlogged and mineralized deposits. As discussed in the Introduction, the different modes of preservation have bias in regard to the type of plant they most commonly attest. For that reason, fruits and vegetables are underrepresented here, since they are best preserved in waterlogged/mineralized conditions.

[32] The different recovery strategies adopted, recording methods, and other variables of fieldwork have made the comparison of the data coming from different excavations very problematic; 38 sites date to the whole Roman period (second century BC to fifth century AD); rural sites dominate the sample but waterlogged remains come exclusively from urban sites.

[33] Teira Brión 2010, 119. [34] Castro Carrera 2006; Currás 2017. [35] Teira Brión 2010, 117.

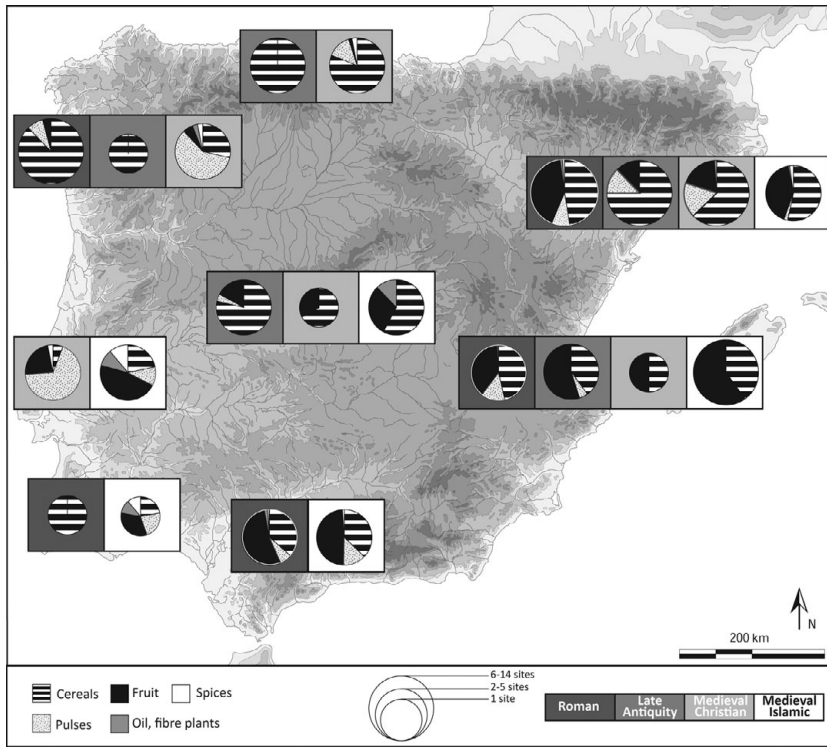

Figure 7.1 Map of the Iberian Peninsula illustrating the distribution in percentage of the different groups of archaeobotanical taxa preserved by charring, as presented in Peña-Chocarro *et al.* 2017.
Courtesy of Leonor Peña-Chocarro and her co-authors.

cultivated plum, is not attested in the Iberian Peninsula before the Roman period, with the earliest finds identified in the town of Oiasso (mod. Irun, in the Basque Country).[36]

In the south and eastern parts of the Iberian Peninsula, cereals represent less than 50 per cent of the different groups of taxa preserved by charring considered in the 2017 survey article (Figure 7.1). Besides the three very common Mediterranean fruits (fig, olive, and grape), cultivated fruits and nuts commonly attested at Roman sites are almond, apple, peach, pomegranate, plum, sweet cherry, walnut, and the melon/cucumber (it is not

[36] Peña-Chocarro and Zapata 2005, 172. In southern France, the first possible attestation for plum is from Lattara and dates to the fifth century BC, Pérez-Jordà *et al.* 2021, 17.

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always possible to distinguish between *Cucumis melo* and *sativus*).[37] More precise chronological horizons that allow a categorization according to centuries are not always available, but when they are, the first century AD seems to be the period when horticultural diversification increased. The earliest finds of peach from the Iberian Peninsula come from Lleida in Catalonia and date to the first half of the first century AD, the period when this fruit had reached widespread diffusion in Italy. The peach finds from Irun also seem to date to the first century AD.[38]

Among the pulses, the species attested include pea (*Pisum sativum*), lentil (*Lens culinaris*), broad bean (*Vicia faba*), grass and red pea (*Lathyrus sativus/cicera*), bitter vetch (*Vicia ervilia*), common vetch (*Vicia sativa*) and chickpea (*Cicer arietinum*); the latter is rare, only identified in the south at the Roman villa site of Gabia, near Granada. As observed by the authors, in Roman times 'legumes . . . are only known in the E, NE, NW and S. In the NW the evidence suggests a lower diversity than in the rest of Iberia with only *V. faba*, *V. sativa* and *P. sativum*'.[39]

Legumes have always played an essential role in the diet of Mediterranean populations. They are very important in crop rotation strategies for the continued viability and enhancement of the land because they help to combat soil impoverishment by fixing nitrogen. The variety of certain legumes present in the archaeobotanical record suggests that farmers of the Roman period in the Iberian Peninsula were well aware of the advisability of rotating crops. More sophisticated agricultural practices comprising crop rotation may have been spread more widely with the arrival of Italic settlers. Lentil is dominant in the archaeobotanical record of the northeast while broad bean is significant in assemblages recovered from sites in the east and northwest of the peninsula. According to modern agricultural data, lentil has the lowest water requirement compared with pea, broad bean, and chickpea; broad bean has a high consumptive water usage, although this can vary considerably with locality.[40] Climatic differences between the northeast and northwest of the Iberian Peninsula help to explain the 'broad bean/lentil' divide: the northeast is dryer and hotter

[37] Peña-Chocarro *et al.* 2017, 6.

[38] Sadori *et al.* 2009; Peña-Chocarro and Zapata 2005; Ravotto *et al.* 2016, 166. As discussed in Chapter 5, the recovery of peach stones does not necessarily indicate local cultivation, since the fruit was preserved whole in syrup or brine and commercialized in this form.

[39] Peña-Chocarro *et al.* 2017, 13.

[40] In modern times, consumptive water use (CWU) for lentils, as reported for N. India, is between 115 and 228 mm for 2 and 4 irrigations; compare with the much higher broad bean requirements: 240–490 mm for Egypt (396–486 mm for northern Sudan); Farah, Arar, and Miller 1988, 272.

than the northwest, so more welcoming to lentil. In addition, lentil does not tolerate flooded or waterlogged soils; indeed, if we take the case of Britain, where pea (*Pisum sativum* L.) and broad bean or Celtic bean (*Vicia faba* L. var. *minor*) were already cultivated during the Iron Age, lentil was never cultivated, not even in the Roman period, and remained an imported 'exotic' food with relatively limited diffusion and social accessibility.[41]

New archaeological data will doubtless add to the current picture, but on the basis of these data from the Iberian Peninsula, the following inferences can be drawn:

- The range of attested fruit types diminishes in late antiquity and, in the medieval period, at some sites classified as 'Christian' (as opposed to 'Islamic'). Fruits that were present in earlier Roman contexts but do not appear in late antiquity are the apple, the peach, the pomegranate, and the cherry (not differentiated between sweet/sour).[42] While domesticated fruit cultivation for a number of species is attested in the Iberian Peninsula for the Iron Age and attributed to contacts with the Greek and Punic colonists, some taxa such as the peach only appeared later in the Roman period, in the early first century AD.[43]
- The attestation of the cultivation of legumes such as bitter vetch, grass pea, and red pea points to the integration of animal husbandry with agriculture (these are fodder crops, used by humans only as 'famine crops' in the case of severe food shortages to ensure survival). As we have seen in Chapter 3, convertible agriculture (alternating the cultivation of nitrogen-weak crops like cereals and nitrogen-fixing plants like legumes with using the land for pasture for extended periods of time on arable land, thus integrating agriculture and animal husbandry) was practised by peasant farmers in first-century BC Roman Etruria. Possibly the same advanced agricultural techniques were followed at sites on the Iberian Peninsula as well.
- A comparison between the percentages of charred botanical taxa recovered at sites in the region corresponding to modern Catalonia in the northeast of the Iberian Peninsula suggests that agricultural production in the Roman imperial era was much more varied than in late antiquity. Remains of fruit and cereals are the two most frequent taxa in this period; although cereals have a higher share, as one would expect, the

[41] Van der Veen, Livarda, and Hill 2008, 31; Lodwick 2017b, 33.
[42] Peña-Chocarro *et al.* 2017, 6.
[43] Peña-Chocarro *et al.* 2017, 13; see also Pérez-Jordà *et al.* 2021.

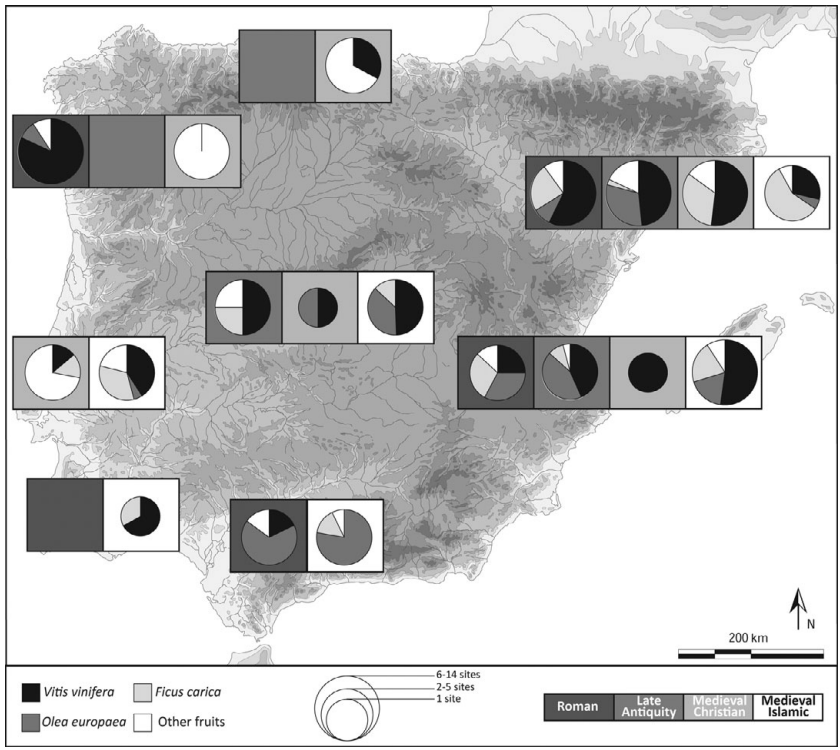

Figure 7.2 Map of the Iberian Peninsula illustrating the distribution in percentage of the different fruit species preserved by charring, as presented in Peña-Chocarro *et al.* 2017. Courtesy of Leonor Peña-Chocarro and her co-authors.

difference between the attestations of cereals and fruits is not large. Pulses and spices follow as the most attested crops. In late antiquity, on the contrary, cereal taxa increase considerably, while fruit diminishes. It is only in the Islamic medieval period that the number of taxa for cultivated fruit reaches levels similar to the one for the Roman period.

The data for charred fruit for the area roughly corresponding to Catalonia (Figure 7.2) show that fig and 'other fruit' are the second most common find after grape which would have been expected to be well attested in this region, the Laietana, known in antiquity for its wine production; olive comes in third place. As mentioned, the region around Barcino experienced a considerable reorganization of the territory and of its agricultural

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production in the Augustan period.[44] The high proportion of fruit remains attested in the archaeobotanical record may indicate that, just as we have seen in Roman Italy, a number of estates located closer to towns of the like of Barcino were also investing in commercial fruit tree cultivation and in horticulture in order to supply the urban markets. Plots used for horticulture were a likely feature of the suburban land around any sizeable Roman city.

Although it was limited in extent, a Roman cultivated horizon has been identified in the city of Barcelona.[45] The site, investigated during rescue excavations in 2009, was just outside the proper Roman urban settlement in antiquity, in the area of the delta of the River Llobregat. The excavations uncovered evidence for a cultivated plot. Intensification in the modification of the natural landscape and use of the land for agriculture has been detected in the period spanning the first and second centuries AD, but the site was in use at least until the sixth century. Remnants of canalizations, both for drainage and irrigation, were discovered, as well as a series of roundish cuts possibly, as suggested by the excavators, to be connected with the removal/clearing of trees to adapt the area for cultivations.[46] I wonder, however, whether these round cuts instead represent tree pits for an orchard. Clearer evidence for horticulture comes from the later imperial phases, when a well was dug in which various waterlogged archaeobotanical remains were identified: hazelnut, walnut, cherry, olive, fig, grape, and melon.[47]

The Hazelnut: From Campania to Spain?

Hazelnut is not a common find in Spain in contexts dating to the Roman era, so its presence in the Barcelona/River Llobregat cultivation plot is noteworthy. Normally considered part of the natural vegetation of the region, it might in fact have been cultivated by the Romans in the Iberian Peninsula.[48] Hazelnut was cultivated in Roman Italy – Abella and Abellinum in Campania were well known for the cultivation of the hazelnut, whose name in Latin is indeed either *abellana nux* or *corylus* – and Cato mentions it in the context of the agricultural practices of villa

[44] For the Roman transport network of Catalonia, see de Soto and Carreras 2006–7.
[45] Ravotto *et al.* 2016; the investigations took place at the intersection of Carrer Foneria and Passeig Zona Franca.
[46] Ravotto *et al.* 2016, 152 and note 5.
[47] Ravotto *et al.* 2016, 159 and Table 1.
[48] Ravotto *et al.* 2016, 166.

estates.[49] Studies on the domestication of the hazelnut using chloroplast microsatellites analysis have concluded that, contrary to the common assumption that hazelnut had been first domesticated in the East and its cultivation had been introduced into Italy by the Greeks (a belief maybe in part resting on Pliny's opinion that the tree came from Asia), the data point toward separate domestications in the eastern and western Mediterranean. This scientific study analysed seventy-five modern hazelnut cultivars common in Italy, Spain, Turkey, and Iran and found a limited genetic exchange between the eastern and western types, but a common genetic base between Spanish and Italian cultivars.[50] Based on the relative presence of one of the chlorotypes (type A) identified in the cultivars, the authors of the study suggest that:

> Italian hazelnut germplasm was spread by the Romans to the Iberian peninsula . . . the prevalence of chlorotype A in Spanish and Italian accessions suggests that southern Italy, most likely the Campania region, was an important centre of origin and diffusion of hazelnut cultivars . . . In addition, the absence of chlorotypes B and C in the groups Spain and Italy suggests that hazelnut varieties were domesticated separately in Turkey and Iran.[51]

Therefore, the attested hazelnut from the cultivated plot in suburban Barcino might be more significant in terms of mapping of agricultural practices than conceded by the excavators. Links and commercial exchanges between Campania and the southeast of the Iberian Peninsula had occurred since the mid Republican period and are well attested archeologically. Under this heading, possible exchange of knowledge, seeds, and plants, alongside the relocation of people, cannot be excluded. It can also be assumed with some certainty that fig and cherry were grown in the immediate proximity of this cultivated plot of ancient Barcelona because, beside the carpological remains of these fruits, wood belonging to these tree species was also found. In the case of the fig, the wood remains were relatively abundant compared to the other plant species. They were small and young branches, some of which were partially worked, sharpened at one end.[52] The small size of the cut branches suggests that they were the result of pruning; the sharpening of one end may indicate that

[49] Cato, *Agr.* 133; see also Plin. *HN* 15.88 and Macrob. *Sat.* 3.18.5, where the hazelnut is defined as *Abellana seu Praenestina*.
[50] Boccacci and Botta 2009, 856.
[51] Boccacci and Botta 2009, 857.
[52] Ravotto *et al.* 2016, 167.

some were perhaps being used as stakes to support vegetables and younger plants.

In sum, the horticultural and arboricultural situation of the Roman Iberian Peninsula shows some interesting regional differences, but the scattered nature of the data and the different recovery strategies followed by various projects over the years pose inevitable limits to our ability to draw general firm conclusions. In the north and northwest, cereals dominate the archaeobotanical record. Beans and pulses appear to have spread throughout the peninsula (but not chickpea, which is currently attested only at one site), with relative incidence only due to climatic conditions: broad bean is one of the only three types of legumes attested in the wetter northwest, whereas lentil seems to have been more common in the drier and hotter northeast of the peninsula. For fruits, the imperial Iberian cultivation included the whole range found in Italy (almond, apple, cherry, fig, peach, plum, pomegranate, and walnut) as well as olive and grape for the table. The recovered data suggest that cultivation of a varied range of fruits occurred in the more urbanized and well-connected parts of the region: the southeast and the south. Melons/cucumbers were perhaps more abundant than what has been found at Italian sites and the hazelnut likely moved from being a natural presence to cultivated status. The earliest attestations in the Iberian Peninsula for exotic fruits such as the peach that I have discussed in Chapter 5 date to the Julio-Claudian period – a date similar to its arrival in Italy – but we are unable to determine with certainty whether the Iberian finds indicate imports of preserved peaches or local cultivation, or both.

Gaul

> *Gallia est omnis divisa in partes tres, quarum unam incolunt Belgae, aliam Aquitani, tertiam qui ipsorum lingua Celtae, nostra Galli appellantur.* (Caes. *BG* 1.1)
>
> the whole of Gaul is divided into three parts, of which one is inhabited by the Belgae, the second by the Aquitani and the third by those populations speaking the Celtic language, whom we call Gauls.

The incipit of Caesar's *de Bello Gallico*, well known to any student of Latin, reminds us that 'Gaul' was in fact a large territory, encompassing different environments and ethnic groups. One of the recurrent topoi found in Roman texts about Gaul is its great wealth.[53] The area the Romans called 'Gaul(s)' corresponds today to the territory of several nations: France, Belgium, Luxembourg, Switzerland, and Germany.

[53] E.g., Dio 59.22; Tac. *Ann.* 11.23; Tac. *Hist.* 1.51 and 4.74; Suet. *Ner.* 40.

With the Augustan administrative reorganization of the territories conquered by Caesar, the Republican provinces of Gallia Transalpina and Gallia Comata became, respectively, Gallia Narbonensis and the Tres Galliae (Aquitania, Belgica, and Lugdunensis). Gallia Narbonensis was always seen as being quite distinct from the rest; it had been part of the Mediterranean world for a long time, thanks to the city of Massalia (mod. Marseilles), originally a Greek colony, and its climatic and environmental conditions, which were wholly Mediterranean. But further north, beyond Cevennes and Vienne, there were very different lands, characterized by a harsh climate.

Southern Gaul, particularly urban centres such as Orange, Arles, and Nîmes, has been the object of many archaeological investigations. Studies have largely dealt with reconstructing settlement patterns from field survey and aerial photography, with a few regions being studied more intensively (e.g., Picardy, Burgundy). Whilst major infrastructure projects in France such as the high-speed train network have given the opportunity to carry out preventive archaeological investigations on a considerable scale, the overall picture remains fragmentary, and the quantity and quality of data uneven. This is an important caveat to what follows, because although the available information coming from palaeobotanical data for Gaul is better than for the Iberian Peninsula, it is still somewhat problematic to draw general conclusions from it.

Southern Gaul

Caesar had considerable impact on the future development of Gaul, not simply because he conquered the territory, but also in terms of its urbanization. Suetonius tells us that in 45 BC, just a few months before Caesar was killed, he had sent Tiberius Nero to 'found colonies in Gaul, among them Narbo Martius [Narbonne] and Arleate [Arles]'.[54] Narbo had actually been first founded in 118 BC, so this was a refoundation to settle veterans of the Tenth legion, while veterans of the Sixth were settled in the new *colonia* of Arleate. It is thought that on this occasion Caesar had very likely also promoted the foundation of Latin colonies, since Suetonius uses the words 'among them', implying that Narbo and Arleate were just two of a larger number of foundations carried out by Tiberius Nero. Vienne is a likely candidate to be added to this group, and the foundation of Lugdunum (mod. Lyons) in 43 BC on the initiative of the senate might

[54] Suet. *Tib.* 4.

have been a response to settle displaced colonists from Vienne, ejected by the Allobroges when disturbances arose following Caesar's death.[55] Caesar might have also ordered the survey and redistribution of lands around the Latin colonies established at Vienne, Nîmes, and Valence, enabling him to assign land to auxiliaries and veterans.[56] Colonization in both Narbonensis and the Tres Galliae continued with Octavian/Augustus, who founded Roman colonies to settle military veterans at Orange, Fréjus, and Béziers and who may have distributed additional land in Gaul to colonists between 16 and 14 BC.[57] It was probably Caesar who had extended, sometime between 58 and 44 BC, the Latin rights to the whole of southern Gaul, and other decisions taken by Augustus promoted the integration of the local elites of Gallia Narbonensis.[58] With Augustus' interventions, medium-sized centres became large urban sites, controlling an even larger territory.[59]

The planning of the new colonial towns occurred on a large scale; the area set up for the settlement measured 50 ha for towns like Arles and Fréjus and might have reached more than 200 ha for Orange, Vienne, and Nîmes. This is substantially more than the size of the average Italian town, and it often involved major works, such as terracing and draining of land.[60] Marking out for an urban settlement such a large area does not mean that the *whole* area was occupied by buildings from the start, and it might not have been so for many years; indeed, as can be observed even in the earlier northern Italian colonial foundations, at the start these featured empty plots next to the houses, used as vegetable patches and gardens.[61] It is, however, revealing of the planning aspirations behind Augustus' policies, which were reinforced by imperial euergetism in paying for major public works, such as the gates and city walls of Nîmes. Certainly, Augustus' decision to subordinate many *oppida* to one specific town shows the intention to make the chosen centre a large urban agglomeration. Urbanization of Narbonensis was not uniform, but it was an irreversible phenomenon of the early first century AD, also involving the development

[55] Dio 46.50. Christol and Goudineau 1987–8; Goudineau 1996, 469–70.
[56] Goudineau 1996, 477. [57] Dio 54.23.
[58] This culminated in AD 14 with the grant of the right, to all Roman citizens of Narbonensis, to stand for election to magistracies in Rome. An important administrative decision by Augustus, maybe taken during his visit in 16–13 BC, was to attach 24 Latin *oppida* to Nimes, which received a city wall and a mint paid for by Augustus.
[59] Goudineau 1996, 476.
[60] Goudineau 1996, 482; on large-scale landscape modification and its (unintended) consequences, see van der Leeuw and The ARCHAEOMEDES team 2005.
[61] Ortalli 2003, in reference to colonies established in Cisalpine Gaul during the Roman Republic.

of secondary urban centres out of the pre-Augustan settlements, be these centres that developed at major road junctions or around sanctuaries, or in the territory of large *civitates* whose capitals were not located centrally enough to serve the whole territory. Major cities like Arles and Vienne had acquired a whole set of Roman-style urban buildings (theatres, amphitheatres, fora, etc.) already at the start of the first century AD.

The changes that occurred, particularly in Narbonensis but to an extent also in parts of the Tres Galliae, in terms of urbanization, society, material culture, and the agricultural economy, were considerable, although by no means uniform across the region.[62] Urban centres which grew in size and population fast – it has been remarked, for instance, how the works to erect public buildings and elite houses with Mediterranean-inspired mosaics and decoration attracted artisans and craftsmen – created aggregate demand for a range of goods, including fresh foods, and thus promoted new and increased volumes of trade. A sense of the order of magnitude reached by this trade is offered by the early Julio-Claudian *horrea* discovered in Vienne: they occupied an area of 50,000 m^2.[63] These *horrea* could have served to store goods destined for the *limes*, or for Gaul's interior, or, conversely, products from Gaul destined for the Mediterranean area and Rome.

The changes caused by Caesar's and Augustus' policies were not limited to the creation of new urban environments but affected the countryside too. Besides the centuriation of the land, whose demarcations still survive in the landscape in various areas, the change can be appreciated in the appearance of farms. Some of the *coloniae* such as Béziers were literally surrounded by many farms and villas, where the local nobles lived.[64] Although they need to be taken with due caution and awareness of their rhetorical contexts, it is interesting to juxtapose Cicero's portrayal of (Transalpine) Gaul as a place populated by wild people with just some pockets of civilization represented by Rome's ally Massalia, the colony of Narbo Martius, and Italic farmers and traders, with Pliny's characterization of Narbonensis as *Italia verius quam provincia*.[65] In the one hundred years or so that had passed between the two authors, the extent of Italian landowning in the province, and the diffusion and adoption by local elites of Roman urbanization, habits, and some Italian agricultural models, had largely increased from the time of the foundation of Narbo in 118 BC. This foundation has been called 'an exercise in agricultural colonization,

[62] Woolf 1998. [63] Helly-Le Bot 1989; Goudineau 1996, 480. [64] Goudineau 1996, 484.
[65] A point made in Goudineau 1996, 472: Cic. *Font.*, a speech composed in 70 BC; Plin. *HN* 3.31.

for the benefit of Italian civilians'.[66] It is remarkable that from the end of the Republic to the end of the first century AD Narbonensis surpassed any other province, even Hispania, for the number of equestrians and senators, many of whom had brilliant public careers. However, the modern evaluation of the economic effects of this colonization has changed over time. At first, it was thought that local agricultural practices in southern Gaul were 'invigorated' by the arrival of so many families of colonists, then that actually very little development occurred, despite the number of colonial settlements. A more truthful picture is probably somewhere in between these two extremes.

When talking about Roman colonization and agriculture, there is one important issue that should not be forgotten: once the land was centuriated, the colonists were usually assigned the *best land*; land returned to the indigenous inhabitants tended to be that located in the least promising areas for cultivation. Such land hierarchy can be appreciated in the Cadastre B from Orange, where three different land groups are distinguished: the best one for the veteran colonists, then lands that were let out by the *colonia*, of inferior quality, but still good for the cultivation of vines (as shown by the location of modern vineyards), and finally, in third place, the lands given back to the indigenous Tricastini.[67] This land needed to be improved in some fashion in order to be cultivated. There is no reason to believe that land division on occasion of all the other colonial foundations followed a different pattern. The colonists got the best land and applied to it the agricultural knowledge of their region of origin, Italy, so that, as it has been said, 'even the crops growing in them [i.e., the fields] were gradually changing'.[68]

An idea of the changes in local vegetation and cultivation in southern Gaul over a long chronological arc (from the Neolithic to the Roman period) comes from the archaeobotanical evidence from a group of wells excavated at Mas de Vignoles IX, near Nîmes. Here land management seems to have undergone a radical change during the Roman period, as illustrated by the increased abundance of fruit species remains (especially fig and grape; cultivation of the grape vine is also attested by vine-planting pits dating to the Roman era), in contrast to the abundance of weed and ruderal plants attested for the earlier chronological phases up to the Iron

[66] Goudineau 1996, 476.
[67] Goudineau 1996, 478; Van der Leeuw and The ARCHAEOMEDES team 2005 for an environmental study of the Roman occupation in the Tricastin Valley.
[68] Goudineau 1996, 487.

Age.[69] In Narbonensis, viticulture spread considerably, followed by oleiculture. As mentioned, these are cultivations that required substantial initial financial investment with no immediate return. It has been suggested that the growth of larger and larger landholdings explained how it was possible to introduce crops like grape and olive,[70] but as we shall see in the next chapter the choice to target viticulture as a commercial crop on their modestly sized estates was taken by many colonial farmers from the very start and it is not necessarily linked to large estates. Viticulture was quite important in the agriculture of southern Gaul, as it was in parts of Aquitania and Belgica, and the many vine trenches discovered in places such as Lapalud, Girardes, and Orange, and kilns producing wine amphorae, attest flourishing commercial viticulture in the region.[71]

Plant Dispersal and Social Access in Southern Gaul

In the agricultural economy of Gaul, it is difficult to trace the diffusion of horticulture, when and how new fruit trees appeared, and the role they played in the Roman economic landscapes of Gallic provinces. Often, when macro-archaeobotanical remains are preserved, they are in the context of urban centres, attesting consumption of possibly imported plant foods, not necessarily of locally produced fruits and vegetables. Although the use of some plant foods seems to increase once the area had been fully incorporated into the Roman empire, it is unclear whether the cultivation of some fruit trees that were not native to the region had been first started by the Romans or earlier by the Greeks who had established in southern coastal France the important colony of Massalia.

The ability and will to transport plant cuttings to establish new cultivations is certainly not exclusive to the Roman period. In the case of viticulture, early evidence comes from the Etruscan shipwreck of the Grand Ribauld F, found near the small island of Hyères (Var), to the east of Toulon and dated, on the basis of the amphorae in the cargo, to *c.*525–490 BC. Among the amphorae, or in the amphorae, the excavators found several vine shoots, which they interpreted as protection placed in between amphorae when stowing them to avoid breakage by friction/touching against one another.[72] This interpretation is somehow

[69] Figueiral and Séjalon 2014, 34. [70] Goudineau 1996, 478.
[71] Brun 2005; Marzano 2013b, 111–12.
[72] The number of shoots identified is not given, nor does the publication report the precise description of these shoots or their exact find spot among the cargo: Long, Gantes, and Drap 2002, 22; see also Long, Gantes, and Rival 2006, 459. I am grateful to Phil Perkins for bringing these references to my

unconvincing, because more suitable vegetal protective packaging material – hay or ropes coiled around the vessels – could have been used to secure and separate the amphorae. Furthermore, the vine shoots had to be transported for the purpose of packaging at the port of departure (admittedly they could have been transported with the amphorae if the wine was bottled in them at the producing farm and not transported to the port in skins, before transferral into amphorae, as was often the case).[73] The excavators of the Grand Ribauld F wreck were prompted to interpret these vine shoots as packaging material on the basis of the discovery, in the first-century BC Madrague de Giens wreck, of many twigs and small branches used to protect the cargo. However, the two are quite dissimilar, because the brushwood/branches discovered in the hull of the Madrague de Giens were of juniper, heather, and rush and were found in great abundance '*sur la quasi-totalité de la surface fouillée*' ('on almost the entire area excavated'), not only in between amphorae, but also underneath them to protect the bottom of the hold. In my view, the vegetal finds from the Grand Ribauld F wreck were vine shoots/cuttings being transported to southern France in order to start a vineyard. They might have originally been placed in small baskets with soil or wrapped in lengths of cloth that was kept wet, as one might do today when transporting plant cuttings. Placing them between the amphorae would protect them from changes in temperature. The El Sec shipwreck discovered off the coast of Majorca and dated to 375/350 BC carried on board several vines with roots protected by a clod of earth.[74] That said, vine cuttings are known to have been used as packaging material on ships, as attested for the late second-century BC Roman wreck Dramont C. This medium-sized ship transported about 100 Dressel 1B amphorae,[75] some millstones, pine resin (not in amphorae, but in a container not preserved), and about fifty iron ingots. The vine branches seem to have been used to isolate the ingots from the bottom of the ship, since the vegetal remains were found immediately under them.[76]

attention. The excavators of the wreck give as the first reference for the use of twigs/small branches to protect the cargo the finds from the Madrague de Giens wreck; see Tchernia, Pomey, and Hesnard 1978, 20–1.

[73] Long, Gantes, and Drap 2002.

[74] Information given in Ruas 1996, 98; he references A. Arribas, 'L'épave d'EI Sec (Mallorca): El Sec ceramica comun, bronces, molinos, varia', in P. Rouillard and M.-C. Villanueva-Puig (eds.), *Grecs et Ibères au IVe siècle avant Jésus-Christ: commerce et iconographie, Actes de la Table Ronde tenue à Bordeaux III (1986)*, Paris 1989, 107–12, a publication which I could not access.

[75] The excavators note that at least two of the amphorae contained whole fishbones of small fish, thus indicating not wine but *hallec*: Joncheray 1994, 36.

[76] Joncheray 1994, 43. The exact number of the vine remains and their location on the excavation plan are not given, but at least one photo of the '*brindilles de vigne*' is published.

At the site of Lattara or Latera (mod. Lattes, Hérault) in southern France archaeobotanical data gives evidence of the changes between the pre-Roman and Roman period in terms of plant food attested, and foodways more generally, in a valuable chronological sequence. This settlement, near a large coastal lagoon, the Étang de Lattes, whose fisheries provided a staple to local diet and its economy, and a small river, the Lez, was an important trade hub due to its geographic position.[77] Established in the seventh century BC, over time Lattara grew into a Gallo-Roman town with large houses and a *sacellum* to Mercury. The sea offered connection to large centres, especially Massalia with which Lattara had entertained trade links since pre-Roman times, while being at the mouth of inland riverine access routes meant that Lattara played a commercial role in relation to the *oppida* of the interior. Lattara has been the object of long-term archaeological excavations, and much information is available on the settlement, before and after the Roman conquest. In terms of plant foods, the data show that the types of cereal and pulse consumed remained relatively stable from the Iron Age to the Roman period. Archaeobotanical and faunal data from Lattara suggest that, during the Iron Age, the actual foods consumed included durum wheat, bread wheat, husked emmer wheat, common millet, oats, barley, beans, peas, chickpeas, lentils, and fruits such as blackthorn berries, blackberries, and domesticated and wild grapes.[78] As regards animal foods, fish and molluscs from the nearby lagoon were consumed, as were cattle, sheep, goats, and pigs.[79] However, starting from the Augustan period, when the Roman presence in the area took strong hold, many more *cultivated* fruits are attested. The excavation of several wells has yielded waterlogged carpological remains attesting the presence of peach, two varieties of plum (*Prunus domestica subsp. institia var. subrotunda* and *P. domestica subsp. institia var. Juliana*), sweet and sour cherry, walnut, and hackberry (*Celtis sp.*).[80] All these fruits are attested beginning in the first-century AD layers and not earlier, and their presence likely indicates new local cultivation of the plants, not imports of preserved

[77] Plin. *HN* 9.29 for reference to the lagoon and its fisheries.

[78] Luley 2014, 43. A study on the emergence of arboriculture in the first millennium BC notes that the few grape pips recovered in ninth- to seventh-century BC layers at Lattes Port Ariane are from wild varieties according to morphometric studies: Pérez-Jordà *et al.* 2021, sections 3.11, 4.2.

[79] Luley notes that the particular context of recovery of these faunal assemblages did not allow determining of differences between daily meals and feasts and/or religious occurrences.

[80] For an overview of the archaeobotanical studies, see Alonso, Buxó, and Rovira 2008; see also Buxó 1992; Buxó 2005; Piquès and Martínez 2008.

fruits.[81] Well-developed local arboriculture can therefore be posited with some confidence.

We have seen through several documented examples that the Romans – besides their law, language, urban settlements, and military presence – introduced a number of fruits and vegetables into the provinces, and that soldiers and military veterans may have played a role in the diffusion of these plants from one region of the empire to another. This brings us to the question of broader changes in the diet in these provinces. While fruit and vegetables may not have had the same central dietary role as cereals, meat, and fish, they nonetheless were important components of the diet: pulses were a source of protein and often legumes such as vetch were fall-back staples in the face of failure of other more refined foodstuffs. By contrast, herbs and spices could considerably change and improve the taste of already existing types of food and dishes. The uneven archaeobotanical record available for the south of France can be supplemented by the evidence concerning food preparation. This evidence can shed light on the changes of diet and produce availability between the pre-Roman and the Roman period, which in turn may indicate something about the introduction and consumption of new foods, local production, and changes in the local economy. The cooking practices for the eastern Languedoc region in the period 300 BC to AD 100, in particular for Lattara, Ambrussum, and Castels à Nages, fortified settlements established by local Celtic populations several centuries before the Roman conquest, have been studied.[82]

Ambrussum (mod. Le Devès, near Villetelle), which dates to the fourth century BC, stood on a low hill on the right bank of the River Vidourle. The Romans conquered the area around 120 BC and, when the construction of the Via Domitia linking the Alps to the Pyrenees started in 118 BC, the *oppidum* found itself very close to this important communication route.[83] The whole settlement was remodelled in this period, acquiring a forum-like square and houses of the atrium type, with settlement expansion to the lower plain from the early imperial period. It was occupied at least until AD 100. Castels à Nages (Gard) also stood on a hilltop, which overlooked the Vaunage Valley. Archaeological investigations have

[81] Table IV in Alonso, Buxó, and Rovira 2008, 195 indicates that finds of either *Prunus avium* or *cerasum* (more specific identification was not possible) come also from layers of the fifth and fourth century BC.

[82] Luley 2014. [83] Ambrussum appears in various ancient itineraries.

identified phases dating from *c.*290 BC to AD 10, with a reoccupation in the third century AD after an apparent hiatus.[84]

From studying the finds from these and other settlements of the region, it has emerged that up to the Augustan period the native Celtic inhabitants of the area made very few distinctions in taste and style of cooking across social groups (quantity, rather than quality and diversity, was the main differentiating factor) and most commonly used locally produced cooking pots for their preparations.[85] The cook ware in use in the period suggests that the cereals, pulses, and meat attested from the botanical and faunal taxa were consumed as soups, stews, and porridges, as was common in the Iron-Age Celtic world.[86] Despite the commercial ties these settlements had with the rest of the Mediterranean, the data suggest an insularity, even a lack of foreign influences in cooking practices, especially when compared with the Greek settlements in southern France, where cooking pots of distinctly Greek type were in use in the same period.

However, after the Roman conquest, during the first century AD, a new social differentiation emerged with the development of specialized cooking and use of foreign ingredients. Elites residing in towns, such as capitals of *civitates* and *coloniae*, attest best to this shift in dietary preferences which abandoned some of the Celtic culinary traditions. Smaller centres like Lattara and the other *oppida* examined by Luley remained more traditional in their cooking methods. In the early period the cooking pots were locally made, but in the imperial era the same vessel shapes were mass produced and fired in industrial-sized kilns: in other words, they were commercially manufactured goods feeding into the larger regional economy. In fact, the organization of production and the standardization of crafted objects is the most notable change in this area which reflects the incorporation into the Roman empire.

Throughout the first century AD both at Lattara and Ambrussum, the *boiling* of food remained an important mode of cooking. Some changes in dietary habits, however, might be detected in the disappearance of beakers and cooking vessels with spouts at Celtic sites at the end of the first century BC. This may indicate the diminished importance of beer consumption in the region, at a time when, as we have seen above, grape vine cultivation and wine production started to appear in the area on a much larger scale.[87]

[84] Py 1978, 19–23. [85] Luley 2014, 39.
[86] Ceramic cooking pots found in the Saône River had remains of boiled millet grain, which could have been porridge or beer: Luley 2014, 44.
[87] Luley 2014, 48.

New foods did appear from the end of the first century BC onwards, most notably olive oil and fish sauces, as revealed from imported amphora types and from evidence for the local manufacture of *garum*/*allec,* and, as mentioned above, a wider range of new fruits, most notably the peach, the plum, and the walnut.[88] In contrast, elite houses in major urban centres such as Narbo Martius show clear emulation of cooking practices of other urban elites in the Roman world. Unlike the *oppida*, assemblages of cooking pots from Gallo-Roman urban houses feature less variety, with only two forms of cooking containers, the Roman *caccabus* and the *patina*,[89] being prevalent for the most part.[90] Neither was especially suited to a diet of porridges and stews: using either would tend to burn, rather than cook, the foodstuffs that were the staples of the *oppida.* From this datum, a diminished role for the consumption of boiled cereals in the diet of the elites is inferred.

Preference for stews and cooking pots for boiling of foodstuff may have continued in the *oppida* in the Roman period, but dietary preferences were slowly changing in Gaul, in parallel with trends in the rest of the Roman world.[91] The combination of botanical and faunal evidence with the evidence for changes in food preparation suggests that notable dietary changes in this region of southern France started from the early first century AD. These changes were distinct in urban centres, less so and later in the countryside.

The Tres Galliae

Gallia Comata was organized by Augustus into three provinces, Belgica, Lugdunensis, and Aquitania, roughly of the same size, probably in 27 BC. These three provinces were in turn subdivided into c*ivitates*, which largely occupied the territories of the late Iron Age ethnic groups.[92] Caesar and Plancus had founded colonies in Gallia Comata too, such as the *colonia Iulia Equestris/Noviodunum* (Nyon in Switzerland) and Augusta Raurica (Augst). In the years after the death of Caesar there had been disturbances,

[88] Luley 2014, 52; Piquès and Martínez 2008, 182–3.
[89] The *caccabus* was a terracotta or metal pail, often with a lid, which was placed immediately upon the fire or a trivet and used to boil meat and vegetables; and the *patina* was a flat pan, sometimes with a handle.
[90] Luley 2014, 50–1; for a more general and wide-ranging discussion of cooking pots, culture, and cuisine, see Spataro and Villing 2015.
[91] For changes in, e.g., fish and seafood consumption, see Marzano 2013a, 276; Luley 2014, 52.
[92] The exact number of the *civitates* is unclear, since ancient texts report varying numbers (60 or 64).

followed by Rome's military campaigns, in the west (among the Aquitani) and northeast (among the Morini, the Suebi, and the Treveri). The construction of the road system attributed to Agrippa and described by Strabo[93] was in all likelihood a response to specific strategic needs in these areas: starting from Lugdunum, one line of communications led to the north and the Rhineland, while the other to the area south of the Garonne. The primary function for such roads was to allow the movements of troops coming from Italy, but considering the amount of engineering works required and the time it took to complete, it is reasonable to think that this large-scale project may have also encouraged the growth of some towns.[94] For instance, excavations in towns located along the main south-western route have identified Augustan layers and street grids established in the Augustan period, and towns whose name started with the prefix August- or Iulio- must have had an early origin.[95]

Lugdunum became quickly a very important centre. The town was the connecting hub in the new road system which supplemented the excellent waterways available, since many rivers that are now no longer navigable were so in antiquity,[96] and also the capital of Gallia Lugdunensis, the seat of the mint, and of the federal sanctuary of the Tres Galliae. From 20 BC onwards, this town expanded very considerably. Throughout the reign of Augustus and the subsequent early Julio-Claudian emperors, the northeast of the Tres Galliae was where tens of thousands of troops were stationed; the logistics behind supplying these troops and the demand for various goods they created were a considerable economic force. In order to be closer to the many customers the army represented, even the pottery workshops of Pisae and Arretium started to produce their typical glossy red tableware near Lugdunum. As discussed in Chapter 2, the military may have contributed to the diffusion of new agricultural practices and the introduction of new plants in the Tres Galliae, besides constituting a considerable aggregate demand for many plant foods that were imported from the Mediterranean and further afield (e.g., black pepper).[97]

The period comprised between the start of Tiberius' reign in AD 14 and the death of Claudius was a period of growth and monumentalization of the towns of the Tres Galliae, even if often this monumentalization featured wooden rather than masonry buildings, as in the case of the

[93] Strabo 4.6.11. [94] Goudineau 1996, 490. [95] Goudineau 1996, 495.
[96] Epigraphic references to *nautae* along river stretches that today are not navigable (e.g., the Ardèche) have been noted: Goudineau 2000, 467. On the excellent navigable waterways of Gaul: Strabo 4.1.2.
[97] Livarda and van der Veen 2008.

wooden theatre of Forum Segusiavorum (mod. Feurs).[98] However, in clear contrast with the situation of Narbonensis, the towns of the Tres Galliae were not as numerous. The area differed from Narbonensis in other respects also: the link between towns and their suburban and rural villas was not as strong, with the *vici* playing an important role instead. But small centres, with nonetheless sophisticated craft production, absolved commercial roles sometimes expressly aimed at military camps, such as in the case of Baden in Switzerland. Further developments occurred during Claudius' reign, with large-scale road building in the Loire valley, in Brittany and Normandy, and with development in the Atlantic region, stimulated by the conquest of Britain.[99]

The sociopolitical history of Narbonensis and the Tres Galliae differs on another important point: the number of *equites* and senators hailing from the region is much lower than in the case of Narbonensis.[100] Despite Claudius' famous request to the senate to allow the elites from the Tres Galliae who had Roman citizenship to enter the senate and run for office in Rome,[101] concession of the Latin rights to the whole of the Tres Galliae might have finally occurred only under the Flavians; this was a privilege Narbonensis had received already at the time of Caesar.[102] It seems that local elites here were much more reluctant, compared to Narbonensis, to move beyond their local power base. But if the urbanization rate in the Tres Galliae was not as high as in Narbonensis, its contribution to the army was. This is relevant when thinking about changing local agricultural practices in response to new dietary habits, as well as exchange of knowledge (and actual plant cuttings and seeds) in matters horticultural. Up to AD 68, Gauls provided *c.*65 per cent of the auxiliary units in the western provinces: twenty-eight cavalry divisions and seventy-six cohorts, but many served in the legions too, as attested by inscriptions from all the Gallic provinces dating to the reigns of Claudius and Nero.[103] Goudineau observed that 'The return of substantial numbers of men who had served for years in the Roman army must have had all sorts of consequences for both the language and more generally the "civilization" of the Three Gauls.'[104] Although we do not know how many former soldiers returned home and how many settled abroad, among the consequences of substantial numbers of men having served in the army we need to consider also the

[98] *CIL* 13.1642. [99] Goudineau 1996, 497. [100] Goudineau 1996, 499.
[101] *CIL* 13.1668; Tac. *Ann.* 11.23–5; according to Tacitus, the senate agreed to give this right only to the Aedui.
[102] Goudineau 2000, 464. [103] Goudineau 1996, 500. [104] Goudineau 1996, 500.

acquisition of new dietary tastes and the introduction, into local cultivations, of new fruits and vegetables. Such possible transmission could have been aided by the connections, both within the military itself and with the traders that supplied the army, that these individuals certainly had.

The rural landscape of the Gallic provinces presents numerous signs of regular land divisions; how to interpret these has still, to an extent, found no universal consensus: reorganization of landholdings in connection to specific agricultural practices, land division in the context of colonization, or some kind of organization of the countryside in connection to the census, and therefore the establishment of taxation? Clearly these three possibilities are not mutually exclusive. The Tres Galliae show more continuity in agriculture between the end of the Celtic period and the early Roman period compared to Narbonensis; there, colonization seems to have forced displaced individuals to bring new areas under cultivation. In the Tres Galliae, instead, the most noticeable changes concern land division, with enclosures and ditch complexes shaped more regularly. Farmhouses slowly adopt Mediterranean building techniques, with masonry and tiled roofs, but there is great variety and, whilst the influence of Italian models can be clearly detected, local traditions continued, with small farms or small rural agglomerations following Iron Age practices coexisting side by side with 'Mediterranean-style' villas. *Average* size of agricultural estates across Gaul seems to have been in the order of 150–200 ha. There were certainly wealthy landlords who owned a lot of land, not as one estate but, as for Roman Italy, as scattered landholdings, as suggested by epigraphic evidence attesting individuals holding public office in more than one *civitas*.[105] Small family plots of course existed, but the nature of the data is unable to consistently pick these up. What archaeological data cannot tell is whether the small farms identified around the very large villas were owned by the same proprietors and occupied by tenant farmers or were dependent in some other form on the larger estate, and what kind of cultivations they were engaged with. Animal husbandry was important in Gaul, and clearly what we would like to know is the relative proportions of land left forested, devoted to pasture, to vineyards, cereal cultivations, orchards, etc.

Agricultural expansion and intensification in the Roman period have been noted in parts of northeastern Gaul in marginal areas with significant soil and terrain constraints, such as the Haye Forest, characterized by marl-limestone or thin calcareous soils with low agricultural potential, or the

[105] Goudineau 2000, 471.

Châtillon Forest (a medium altitude plateau with very shallow soils).[106] Ouzoulias discusses four case studies from northeastern Gaul indicating that in the imperial age, starting from about the first century AD, notable efforts were made to bring under cultivation new areas or to improve the exploitation of areas already in use in the Iron Age.[107] Large-scale clearance of vegetation, complex field systems, indication of manuring practices (and hence the combination of animal husbandry and agriculture), in association with small, or at most medium-sized farms, are the essential features of this expansion. In some cases, the occupation is relatively short – just over 100 years for most of the farms identified in the Haye Forest. The sites Ouzoulias presents show agricultural expansion and intensification within an agricultural system different from the Roman 'villa system'.[108] He suggests that the extension over large areas of field systems associated with small Gallo-Roman farmsteads 'forces us to significantly reconsider our views on the agricultural boom accompanying the economic development of the *civitates* of eastern Gaul in the High Empire'.[109] There are some interesting points that emerge from his study. First, on the whole, these farming communities were not removed from the wider regional economy, to judge from the material culture recovered. Second, while the developments identified in the case studies attest to major changes in the agricultural use of the land in the Roman early imperial period, these improvements were not achieved by adopting new cultivation techniques but rather by organizing the cultivated areas in a different manner and, crucially, by increasing the amount of work per surface unit. This is something farms relying on the work of family members can do more easily, in economic terms, than farms employing hired or servile labour.[110] Lastly, when the extension and unitary planning of the ditch work making the field system suggest a wider organization beyond the dimension of a few farms (as in the case of the Haye Forest and the Brie plateau Ouzoulias discusses), a possibility to consider is whether these small farmers were encouraged by some public authority to settle in the areas in question.[111] Ouzoulias asks whether the evidence he discusses is an indication of

[106] Ouzoulias 2020.
[107] For example, in the Bussy-Saint-Georges sector alone of the Brie Boisée district (Seine-et-Marne) the digging of the ditches required the removal of *c.*46,000 m³ of earth.
[108] Ouzoulias 2020, 14. [109] Ouzoulias 2020, 14–15.
[110] Ouzoulias 2020 stresses this point (e.g., p. 20): in contrast to the traditional Malthusian framework used by historians of ancient economics, he discusses the work of economist Ester Boserup on rural communities and agricultural intensification.
[111] Ouzoulias 2020, 18.

schemes planned and implemented by the Roman authority or by other external individuals that managed and controlled the lands.[112] He makes another important point. Since it would have taken years to bring to a level of fertility able to ensure subsistence the poor soils that characterize the four areas he examines, 'specific economic circumstances were required for peasant family to settle in these areas'.[113] The agricultural intensification shown by the case studies is not in correlation with the appearance of villas in the region and contradicts the traditional view that settlements on marginal land were the result of displacement of local people due to the expansion of the Roman villa system. The development of agriculture on these marginal lands rather suggests this was a response to a significant increase in the demand for food, linked to population growth.[114] All available evidence points to the fact that the agricultural expansion attested in the north of Gaul accompanied developments linked closely to – or intensified by – the Roman conquest of the area.[115]

The Archaeobotanical Data

In comparison to the south, central and northern Gaul present a more extensive record of archaeobotanical data. The current state of knowledge based on archaeobotanical finds indicates that the attested fruit trees and aromatic plants became more varied towards the end of the Iron Age (first century BC),[116] followed by a notable increase in diversity in the Roman period.[117] At this time, new plants from other parts of the Roman world were introduced, or else there was northward diffusion of such plants as were indigenous to the south of France. The walnut represents such a case. The walnut tree is considered to have been native in southern France, but it starts being regularly planted in the north after the Roman conquest.[118] Among vegetables, the chard, indigenous to southern France, appears in the archaeobotanical record of the northern regions only from the mid first century AD onwards. The first century AD is when new crops appeared: chickpea, rye, grape, and domesticated fruit trees, such as quinces, apples, pears, and cherries.[119]

[112] Ouzoulias 2020, 21. [113] Ouzoulias 2020, 21. [114] Ouzoulias 2020, 17, 24.
[115] Ouzoulias 2020, 24.
[116] There is no exact correlation in the Iron Age chronological phases between southern France and northern France/temperate Europe; for a detailed discussion of such chronological problems, see Duval, Morel, and Roman 1990.
[117] Zech-Matterne *et al.* 2017, 51; see also discussion in Ruas 1996, 98–9.
[118] Zech-Matterne *et al.* 2017, 52.
[119] Goudineau 2000, 473. As comparison to this scenario one can look at the lower Danube delta: there archaeobotanical and pollen data for grape, walnut, fennel, coriander, and dill suggest they

Several 'exotic' plant foods are present in northern France in the Roman era and, because they can grow in that particular climate and environment, these plants may well have been acclimatized and locally cultivated. These include the peach, which appears in northern France at about the same time as in Italy, the start of the first century AD,[120] the melon/cucumber (attested sometime around the mid first century AD),[121] the bottle gourd (*Lagenaria siceraria*, attested at the start of the first century AD), and medlar (*Mespilus germanica*, late second century AD).[122]

However, for all these plants there are chronological and contextual differences. For rural settlements, the earliest attestations for the peach and chard date to the third century AD, whereas the melon/cucumber dates to the second half of the second century and the bottle gourd is absent altogether from the record from rural sites. Even the mulberry, an exotic introduced and acclimatized already in the Iron Age, does not appear at all in the record from rural sites, only from urban contexts. This skew of evidence may be due to the problem of recovery and conservation bias from certain archaeological contexts and taphonomic issues; some of these plants/seeds are best recovered in mineralized form from latrines and sewers, thus steering the evidence towards urban centres and thereby making it difficult to determine what was grown locally and what may have been imported into towns from elsewhere. Indeed, when considering the available data for northern and central France pertaining to diffusion of 'exotic' plant foods, attestations on rural sites are limited.[123] Instead, urban markets and other agglomerations such as army forts played a crucial role in attracting the new goods, because of the generated aggregate demand, but later also in promoting the acclimatization of some of these plants.[124]

Within this picture of diffusion of 'Roman' vegetables and fruits, there are strange absences. Some plant foods common in Mediterranean regions that could have easily been imported from the south of France in preserved form – I refer here to olives in particular – do not seem to have been widely spread in the northern and central regions. Although imported already in the Augustan period in the *oppidum* of Bibracte, near modern Autun, only

may have been cultivated locally following the Batavian revolt of AD 69/70: Bakels and Jacomet 2003; Kooistra 2009.

[120] However, at this early date the peach is attested only in urban centres such as Paris and in the military, religious, and civic settlement of Biesheim-Kunheim; attestations in nucleated settlements are much later and date to the second/third centuries and to the third/fourth in rural villas.

[121] At the military, religious, and civic centre of Biesheim-Kunheim: Zech-Matterne *et al.* 2017, 57; a bit later, between the first/second century, in the case of the settlement of Jouars-Ponchartrain.

[122] Zech-Matterne *et al.* 2017, table 1; on the history of medlar cultivation: Baird and Thieret 1989.

[123] Zech-Matterne *et al.* 2017, 57.

[124] Zech-Matterne *et al.* 2017, 58.

in a few other urban contexts of the first century AD are olive pits attested, and in very small quantities.[125]

Sometimes, evidence for both consumption and production of fruits and vegetables is found at the same site. At Beaume-la-Rolande in the Loiret region, excavations of the Gallo-Roman settlement have recovered carpological remains from two latrines. These finds suggest the very likely local cultivation of apples, pears, lentils, and grapes. A 23 × 18 m plot (414 m^2 or 0.102 acres) with parallel ditches for vines was found not far from the latrines, in a garden where fruit trees and pulses were also grown in the traditional Italian manner of intercropping vines, vegetables, and fruit trees, not the large, intensively planted vineyards known elsewhere in southern Gaul, as at the Gasquinoy site discussed in Chapter 8.[126]

Stages in the Diffusion of New Plant Foods

Two different waves of diffusion of new plant foods into northern Gaul in the Roman period can be discerned. The first occurred in the late first century BC / Augustan period, with a second wave following later, in the late second century. The melon is an example of diffusion during the second wave, probably reflecting the fact that the fruit is not easily dried or preserved in other ways and is easily damaged during transport: the interval of about 200 years may therefore indicate the time it took to develop varieties of melon suitable to be grown in northern Gaul. The hiatus between 'first wave' and 'second wave' may indicate the acclimatization period needed for a new plant like the melon to become a locally cultivated plant.[127] The trajectory of the bottle gourd appears to have been similar: the gourd is attested in the first century at Oedenburg/Biesheim-Kunheim,[128] a site in Alsace at the border with modern Germany, and must have been completely acclimatized by the second century AD, as indicated by finds of bottle gourd seeds and fragments of the pericarp in waterlogged contexts associated with vegetable plots excavated at the Gallo-Roman site of Le Bois Harlé near Longueil-Sainte-Marie, on the

[125] Finds from Troyes, Bisheim-Kunheim, and Arras, consisting of three to five olive pits per site: Derreumax and Lepetz 2008, 62; Zech-Matterne *et al.* 2017, 58.
[126] Cribellier 2014, 65; for a nice example of intercropping, with vines, some fruit trees, and vegetable beds, see the House of the Ship Europa in Pompeii (I.15.3), Jashemski 1974; Jashemski 1979–93, vol. I, 233–8.
[127] Zech-Matterne *et al.* 2017, 57.
[128] See Chapter 2 for discussion of the finds pertaining to bottle gourds from this site.

right bank of the Oise River.[129] This site offered evidence not only for the local cultivation of the bottle gourd, but also of cucumber, lentil, pea, broad bean, beet/chard, coriander and opium poppy, showing that those plants and condiments were in the Roman era firmly established as crops in the northern regions.[130]

As we have seen earlier in the book, there is archaeological evidence for the cultivation of some plant foods at Roman military settlements and possibly for the acclimatization of certain fruits and vegetables that appear in a given region only from the Roman period onwards.[131] Oedenburg/Biesheim-Kunheim is a site that has made a considerable contribution to archaeobotanical research north of the Alps for the Roman era.[132] The site seems to have been occupied sometime in the early years of Tiberius' reign by a military camp dependent on the command area of Vindonissa (mod. Windisch).[133] The civilian settlement around the camp, which perhaps is to be identified with Argentovaria, developed almost contemporaneously with the arrival of the army, and continued to develop around a temple complex for the whole of the second century, well after the Roman army had left.[134]

The extensive excavations at the Oedenburg site have recovered a total of 303 plant taxa, the majority (292) preserved as waterlogged, which means that macro-remains of fruits and seeds of vegetables are well represented.[135] As in the case of the military sites in Roman Britain, herbs and condiments are very well attested.[136] Not all of the plant foods identified in the archaeological record of Oedenburg would have been

[129] De Hingh 1993, 96 notes that the morphology of the seeds suggests the seeds were from ripe *lagenaria* fruits, i.e., from gourds being grown either for seeds or to be used as containers, since the pericarp hardens and the pulp dries out when the fruit ripens. Bottle gourds are eaten when green and unripe. In the past it was debated whether *lagearia sicenaria* could have ever been grown in northern Europe (see De Hingh 1993, 95) but it has been deemed possible: Schlumbaum and Vandorpe 2012, 500.

[130] There might have been a grape vine too, because *vitis vinifera* is attested in small numbers; the cereals attested include barley, with the highest number of samples, millet, bread wheat, and emmer. Opium poppy is often considered a Roman introduction in regions further away from the Mediterranean, but the data from the area of northern Brabant, in the southern part of the Netherlands, indicate that both opium poppy and spelt wheat were cultivated there at least from the Iron Age: see Bakels, van der Jagt, and Jansen 2017, 80.

[131] Pollmann, Jacomet, and Schlumbaum 2005, 1471.

[132] Vandorpe and Jacomet 2011a, 3–4.

[133] Reddé *et al.* 2005. The military unit seems to have withdrawn in *c.* AD 70 and the civilian settlement continued to develop on its own. It is unclear whether in the second half of the third century, when the Rhine became the frontier line again, the settlement was reoccupied by the military.

[134] Reddé *et al.* 2005, 215; Vandorpe and Jacomet 2011a, 64.

[135] Of the remaining taxa, 57 were mineralized and 58 were charred.

[136] Livarda and van der Veen 2008.

cultivated in the region. There are clear imports, such as black peppercorns, stone pine, and date, which must have arrived as imported dried fruit,[137] but a number of plants were clearly introduced at the start of the Roman period and must have been grown locally by the end of the first century AD.[138] These include coriander, dill, and celery, which were found regularly and abundantly across the site; and summer savory and fennel seeds, which were less common, but still well attested.[139] The presence of celery among a range of cultivated plants at Oedenburg might come as a surprise, since it is sometimes thought that 'celery was probably not cultivated until the Middle Ages'.[140]

Among the vegetables and salads attested, the most common are amaranth, orache, little hogweed, and cabbages (*Brassica oleracea*, *Brassica rapa/nigra, Brassica* sp.).[141] Noteworthy as well are the root vegetables: carrot, attested in 16.5 per cent of samples (in all parts of the settlement), beet (found as fruit and as seed), and parsnip. Carrot and beet fruit were more common in first-century AD contexts. Garlic is also attested, quite exceptionally, because normally it is not found due to preservation biases, but in this case two charred garlic cloves were found in a second-century context in the area of the temple complex.[142] These finds suggest considerable horticultural variety from the first century AD onwards. The archaeobotanists who studied the Oedenburg vegetal taxa think that the plots devoted to the cultivation of vegetables, spices, and pulses were located within the settlement area, where finds of vegetables and spices are abundant. Local cultivation is strongly suggested because for a number of vegetables, whose edible parts are only the leaves and/or the roots, seeds were found, meaning that the plants were allowed to flower in order to produce the seeds needed in cultivation.[143]

[137] Vandorpe and Jacomet 2011a, 27, 29. [138] Vandorpe and Jacomet 2011a, 27.

[139] Vandorpe and Jacomet 2011a, 27; parsley and aniseed (plants that together with rue are considered introductions by the Romans north of the Alps) were rare finds here. At p. 27 note 52, Vandorpe and Jacomet report the discovery of aniseed pollen from a well at the Roman settlement at Waldgirmes, Germany, which suggests cultivation of aniseed in the region.

[140] Malhotra 2012, 249. Celery (*Apium graveolens*) appears as a wild plant in Mediterranean regions, in areas with marshy and salty soils.

[141] Amaranth is the most common leaf vegetable, present in 36.8 per cent of samples and present in all areas of the excavation; it was more common in second-century contexts than in the first century. Orache was found in 11.1 per cent of samples.

[142] Vandorpe and Jacomet 2011a, 29. Garlic, date, and stone pine finds are restricted to the temple environs and seem to pertain to sacrificial context.

[143] Vandorpe and Jacomet 2011a, 54–5; this observation does not apply to many of the spices, for which the seed is the sought-after aromatic part. Safflower seeds were also discovered, a rare find north of the Alps, possibly 'part of seed transport for the initiation of local cultivation' (p. 62).

Moving from vegetables to fruits, twenty species of fruit were identified at Oedenburg, largely from waterlogged deposits and from pits. In decreasing order of their percentage incidence, the fruits that were found most regularly are: fig, elderberry, grape, apple/pear, winter cherry (*Physalis alkekengi*), cherry, either sweet or sour, dewberry (*Rubus caesius*), blackthorn (*Prunus spinosa*), and peach.[144] Less frequent species (present in less than 10 per cent of samples) are date, mulberry (*Morus nigra*), olive, melon (*Cucumis melo*), cucumber (*Cucumis sativus*), and plums (*Prunus domestica/insititia*).[145] While dewberry and blackthorn were indigenous fruits gathered in the wild, a number of cultivated fruits were introduced by the Romans. Fruits that the archaeobotanists suggest might have been grown locally are peach, fig, melon, cucumber, cherry, plum, black mulberry, apple/pear, and grape. These are plants for which other indicators (e.g., presence of pollen and of wood of the tree species in question) have been identified, thus giving a higher likelihood that these plants were acclimatized and grown locally.[146] To this we can add the walnut, whose presence in Oedenburg is confirmed not only by macro-remains, but also by pollen and charred wood, so that the presence of walnut trees growing in the temple complex has been suggested.[147] Walnut and chestnut are normally considered plants that the Romans spread to northern Europe.

If all these fruits were not grown locally, the fact that they are found in both the first-century and the second-century contexts indicates that even after the Roman soldiers left the area, the civilians living there continued to seek the new plant foods that had been introduced into the area and had the networks in place to acquire them to satisfy their preferences and dietary needs.[148] The range of plant foods identified could have arrived at the site via trade, since the settlement continued to thrive and must have had a certain importance due to the temple complex which was in use until the third century AD, perhaps as a pilgrimage site.[149] The site was not far from the Rhine, a major water route and thus easily accessible from farther afield. The settlement certainly benefited from this connectivity, allowing access to a range of goods destined to supply larger urban centres along the river. But the plants could equally have been cultivated locally after being

[144] Vandorpe and Jacomet 2011a, 30: most of the fruit species are found throughout the three areas of the civil settlement, with the temple area yielding the lowest number and variety of fruit remains. Casual consumption of soft fruit may not have been associated with temple visits.
[145] Vandorpe and Jacomet 2011a, 29.
[146] Vandorpe and Jacomet 2011a, 53.
[147] Vandorpe and Jacomet 2011a, 61.
[148] Vandorpe and Jacomet 2011a, 41.
[149] Vandorpe and Jacomet 2011a, 64.

first introduced, possibly by the Roman soldiers and traders that followed them.

Finally, pollen of pistachio was also identified, a rare find north of the Alps.[150] From the study, it is not clear whether this pollen could have been airborne and travelled long distances, as can happen with the pollen of some plants, or whether it could be considered a relatively local plant (i.e., a plant that was growing in the region of Oedenburg), or whether the pollen could have been present in imports coming from the Mediterranean. As I have noted in Chapter 2, Pliny tells us that L. Vitellius, father of the short-lived emperor, and his colleague the *eques* Pompeius Flaccus introduced the pistachio plant from Syria into Italy and Hispania in the first half of the first century AD.[151] As in the case of the azerole and jujube plants grown from slips in military camps of North Africa and Syria by Sextus Papinius before their introduction into Italy, the pistachio may have been grown in military camps of the Near East. Could this find from Oedenburg represent an attempt at growing pistachio in these northern climes? While the pistachio plant thrives in an arid semi-desert climate with long, dry, hot summers, to bear fruit the plant does require very cold winters.[152] Military personnel often changed posting from one part of the empire to another, and they may have brought seeds with them. Allegedly, the Romans cultivated cassia, an eastern plant, along the Rhine, but the spice did not have the same fragrance and potency as the one grown in hotter climates; maybe growing pistachios was also attempted.[153]

The Oedenburg finds clearly show that a change in the local diet occurred in the Roman era; in comparison to the Iron Age, dominated by cereals and pulses, many more vegetables, spices, and fruits (both imported and locally gathered wild plants) were regularly consumed.[154] In addition, agricultural practices may have changed: finds of plants/weeds that show high soil nitrogen content (e.g., black nightshade or *Solanum nigrum*) could indicate regular manuring practices which, as discussed in Chapter 3, played an important part in improving size and quantity of

[150] Reddé *et al.* 2005, 257. At the time of this article, pistachio had been identified only at Windisch in Augustan layers, *ibidem* note 28.

[151] Plin. *HN* 15.91; see Chapter 2, p. 74.

[152] The pistachio plant thrives in an arid semi-desert climate with long, dry, hot summers, low humidity, and cool but not frigid winters; however, to bear fruit the plant does require very cold winters, since more than 1,000 hours of summer and autumn rains may induce fungal problems and harvest difficulties. See the Pistachio Growers' Association page, www.pgai.com.au/growing-pistachios (accessed October 2018).

[153] Plin. *HN* 12.98.

[154] Vandorpe and Jacomet 2011a, 53.

crops. It is generally recognized that an important contribution of 'Romanization' in the Gallic provinces was a more systematic approach to farming, with the adoption of crop rotation, improvement of soil by letting lie fallow, and stock control and selective breeding in animal husbandry.[155] The results from the Oedenburg excavation are consistent with this picture.

The North and NorthEast of the Tres Galliae

Good data on the changes in agricultural practice that occurred in the Roman era come from the northern portion of the Tres Galliae. In the north of France, where cereal cultivation was a major part of agriculture, the Roman period saw the growth and/or introduction of the cultivation of different types of cereals *and* an increase in the horticultural cultivation of legumes. A survey of archaeobotanical finds from 655 archaeological contexts in northeastern Gaul (within the borders of modern France) shows a higher occurrence of lentil, pea, fava bean, vetch, chickpea, and lupin for the period from the first to the third century AD, when compared to the pre-Roman (250–60 BC) and early Roman (30 BC–AD 60) periods.[156] It seems that these cultivations were grown in rotation with naked wheat, since the distribution maps for the Roman period show an overlap in the area of great attestation of naked wheat and legume plants.[157] 'Naked wheat' indicates free-threshing forms of wheat, such as durum wheat and common wheat: these grains do not have hulls/husks and require less processing compared to hulled or husked wheat such as emmer and spelt. Crop rotation is a distinct Roman contribution to basic agricultural strategies, as shown in the literary treatises and by evidence of farmers' practices in the archaeological record.

The practice of crop rotation and choices among cereals come home to the farm in various social, geographical, and commercial aspects. It has been convincingly argued that the choice between growing naked or husked cereals was not simply dictated by fashion/dietary preferences. Rather, it was a conscious choice on the part of farmers connected to the type of distributive network and economy they were part of.[158] In an urban-centred economy, with the processing of cereals (from grains to flour and from flour to bread) taking place in towns, naked cereals were a better choice because they required less work at the farm after the harvest,

[155] Goudineau 2000, 473. [156] Zech-Matterne *et al.* 2017.
[157] Zech-Matterne *et al.* 2017, 47–51 and fig. 11. [158] Heinrich 2017.

since they needed no de-husking, and were lighter to transport. These advantages outweighed the fact that naked cereals are less resistant to diseases and parasites when stored long term. On the contrary, husked cereals, which last better when stored, were preferred if the farmers were subsistence farmers and/or farmers who did not send their produce to the market immediately but intended to store it, either to wait for a better price or for some other reason.[159]

Results from the excavations of two Roman military settlements at Arras in northeastern France give some clues on how the invading military presence and the subsequent emergence of a new urban settlement (Nemetacum, a Romanized centre with a strong military connection which became the capital of the Atrebates)[160] combining Gallic and Roman cultural traits impacted on the plant foods available.[161] The first military settlement (Arras, Actiparc site), established by *c.*40 BC, featured a large granary which exceeded the needs of the fort.[162] It is quite possible that the out-of-proportion grain storage facility at the fort was connected to the local requisition of cereals for taxation, since the archaeobotanical taxa recovered indicate the same cereals (hulled barley, emmer, and spelt) normally attested in northern Gaul in the Iron Age and point to local species.[163] The military settlement, which was occupied only until *c.* AD 14, may have acted as supply base for the Roman armies deployed in the northern regions, requisitioning local produce. The second military settlement (Arras, Rue Baudimont site), which then developed into the urban centre of Nemetacum,[164] was on the opposite side of the Scarpe Valley and its first phase of occupation dates to the last two decades of the first century BC. Many archaeobotanical remains were recovered at this site; unlike the

[159] Heinrich 2017.

[160] Derreumax and Lepetz 2008, 55: The earlier layers of occupation indicate that both infantry and cavalry units were present, as shown by finds of Roman military equipment. Other finds the excavators relate to military presence are writing implements, *terra sigillata* tableware from Arretium and Pisae, oil lamps, and amphorae, including from the eastern Mediterranean.

[161] Derreumax and Lepetz 2008.

[162] The granary was not meant to supply the nearby civilian settlement, since this had its own granaries: Derreumax and Lepetz 2008, 53. Finds from the early settlement include many spear and arrow heads, sword sheaths, fragments of helmets and harness decorations, large quantities of Italian Dressel 1B wine amphorae, and thin-walled ceramics. This fort was 10 km away from the important stronghold of Etun, a military complex measuring 40 ha.

[163] Derreumax and Lepetz 2008, 56–7; however, the authors of the study note that the botanical remains from this site were very badly preserved and it was not always possible to obtain specific identifications. No imported/exotic plant foods were identified, but they observe that this could be the result of the bad preservation.

[164] The early imperial town measured 50 ha, with an orthogonal street grid and monumental buildings.

cereal finds from the first military settlement at Actiparc, cereals recovered here from the early first-century AD layers included naked wheat, together with emmer, spelt, and barley. The weed species associated with naked wheat and the evidence for grain attacked by weevil larvae (a Mediterranean insect) suggest the importation of naked wheat from southern/Mediterranean regions, either as processed grain food or as seed crop.[165] Naked wheat was not the only imported plant food in the Augustan period. Grape, coriander, and fennel were detected, and while fennel can be cultivated locally, grape and coriander are believed to be imports from a southern region. Apple was identified too, but it was not possible to determine whether it was the indigenous wild apple (the crab apple) or the domesticated apple, which did not appear in the northern regions until the Roman era.[166] In short, while the earlier military settlement of *c.*40 BC relied on requisitions of both cereals and animals from local indigenous communities, in the Augustan period the later military settlement developed into a new city combining Roman and Gallic influences. The import of naked wheat, and its likely subsequent local cultivation, together with grape, coriander, amphorae attesting import of fish sauces and Italic wine, and finds from aristocratic tombs show that the 'Atrebates accepted the Roman presence and way of life'.[167]

As far as the appearance of new plant foods is concerned, the phenomenon is clearly observable in the first century AD also in the general area that was the extreme northeast of northern Gaul, the region of the Dutch province of Noord-Brabant, the area located to the north and northeast of Antwerpin.[168] At Oss-Ussen (*c.*20 km northeast of the town of Hertogenbosch), for instance, clusters of farmhouses, which had started in the late Iron Age, increased in the Roman period (first century AD) to become small hamlets. Some farmsteads acquired some features of Mediterranean /Roman architecture, such as tiled roofs and porticoes, and developed into 'villas'. At Nistelrode-Zwarte Molen (east of Hertogenbosch), field parcelling was recognized, showing the use of Roman units of measure; both orientation and placement of these land

[165] Derreumax and Lepetz 2008, 58–61; this type of weevil (*Sitophilus granaries*) spread to northern Europe because of the long-distance transport of cereals; it has been argued that this occurred during the Roman period because of the import of Mediterranean grain to supply the army or market trade channels: see Derreumax and Lepetz 2008, 61, with earlier bibliography.

[166] Derreumax and Lepetz 2008, 61.

[167] Derreumax and Lepetz 2008, 66.

[168] Noord (= North) Brabant borders the provinces of South Holland and Gelderland to the north, Limburg to the east, Zeeland to the west, and Belgium to the south.

plots indicate that they were in phase and connected with the farmsteads.[169]

Starting from the first century AD, a number of new plant foods appeared in the area of Oss-Westerveld, and most notably at the newly developed 'villa sites'. At Hoogeloon, a range of fruit, vegetables, and condiments were found in waterlogged deposits at a farmstead which developed into a 'villa' around AD 110 and lasted about 100 years to the start of the third century, then reverted to a very basic farmstead building. Before the villa phase, no foreign plant was attested. The 'introduced' plants that have been identified at this site are garlic, dill, celery, beet, summer savory, the cabbage/broccoli group, peas, common wheat, coriander, parsley, fig, walnut, and plum.[170] This site, in a relatively isolated position in a landscape unsuitable for large-scale arable farming, has yielded archaeological evidence for the large-scale handling of livestock.[171]

Some of these new plants found at Hoogeloon must have been imported; for instance, fig was probably imported as dried fruit, since fig does not fruit well in northern regions. Whether the other archaeobotanical finds represent local cultivation of newly introduced plants or the import of plant food from southern regions remains an open question,[172] since no evidence for cultivated vegetable patches was found in the area and pollen analysis was inconclusive. Beets, however, were certainly cultivated locally, since the excavations recovered the fruit of the beet, which is not edible,[173] and not the fleshy taproot which, together with the leaves, is the edible part of this plant.[174] The recovery of the beet fruit clearly indicates that: (1) the beet was not an imported plant food, since in this case one would have transported only the edible taproot, and (2) that there were plants grown locally that were left to fruit in order to provide seeds for future planting seasons. With the exception of fig and walnut, when considering the evidence from the rest of northern Gaul (and, comparatively, from Roman Britain),[175] there is a high likelihood that summer

[169] Bakels, van der Jagt, and Jansen 2017, 76.

[170] *Allium sativum* L., *Anethum graveolens* L., *Apium graveolens* L. *Beta vulgaris* L., *Satureja hortensis* L., *Brassica* L. *sp.*, *Pisum sativum* L., *Triticum aestivum* L., *Coriandrum sativum* L., *Petroselinum crispum* (Mill.) A.W.Hill, *Ficus carica* L., *Juglans regia* L., *Prunus domestica* L.

[171] Groot 2020, 37.

[172] The evidence for herbs such as celery and parsley consists of seeds; the Romans used the seeds of these plants for culinary and medicinal purposes.

[173] Bakels, van der Jagt, and Jansen 2017, 82.

[174] In modern cultivars of garden beet, the fruit develops in the second season of the plant from a tall, leafy stem that bears clusters of small green flowers. It is a brown corky fruit commonly called 'seedball'.

[175] Van der Veen, Livarda, and Hill 2007; van der Veen 2016; Livarda 2011.

savory, cabbage, celery, parsley, coriander, and plum were all cultivated locally, an introduction of new plants corresponding to Roman culinary habits, which in turn raises the question of who the inhabitants of these 'villa sites' were and how much these changes were induced by the army presence in the not-far-distant German *limes* area.[176]

The analysis of the zooarchaeological evidence from the Noord-Brabant district of the Netherlands stresses that there was no change in the percentage of cattle in the Roman period (the shift to higher cattle presence had already occurred in the Iron Age), nor is horse breeding attested; these two factors are normally the most common effects of Roman army presence and its demands impacting local animal husbandry.[177] However, 'Roman influence' was shown by the appearance, from the first century AD, of chickens at various 'villa' or villa-like sites. Chickens (and pigs) are connected to the Roman army further east, in the Rhine delta, especially in the first phase of Roman presence, and in Switzerland chicken presence increases starting from the first century AD.[178] In addition, at the Hoogeloon villa mentioned earlier, where we have seen a range of new plant food attested, also consumption of land snails imported from southern regions and of seafood coming from the coast, such as oysters, mussels, and cockles, is attested, an indicator of Roman culinary tastes.[179] The concentration of these new plant foods at villa sites or quasi-villa sites, while at the same time the main crops grown in the area and animal husbandry do not show any remarkable change between the Iron Age and the Roman presence, suggests that these were very localized introductions by Roman and/or Romanized individuals and add to the other evidence presented earlier about the cultivation of certain plants being the hallmark of Roman settlers or locals who wanted to follow the Roman ways.

The data presented in this chapter indicate that agricultural practices and diet underwent important changes in the Iberian Peninsula and in the Gallic territories during and after the Roman conquest. Horticulture, and

[176] In the case of the Hoogeloon villa, the study of ceramics indicates trade routes oriented more to the south (towns of Tongeren and Tienen) than the north (Nijmegen). Groot (2020, 37) observes that the proportions of bones from mammals found in Hoogeloon is consistent with those found in the towns of the *civitas Tungrorum*, suggesting that Hoogeloon could have supplied these towns with meat animals.

[177] Groot and Deschler-Erb 2015.

[178] See Cavallo, Kooistra, and Dütting 2008, 77; Groot and Deschler-Erb 2015, 453; for chicken and other domestic fowl in the military diet: Davies 1989, 195–6.

[179] Hitchner 1999 for the preference for oysters rather than the traditional mussels in Roman Gaul; Marzano 2013a, 190–1 for the taste for oysters introduced by the Romans in Britain.

arboriculture more specifically, benefited from a greater diversity of species and the diffusion of specific technical knowledge associated with the cultivation of fruit trees which were not indigenous and had clearly been introduced from outside. Arboriculture in these geographic regions had first advanced, with the introduction of plants first domesticated in the East such as almond, pomegranate, fig, and grape, at the time of the Punic and Greek colonization. It developed further later in the Roman era, with the arrival of settlers, soldiers, and traders engaged in more systematic commercial exchanges. While there are important differences in the chronology and trajectory of the 'Romanization' of these territories, both in the case of the Iberian Peninsula and of the Gallic provinces the Augustan era was marked by greater diversity in fruit and vegetables and by the progressive local cultivation of a range of new plants. Roman soldiers and colonial farmers had an important role to play in this story of plant dispersal and changes in the dietary habits of the local populations.